RE-DEVELOPMENT OF TY MAWR,

YNYSDERW ROAD, PONTARDAWE, SA8 4EG

Ground Investigation Report

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0.0 FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

0.1 General

Recommendations made and opinions expressed in the report are based on the strata observed in the excavations, together with the results of site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the Exploratory Holes or which occur between Exploratory Holes. Whilst the report may suggest the likely configuration of strata, both between Exploratory Holes and below the maximum depth of investigation, this is only indicative and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

0.2 Investigation Procedures

Rotary Boreholes have been employed within the project. All Exploratory Hole operations, sampling and logging of soils, rocks and in-situ testing complies with the recommendations of the British Code of Practice BS 5930:2015+A1:2020 'Site Investigations', British Code of Practice BS 10175:2011+A1:2020 'Investigation of Potentially Contaminated Sites' and BS 1377:1990 (as updated), 'Methods of Test for Soils for Engineering Purposes'.

0.3 Routine Sampling

Representative bulk disturbed and environmental samples of the different strata are taken following completion of logging. These samples are sealed and labelled in clear plastic bags and 2kg plastic tubs. Soil samples obtained for environmental testing are sampled and sealed in borosilicate amber jars or in specialist vessels where required. All samples are returned from site to QGL's facility for controlled storage within 24 hours of sampling to await test scheduling/ requirements.

0.4 In-Situ Testing, Surveying & Instrumentation

In-situ testing comprised:

- SPT testing

0.5 Groundwater

Where possible, the depth of entry of any influx of groundwater is recorded during the course of boring operations. The rate of inflow into the borehole is monitored during the course of drilling procedures. Upon encountering any water strikes, work is temporarily halted and the water levels monitored for a standard twenty-minute period recording the change in water level at the end of the twenty minutes.

Groundwater conditions observed in the excavations are those appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

0.6 Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded. Unless otherwise instructed or detailed within the Contract, all soil and/or rock samples not tested will be discarded 28 days after submission of the approved final report.

1.0 INTRODUCTION

1.1 General

Upon the instruction of T.A.D.Builders Ltd (the Client), Quantum Geotechnic Ltd (QGL) has been commissioned to undertake a supplementary Ground Investigation for a proposed extension to the existing building and redevelopment of Ty Mawr, Ynisderw Rd, Pontardawe.

In this interpretative report, a factual account of the fieldwork, details of the strata encountered including any groundwater observations is provided. Guidance and recommendations on geotechnical and geo-environmental matters are provided along with details on any constraints highlighted to aid design of the new scheme.

1.2 Purpose of Ground Investigation

Site investigation is required to provide additional information to allow the foundations to be designed for the development.

The intrusive investigation works comprised of two rotary boreholes, four trial pits, along with geotechnical testing.

A previous investigation has been carried out on the site on behalf of the end client. The investigation could not penetrate the dense shallow soils proved and highlighted certain constraints that required additional analysis. The report prepared by Earth Science Partnership (reference: ESP.8293.02.3827 'Ty Mawr, Pontardawe. Proposed Residential Development Exploratory Investigation'). The ESP report should be read in conjunction with this Report.

1.3 Scope of Work

The general scope of work undertaken in the preparation of this assessment was as follows:

- Conduct an intrusive ground investigation with the aim to identify the underlying ground conditions targeting the issues that could potentially impact the proposed development.
- Carry out laboratory testing to gain further geotechnical and geo-environmental data.
- Provide an interpretative report presenting an analysis of the available information and offering recommendations for the new foundation with regards to geotechnical parameters, an updated conceptual site model and a ground gas risk assessment.

General notes on the techniques employed by Quantum Geotechnic are described in the Foreword together with the limitations inherent in carrying out ground investigation work.

2.0 SITE DETAIL

2.1 Site Description

The site is located on Ynysderw Road on the southern outskirts of Pontardawe with a postcode SA8 4EG.

The site is occupied by an existing two-storey buildings associated with the former tinplate works in this area. Relatively flat grassed areas form the southern and eastern parts of the site.

The National Grid Reference of the site centre is 272265E 203635N. The level of the site is approximately 32mOD.

An aerial view of the site from current on-line mapping is presented below.

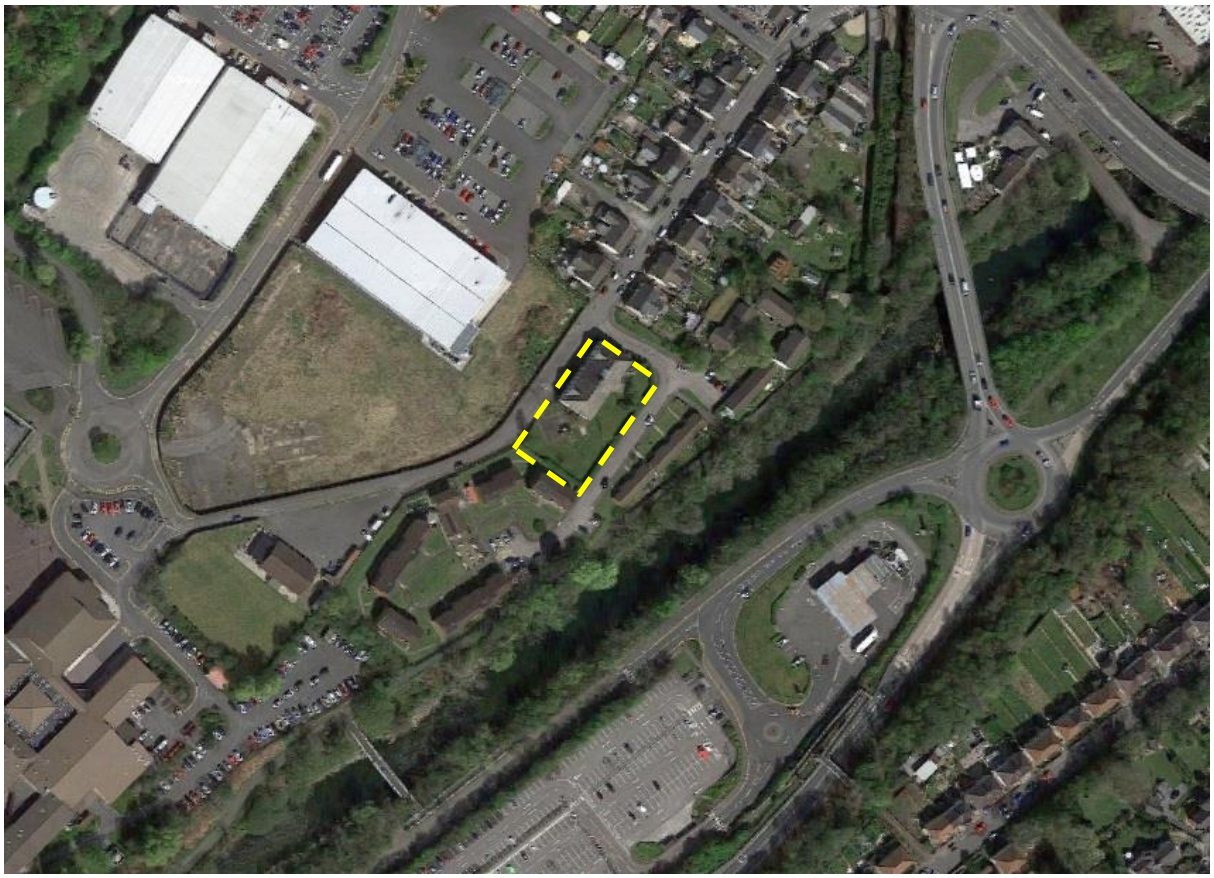


Figure 1: Site Location [Not to Scale] © GoogleMaps Accessed 2024

2.2 Published Geology

Details of the geology of the site are provided by British Geological Survey (BGS) Sheet SN70SW at 1:10,560 scale, and BGS's online resource Geology of Britain Viewer.

From the BGS mapping, the site is shown to be mantled by Alluvium; clay, silt, sand and gravel. Alluvial Fan Deposits (sand and gravel) are mapped close to the north-west and Glaciofluvial sand and gravel to the south-east.

Published geological records do not indicate the likely thickness of the soil cover. Given the industrial history

of the immediate area, Made Ground is highly likely to be present on the site.

The geological mapping indicates the site to be underlain by solid strata from the Brithdir Member, predominantly Sandstone, from the Upper Coal Measures. The Swansea valley Fault passes close to the north-west of the site.

An extract of the geological map is presented below.

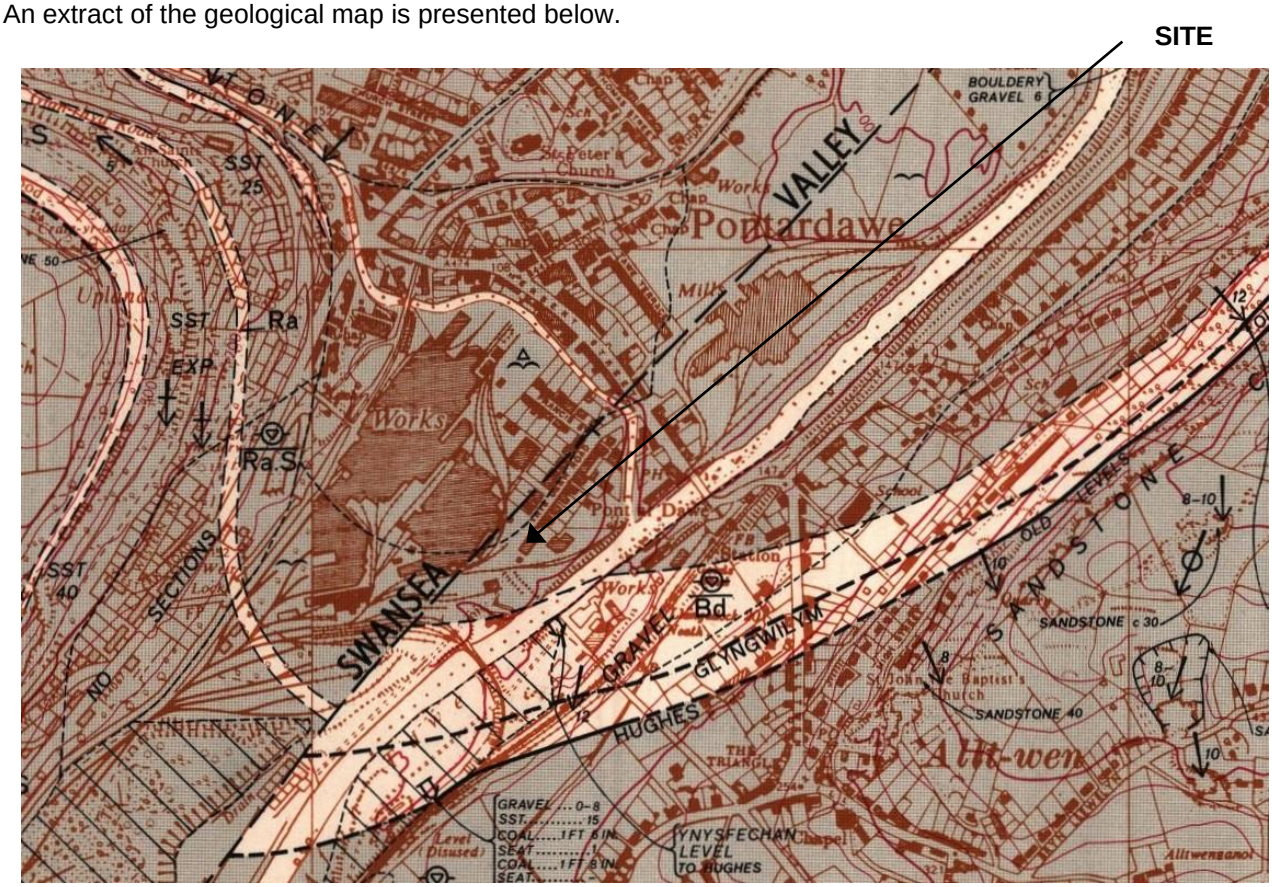


Figure 2: BGS Sheet SN70SW Extract ©NERC [Not to Scale]

3.0 FIELDWORK

3.1 General

The fieldwork was carried out between 13th and 21st November 2023. Supervision was provided by a Chartered Engineering Geologist from QGL.

The exploratory hole location was surveyed by a CAT4 Cable Avoidance Tool prior to breaking ground.

A summary of the fieldworks is outlined below:

- 2 No. Rotary Boreholes
- In-situ testing, by SPT in Boreholes
- 4 No. machine excavated Trial Pits
- Logging of all samples

3.2 Exploratory Hole Location

The exploratory hole locations were set out by a QGL Engineering Geologist to maximise coverage f the area of the proposed new building, considering existing structures and services. borehole log details the approximate National Grid Coordinates and ground level to Ordnance Datum based on extrapolation from client plans.

An Exploratory Hole Location Plan is presented in Appendix I.

3.3 Rotary Boreholes

The boreholes were drilled using a Comacchio MC450P rotary rig. The borehole was progressed through the superficial deposits by open hole methods, with samples recovered from flush returns with casing the borehole as drilling progressed to maintain the stability of the borehole.

Repeated attempts were required to progress the borehole at the position of BH2 as metal obstructions were encountered in the made ground.

Table 1: Summary of Boreholes

Exploratory Hole ID	Completed Depth (m)	Comments
BH01	16.10	Completed in Medium dense/Dense Gravels
BH02	2.00	Terminated on metal obstruction
BH02A	0.70	Terminated on metal obstruction
BH02B	3.00	Terminated on metal obstruction
BH02C	14.60	Completed in Medium Dense Silt

The recovered samples were logged in accordance with BS5930:2015+A1:2020; BS EN ISO 14688-1:2018 and BS EN ISO 14688-2:2018, by a QGL Engineering Geologist.

3.3 Trial Pits

A total of four trial pits were excavated by 14T tracked excavator. The trial pits were unsupported.

This method of investigation allows direct sampling of the near surface deposits for identification purposes as

well as assessment of any salient features and Made Ground or disturbed ground. The trial pits were logged in accordance with BS5930:2015+A1:2020; BS EN ISO 14688-1:2018 and BS EN ISO 14688-2:2018 and supervised at all times by an Engineering Geologist from QGL.

All trial pits were backfilled with compacted layers of arisings upon completion.

Geotechnical samples were taken within the superficial deposits for laboratory testing purposes.

Summary details of the Trial Pits are provided in Table 2 below.

Table 2: Machine Excavated Trial Pit Summary

Exploratory Hole ID	Completed Depth (m)	Notes/Reason for Termination
TP01	2.50	Terminated due to instability
TP02	1.60	Terminated due to obstructions & instability
TP03	1.80	Terminated due to obstructions & instability
TP04	1.70	Terminated due to obstructions & instability

The trial pit logs and photographic records of the excavations are presented in Appendix III.

3.4 In-Situ Testing

3.4.1 Standard Penetration Testing

Standard penetration tests (SPT) were undertaken throughout the superficial deposits in the rotary boreholes at regular intervals.

This is a dynamic test as described in BS1377:1990 Part 9 and as superseded by BS EN ISO 22476-3:2005 +A1:2018 and is a measure of the relative density or consistency of the soil. The records of the SPT tests are included on the borehole log in Appendix II.

The calibration certificate of the SPT hammer is included in Appendix II for reference.

3.5 Standpipe Installations

Standpipes were installed in the two boreholes drilled through the made ground, to allow monitoring of ground gases in the deeper natural (alluvial) soils that could potentially generate ground gases.

The installation details are summarised in the table below.

Table 3: Summary of Gas Monitoring Standpipes

Borehole	Response Zone (m bgl)
BH01	1.00 – 6.00
BH02C	1.00 – 7.00

The results of the monitoring are presented in Appendix VI.

4.0 LABORATORY TESTING

4.1 General

The laboratory testing was scheduled by Quantum and comprised a number of geotechnical tests on selected samples obtained during the investigation.

4.2 Geotechnical Laboratory Testing

All the geotechnical soil testing work was carried out in accordance with the procedures stipulated in the relevant sections of BS 1377:1990 Parts 1 - 9 *Methods of test for soils for civil engineering purposes* and BRE Special Digest SD1 *Concrete in Aggressive Ground*. Table 1 details the tests undertaken.

Table 3: Geotechnical Tests Undertaken

Type of Test	No of Tests
Moisture Content	15
Atterberg Limits (Liquid Limit/Plastic Limit)	5
Rapid Expansion Test of Slag/Fill	2
Loss on Ignition	4
BRE SD1 Suite A	6
BRE SD1 Suite D	4

A full set of geotechnical laboratory test certificates are provided within Appendix IV.

4.2 Geo-Environmental Laboratory Testing

Selected samples from the trial pits were scheduled for testing for a baseline suite of potential contaminants of concern and mobile leachate from the soils. These were as follows:

Table 4: Geo-Environmental Tests Undertaken

Suite	Determinands
Metals & Inorganics:	Arsenic, Boron, Cadmium, Chromium Hexavalent, Chromium III, Copper, Lead, Mercury, Nickel, Zinc, Organic Matter, pH, Sulphate (Total & Sol.), Sulphide, Chloride, Cyanide Total/ Free & Asbestos (presence)
Organics:	Phenols, Total Petroleum Hydrocarbons (TPH) (CWG method incl. BTEX), Polycyclic Aromatic Hydrocarbons (PAH) - Speciated USEPA 16 Method

In addition to these suites, selected samples were tested for Waste Acceptance Criteria (WAC).

Subsequent to the initial soil and leachate testing, supplementary water samples were taken from the standpipes installed in the boreholes and tested for the same suite of tests as for the leachate testing.

The geo-environmental test result certificates are presented in Appendix V.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 General

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented in Appendix II and III. The following sections summarise the findings of the exploratory hole.

5.2 Ground Conditions

5.2.1 Superficial Deposits

The two boreholes proved a similar succession of soils. Bedrock was not proved within the depth of drilled. This is summarised in the table below.

Table 5: Summary of Strata Encountered

Stratum	BH01		BH02C	
	From	To	From	To
Made Ground	GL	3.2	GL	4.0
Alluvium	3.2	8.0	4.0	7.1
Alluvial Fan/Glaciofluvial	8.0	>16.1	7.1	>14.6

Four attempts were needed around the position of BH02 to penetrate obstructions in the shallow made ground.

All four trial pits terminated in very dense industrial fill: a variably granular gravel, with many cobbles & boulders. The full depth of the Made Ground was not proved in the trial pits.

The alluvium was proved as a medium dense sandy gravelly Silt. This was succeeded by medium dense sandy very gravelly Silt and dense silty sandy Gravel interpreted to be Alluvial Fan Deposits/Glaciofluvial deposits.

5.2.2 Groundwater Conditions

Groundwater was encountered in both boreholes that penetrated the made ground, at depths of 3.5m and 4.0m depth respectively in BH01 and BH02C. Records of the standing water levels within the standpipe installations are included with the monitoring records in Appendix VI.

Groundwater strikes were not noted in the made ground in the trial pits.

The groundwater conditions observed in the borehole are those appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

6.0 GEOTECHNICAL ENGINEERING APPRAISAL

6.1 General

As part of the redevelopment of Ty Mawr, a new building will be constructed at the southern elevation of the existing building. The proposed development plan is included within Appendix I.

Previous investigation of the site made recommendations with respect to determining solutions to potential constraints that the scope of the initial investigation by ESP was not fully able to conclude. These included:

- Undertaking of supplementary, deep, investigation below the proposed extension to allow confirmation of type and likely performance of foundation options, and installation of deeper ground gas wells.
- Consideration of the potential impact of volumetrically unstable (slag) deposits.
- Assessment of potential for spontaneous combustion.

This site investigation was designed to provide supplementary geotechnical information to allow design of an appropriate foundation. This interpretative section discusses the anticipated performance of the foundation in the prevailing ground conditions.

6.2 Engineering Properties of Strata

The strata encountered proved predominantly granular made ground at thicknesses of between 3.2m and 4.0m. The general geotechnical properties of this stratum from laboratory testing are summarised in Table 6 below.

Table 6: Summary of Geotechnical Testing Properties (Made Ground)

Parameter	Units	Min.	Max.	Ave.	Characteristic
Moisture Content	%	20	25	23	23
Atterberg Limits (*Single Sample*):					
Liquid Limit	%	-	53	-	53
Plastic Limit	%	-	21	-	21
Plasticity Index	%	-	32	-	32
Modified Plasticity Index	%	-	29	-	29
Chemical Properties:					
pH Value	Units	7.6	8.3	8.1	8.1
Soluble Sulphate	mg/litre	23	420	126	420
Total Sulphate	%	0.05	0.35	0.14	0.35
Total Sulphur	%	0.18	0.54	0.38	0.54
Water Soluble Chloride	mg/litre	2.7	13.0	6.1	13.0
Water Soluble Nitrate	mg/litre	4.3	8.8	6.0	8.8
Water Soluble Magnesium	mg/litre	-	<20	<20	20
Loss on Ignition	%	10	26	16	16
Mechanical Properties:					
Slag Expansion	%	0.26	0.28	0.27	0.27

The Atterberg Limits tests from an individual sample in TP02 (at 0.5m depth) indicate the cohesive soil is classified as a Clay of High Plasticity (CH).

A graphical summary of the in-situ SPT N values in the borehole is presented over page. The SPT N value recorded in-situ has been corrected for the energy efficiency ratio for the SPT hammer to derive the N_{60} value. This corrected figure has been used in the foundation analysis calculations.

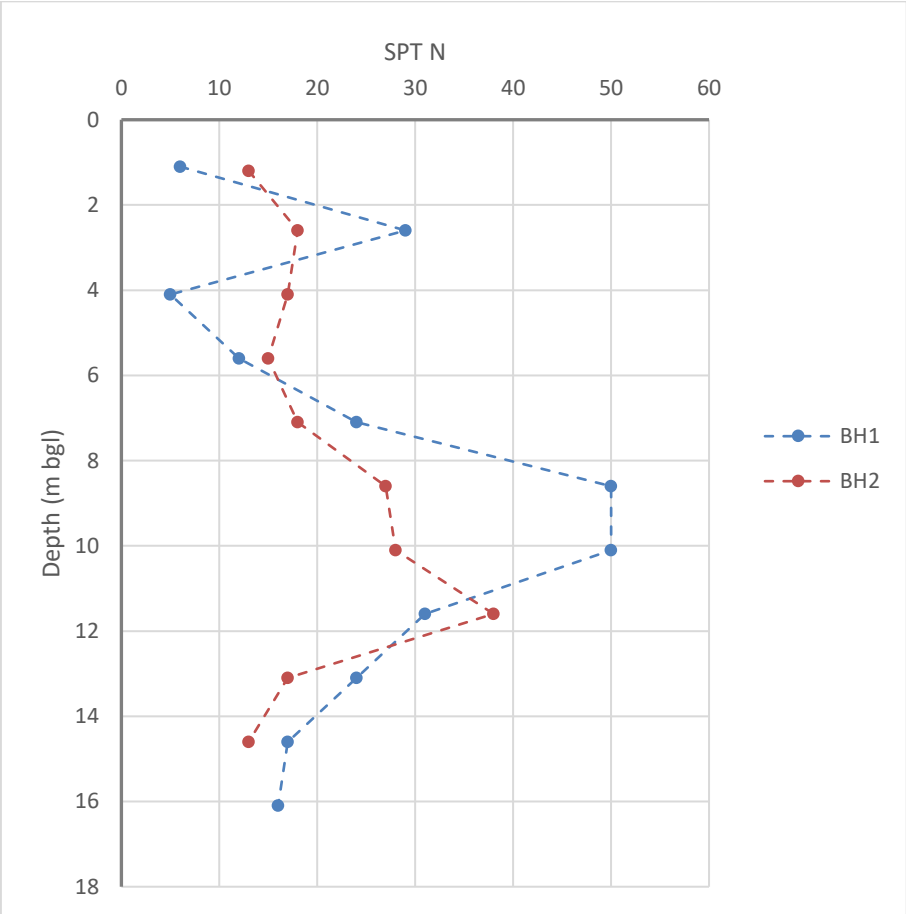


Figure 3: SPT Summary

6.3 Geotechnical Discussion

6.3.1 Foundation Recommendations

From the in-situ testing by SPT the SPT N value rises to a depth of around 10m, then reducing to the base of the boreholes, but still a medium dense relative density.

The Made Ground exhibits variable N values, but is essentially a loose to medium dense granular soil and as such should provide an adequate formation for foundations in relation to bearing capacity. From the shallow N values a *safe* bearing capacity of 75kN/m^2 will be available, but the resulting settlement may be unacceptable and could be differential. We would recommend an allowable bearing capacity of 50kN/m^2 be adopted in any shallow foundations to limit the settlements that may occur.

Considering a shallow raft type foundation; this will stress the soils to a depth of 1.5 times the raft width, i.e. c.9-10m depth. The average N value over this depth range is 16. By conventional settlement analysis, total settlements of up to 20mm can be expected with an imposed load of 50kN/m^2.

We would recommend that the existing variable made ground is removed, the formation proof rolled, and any soft spots removed and replaced by suitable imported granular fill to a depth of <u>at least</u> 500mm beneath the foundation.

If higher loads are anticipated, then piled foundations should be considered with a socket within the granular soils below 6m depth.

6.3.2 Volumetric Instability of Slag/Fill

Two samples of the made ground with slag inclusions were tested for their swelling potential by the rapid slag expansion 14-day test as described in BRE481, Part B, Appendix B.

Both samples recorded minimal expansion of between 0.26% and 0.28%.

These levels of expansion potential will not have a detrimental effect on new foundations or floor slabs.

6.3.3 Combustibility of Soils

As an initial screening approach to the potential combustibility of soils, samples have been tested by the Loss on Ignition method.

Of the six samples tested, the LOI ranged between 10% and 26% with an average of 16%.

As a 'rule of thumb' LOI values below 20% are of a lower risk of spontaneous combustion, which equates to a calorific value of approximately <5kJ/kg (below the commonly accepted threshold of 7kJ/kg for potential smouldering within a soil mass).

Any risk from combustion relies on a source of ignition. In a buried soil that remains in-situ, the risk of ignition remains low. Furthermore, there was no evidence from this phase of investigation of combustible materials in the soils, which concurred with the earlier investigation.

Section 6.3.1 recommends that the proposed raft foundation is placed on a minimum 500mm thick granular fill. This capping will act to sever any link between the atmosphere and the underlying soils which could promote ignition, reducing any risk to acceptable levels.

6.3.4 Concrete Class Designation

The Aggressive Chemical Environment for Concrete (ACEC) classification for the site has been assessed according to the guidelines within BRE Special Digest 1 (2005), Table C2 *Brownfield* setting (due to the presence of made ground). For classification purposes, based on the BRE guidance, the groundwater must be classed as 'mobile' unless proven to be 'static' over a 24hr period.

The pH values of the samples of shallow soils ranged between 7.6 and 8.3. The maximum Total Sulphate value recorded was 0.34%. The levels of water-soluble sulphate (SO_4) content of the tested samples recorded levels up to 420mg/l.

Further testing for soluble Chloride, Nitrate and Magnesium recorded respective maxima of 13mg/l, 8.8mg/l and 20mg/l.

Based on the above where concrete may come into contact with the existing soils on site (BRE SD1, Table C2), the Design Sulphate (DS) class for the site is DS-2, and the Aggressive Chemical Environment for Concrete (ACEC) site classification is AC-2, assuming mobile (but not flowing) groundwater conditions.

6.4 Earthworks

<u>Site Preparation</u>

Any earthworks should be carried out in accordance with BS 6031:2009 Code of Practice for Earthworks. Workmanship for excavation shall comply with BS 8000: Part 1, sections 3.1, 3.2 and 3.3.

Prior to commencing any earthworks / groundworks for the development, any live services on and in the vicinity of the site should be accurately located and protected, or if required diverted.

Any exposed formations should be protected from the effects of the weather, site traffic, or water in order to prevent deterioration of this surface. It is recommended that any exposed formations be protected with a minimum thickness of up to 150mm of suitable granular material or a thin layer of blinding concrete, which should be placed immediately after excavation and exposure.

Cutting and Filling

Cutting and filling *per se* is not envisaged to be required for this development scheme.

Excavation Plant

On the basis of the observations made during the exploratory investigation, it is considered that shallow excavations within the soils can be undertaken by conventional excavation plant, although care should be taken to observe any possible wate strikes within the soils. The preponderance of cobbles and boulders of slag type material would make the ground conditions difficult for an excavator of <14T capacity.

Stability of Excavations

The trial pit excavations carried out as art of this investigation all noted unstable ground to the base of the investigated depth.

Any shallow excavations in the shallow soils cannot be relied on to remain stable even in the short term. Close support should be adopted for any such excavations.

It is advised that any excavations left open for any length of time are protected, owing to the likelihood for ground condition deterioration if exposed to inclement weather.

Control of Groundwater

Groundwater was not encountered during the shallow trial pitting but was noted in the boreholes below the base of the made ground.

Subsequent monitoring of the borehole standpipes measured equilibrium water level depths of 3.70m to 4.16m in BH01 and between 4.28m and 4.77m in BH02C. This would suggest that water will not be encountered in shallow excavations, however, given that the shallow soils are fill material, there is always a risk of perched water tables within the made ground.

Where ground water is encountered in shallow excavations, this may be accompanied by instability and softening of formations but should be able to be controlled by pumping from sumps locally.

7.0 GEO-ENVIRONMENTAL CONSIDERATIONS

7.1 Background

The following Section assesses the findings of the geo-environmental laboratory test results from samples obtained during the supplementary ground investigation. The risks to human health and the environment are both considered herein.

An assessment of the potential risks posed by the soils on site was completed as part of the first phase of investigation. The conclusions in the ESP report should be read in conjunction with this supplementary testing and reporting.

7.2 Initial Investigation Conceptual Site Model

The initial investigation report presented a Conceptual Site Model by way of a risk evaluation matrix with relevant pollutant linkages. In summary this concluded the following:

Table 7: Summary of ESP Risk Matrix

Source-Risk	Pathway	Receptor	Assessed Risk Category	Conclusion/Actions
Potentially Contaminated Shallow Soils	Contact/Ingestion	Site User (Residents)	Moderate/Low Risk	No specific measures for proposed use. No private gardens planned.
		Site Workers	Low Risk	No acute risk. Appropriate PPE & Welfare arrangements needed.
	Leaching of Soil Contaminants	Groundwater	Moderate Risk	Some elevated levels identified. Unlikely these to be regionally significant in context of site area.
		River Tawe	Moderate Risk	
Asbestos in Soils	Inhalation of Fibres	Construction Workers	Low Risk	None Identified. No further action.
Ground Gases	Asphyxiation/ Poisoning. Explosion	Site User	High Risk	Monitoring was ongoing. Recommended further assessment.
		Construction Workers	High Risk	
	Explosion	Building	High Risk	
Radon Gas	Migration into Buildings	Site Users	Moderate/High Risk	Full Radon Protection Measures

The following risk assessment provides supplementary information regarding the building footprint and wider site area and potential risks to site users (residents and construction workers) and controlled waters along with an updated ground gas risk assessment.

7.3 Human Health Risk Assessment

7.3.1 Legislative Background

There have been several major changes in Contaminated Land non-statutory guidance over the past decade, in particular relating to Contaminated Land Regime (CLR) documentation and their derivatives i.e., Soil Guideline Values and Toxicological Reports. In 2006, DEFRA commenced work on their 'Way Forward' exercise which aimed to redefine the way contaminated land is assessed with the aid of devising revamped technical guidance and soil guideline values. A working group of various environmental consultancies/ establishments/ stakeholders set about determining how the non-statutory guidance of CLEA 2002 may be amended to be increasingly user friendly for assessors of contaminated land and ultimately to help in defining whether land qualifies as contaminated land under Part IIA Environmental Protection Act 1990. July 2008 saw the findings of this exercise published. Firstly, the document entitled *'Guidance on the Legal Definition of Contaminated Land'* was published followed closely by the publication of the fourteen measures derived to improve contaminated land non-statutory technical guidance i.e., CLR Publications.

In light of these improvements, the toxicology of various contaminants and therefore the generic soil guideline values, has been revised by EA and DEFRA. The revised paper published in August 2008 is entitled *'Human Health Toxicological Assessment of Contaminants in Soil"*. Based on the findings of this paper, EA are developing a new set of Toxicological Reports and subsequently a new, expanded set of SGV'. Upon publishing, these new SGV's may then be used in assessing risks to human health.

In parallel to much of these developments, in 2006/07 it was recognised that due to the limited number of revised SGVs being produced, the Chartered Institute of Environmental Health (CIEH) co-jointly with Land Quality Management (LQM) researched and developed an additional or alternate set of Soil Guideline Values known as Generic Assessment Criteria (GAC) values, producing GACs for 31 contaminants for Residential, Allotment and Commercial End Land Uses. These new values complete with details of how they were derived and including toxicological datasets was published in a single document 'The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment'.

Following publication of the '*Way Forward'* document in late 2006, LQM/CIEH looked to review their GAC and add to them. By 2009 a 2nd Edition of 'The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment' was published using updated methods and culminated in GAC for 82 substances.

In 2013, a cross-government steering group commenced the development of a new set of Generic Assessment Criteria as driven by DEFRA. The newly derived Guideline Values are termed C4SLs – Category 4 Screening Levels and are considered more pragmatic (but still precautionary) by DEFRA and were proposed as more suitable and sensible comparison values.

In November 2014, the LQM/CIEH produced its third set of Generic Assessment Criteria for 89 potential contaminants as knowledge of toxicity and interaction continued to progress, thus replacing the 2nd Edition with the new publication entitled *'The LQM/CIEH S4ULs for Human Health Risk Assessment'*. This most recent set of GACs are referred to as 'S4ULs' – Suitable for Use Levels'

7.3.2 Human Health Risk Assessment Criteria

For the purposes of Quantum Geotechnic Ltd assessments, the most recent and applicable SGVs, GACs, SU4Ls and C4SLs are used based on site end use and development and overall suitability. These are all referenced within the text. S4ULs take precedence in QGL assessments. Where these are not available or suitable, C4SLs are adopted.

They methodology for assessment of risk from contamination is detailed in Government guidance: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm. This develops the former CLEA approach to human health risk assessment as previously defined in CLR11.

This additional generic human health risk assessment has been undertaken for the proposed development adopting the most applicable model of *Residential End Use Without Plant Uptake* threshold values. While the ESP report adopted *Public Open Space near Residential Properties* criteria, subsequent correspondence from the Local Authority Contaminated Land officer indicated that the residential without plants end use was more appropriate for this particular scheme.

The generic assessment criteria used in this assessment is that presented by LQM/CIEH in their publication *The LQM/CIEH S4ULs for Human Health Risk Assessment (2015)*. The *S4ULs* (Suitable for Use Levels) used have been derived in accordance with UK legislation, national as well as Environment Agency policy and using a modified version of the Environment Agency CLEA software and available guidance provided to the contaminated land practitioner community for the purpose of deriving Generic Assessment Criteria (GAC).

The LQM/CIEH S4ULs are intended for use in assessing potential risks posed to human health by

contaminants in soil and as transparently derived and cautious 'trigger values' above which further assessment or remedial action may be necessary. By using the LQM/CIEH S4AULs, Quantum Geotechnical acknowledges *Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4AUL3409. All Rights Reserved.*

7.4 Soil Sample Test Results Comparisons

The results of chemical laboratory testing on selected soil samples from Natural shallow lying soils are presented and discussed within this Section. No Made Ground was observed during the intrusive investigation.

7.4.1 Heavy Metal and Inorganic Compounds

The results of levels of potential contaminants have been compared to generic assessment criteria as described above, for a residential end use without plant uptake. The test certificates are included in Appendix V. The concentrations of heavy metal and inorganic compounds are summarised in the table below:

Table 8: Summary of Heavy Metals and Inorganic Soil Test Results

Determinant	Results Range (mg/kg)	*LQM/CIEH (2015)* GAC (mg/kg) Resi w/o Plants End Use (1)	Exceedances (Four Samples)
Arsenic	30 – 61	40	2
Boron	<0.40 – 0.45	11,000	0
Cadmium	0.80 -5.8	85	0
Chromium	19 – 40	910	0
Copper	59 – 350	7,100	0
Lead	140 – 750	310	1
Mercury	0.20 – 0.28	56	0
Nickel	21 – 73	180	0
Zinc	210 – 630	40,000	0

Notes:
(1). GAC from LQM/CIEH S4ULs 2015. (2). GAC from LQM/CIEH 2009 & 2015. (3). GAC from DEFRA C4SL.
(4). GAC from at Risk adopting most sensitive end use for acute risk.

7.4.2 Polycyclic Aromatic Hydrocarbons

The results of levels of potential polycyclic aromatic hydrocarbon contaminants have been compared to generic assessment criteria as described, for a residential end use without plant uptake and for a Soil Organic Matter (SOM) content of 6%. The concentrations of speciated Polycyclic Aromatic Hydrocarbon are summarised and compared in Table 9.

Table 9: Summary of Polycyclic Aromatic Hydrocarbon Soil Test Results

Determinant	Site Results Range (mg/kg)	*LQM/CIEH (2015)* GAC Resi w/o Plant End Use (mg/kg)	
		6% SOM	Exceedances
Soil Organic Matter (SOM)	20 – 230		
Acenaphthene	<0.10 – 0.46	6,000	0
Acenaphthylene	<0.10 – 0.21	6,000	0
Anthracene	0.13 – 0.98	37,000	0
Benzo(a)anthracene	0.65 – 3.3	15	0
Benzo(a)pyrene	0.74 – 3.4	3.2	1
Benzo(b)fluoranthene	0.81 – 4.4	4.0	1
Benzo(ghi)perylene	0.77 – 2.4	360	0
Benzo(k)fluoranthene	0.34 – 2.3	110	0
Chrysene	0.73 – 3.1	32	0
Dibenz(a,h)anthracene	0.31 – 1.5	0.32	2
Fluoranthene	0.81 – 4.9	1,600	0
Fluorene	<0.10 – 0.41	4,500	0
Indeno(1,2,3-cd)pyrene	0.52 – 2.8	46	0
Naphthalene	0.32 – 6.6	13	0
Phenanthrene	0.96 – 3.8	1,500	0
Pyrene	0.80 – 3.9	3,800	0

Notes: (1). GAC from LQM/CIEH S4ULs 2015.

7.4.3 Total Phenols

Total Phenols (monohydric) recorded values below detectable limits of <0.10mg/kg.

7.4.4 Petroleum Hydrocarbons

The results of levels of potential petroleum hydrocarbon contaminants have been compared to generic assessment criteria as described, for a residential end-use without plant uptake and for a Soil Organic Matter (SOM) content of 6%. The concentrations of speciated volatile (VPH) and extractable (EPH) Petroleum Hydrocarbons are summarised and compared in Table 10.

Table 10: Summary of Petroleum Hydrocarbon Soil Test Results

Determinant	Site Results Range (mg/kg)	*LQM/CIEH (2015)* GAC [1] *Commercial End Use* (mg/kg)	
		6% SOM	Exceedances
Organic Matter Content	20 – 230		
VPH – Aliphatic C5-C6	<0.05	160	0
VPH – Aliphatic >C6-C7	<0.05	530[2]	0
VPH – Aliphatic >C7-C8	<0.05	530[2]	0
VPH – Aliphatic >C8-C10	0.13 – 0.18	150	0
EPH – Aliphatic >C10-C12	<2.0	770	0
EPH – Aliphatic >C12-C16	<1.0 – 1.2	4,400	0
EPH – Aliphatic >C16-C21	<2.0	110,000[3]	0
EPH – Aliphatic >C21-C35	<3.0	110,000[3]	0
EPH – Aliphatic >C35-C40	<10	110,000	0
VPH – Aromatic >C5-C7	<0.05	1,400	0
VPH – Aromatic >C7-C8	<0.05	3,900	0
TPH – Aromatic >C8-C10	<0.05	270	0
EPH – Aromatic >C10-C12	<1.0 – 1.1	1,200	0
EPH – Aromatic >C12-C16	<1.0 – 1.9	2,500	0
EPH – Aromatic >C16-C21	3.5 – 13	1,900	0
EPH – Aromatic >C21-C35	8.6 – 170	1,900	0
EPH – Aromatic >C35-C40	<1.0 – 41	1,900	0

Notes: <1.0(1). GAC from LQM/CIEH S4ULs 2015. (2) Combined Total for C6 – C8 Aliphatic range. (3) Combined Total for C16 – C35 Aliphatic range

7.4.5 *Asbestos*

Four soil samples were sent for routine Asbestos testing and identification. Asbestos was not detected in any samples.

7.5 Environmental Risk Assessment

The following section presents the findings of the soil leachate test results and provides assessment in relation to risks to the environment, particularly controlled waters.

7.5.1 Test Criteria

The risk to controlled waters, i.e., nearby watercourses and groundwater, is defined by the potential for any contaminants present on site to leach from the soils beneath the site and into the groundwater body.

4 No. soil sample obtained from the natural soils were tested using the leachate method to determine if any potential contaminants held within the soils are leachable. Subsequent to the leachate testing results, additional samples were taken from the standpipe installations to better characterise the ground water quality. The result ranges for both leachate and groundwater are presented together with the threshold levels given by the United Kingdom Drinking Water Standards (UKDWS) as well as the relevant Environmental Quality Standards (EQS) guideline values.

7.5.2 Soil Leachate Test Results Comparisons

Table 11 over page presents the summarised findings of the soil leachate testing undertaken compared to relevant assessment criteria where limits are proscribed. The test certificates are included in Appendix V.

Table 11: Summary of Leachate Chemical Analysis

Determinant	Units	Site Results Range (µg/l) Leachate	Environmental Quality Standards – Freshwater[1]	UK Drinking Water Standards[2]	Exceedances
Arsenic	µg/l	0.73 – 4.5	50	10	0
Cadmium	µg/l	<0.11	5	5	0
Chromium (Hex)	µg/l	<20	150[3]	50	0
Copper	µg/l	<0.5 - 11	22[3]	2000	0
Lead	µg/l	<0.5 – 5.0	10[3]	10	0
Mercury	µg/l	<0.05	1	1	0
Nickel	µg/l	0.54 – 1.5	100[3]	20	0
Zinc	µg/l	7.1 – 13	50[3]	5000	0
Naphthalene	µg/l	<0.10	*10*	*Not Available*	0
Fluoranthene	µg/l	<0.10	*0.02*	*Not Available*	0
Benzo(a)pyrene	µg/l	<0.10	*0.03*	*0.001*	0

[1]Figures for Environmental Quality Standards (EQS) are Annual Average Concentrations derived from the Environment Agency [2]UK Drinking Water Standards taken from; Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) (as amended), and Water Supply (Water Quality) Regulations 2000 (SI 2000/3184) (as amended). [3]Hardness Banding to be applied, mid hardness utilised of 100mg$CaCO_3$/l– using Table 2b: EGS for hardness related List 2 dangerous substances, EC Dangerous Substances Directive (76/464/EEC). NT – Not Tested. I/S – Insufficient Sample, NYS – Not Yet Specified

7.5.3 Groundwater Test Results Comparisons

Table 12 below presents the summarised findings of the soil leachate testing undertaken compared to relevant assessment criteria where limits are proscribed. The test certificates are included in Appendix V.

Table 12: Summary of Groundwater Chemical Analysis

Determinant	Units	Site Results Range (µg/l) Groundwater –	Environmental Quality Standards – Freshwater[1]	UK Drinking Water Standards[2]	Exceedances
Arsenic	µg/l	< 0.15 – 0.16	50	10	0
Cadmium	µg/l	< 0.02	5	5	0
Chromium (Hex)	µg/l	< 5.0	150[3]	50	0
Copper	µg/l	1.1 – 1.5	22[3]	2000	0
Lead	µg/l	< 0.05	10[3]	10	0
Mercury	µg/l	< 0.5	1	1	0
Nickel	µg/l	< 0.5	100[3]	20	0
Zinc	µg/l	2.0 – 2.2	50[3]	5000	0
Naphthalene	µg/l	< 0.01	*10*	*Not Available*	0
Fluoranthene	µg/l	< 0.01	*0.02*	*Not Available*	0
Benzo(a)pyrene	µg/l	< 0.01	*0.03*	*0.001*	0

[1]Figures for Environmental Quality Standards (EQS) are Annual Average Concentrations derived from the Environment Agency [2]UK Drinking Water Standards taken from; Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) (as amended), and Water Supply (Water Quality) Regulations 2000 (SI 2000/3184) (as amended). [3]Hardness Banding to be applied, mid hardness utilised of 100mg$CaCO_3$/l– using Table 2b: EGS for hardness related List 2 dangerous substances, EC Dangerous Substances Directive (76/464/EEC). NT – Not Tested. I/S – Insufficient Sample, NYS – Not Yet Specified

7.6 Recommendations on Contaminated Land

7.6.1 Human Health Risk of Site End Users

The ground investigation testing has revealed isolated occurrences of raised contaminants when compared to the risk to end users in a residential setting without plant uptake. Adopting the criteria for a Public Open Space near residential land would return no exceedances.

Notwithstanding this, in using the slightly more erroneous criteria, the concentrations of Arsenic and Lead in

two locations was slightly elevated.

All soil test results for the remaining heavy metals, Petroleum Hydrocarbons, PAH, and Phenols potential contaminants tested fell within the respective SGV or GAC assessment values for a residential without plant uptake end use scenario. In addition, no Asbestos was detected in the testing.

This in itself does not present an unacceptable risk to the site users but can be adequately mitigated by ensuring adequate soil cover is present in areas of landscaping, rendering the risk to the residents to acceptable levels. The remedial options available are discussed in Section 7.9.

7.6.2 Human Health Risks during Construction

The concentrations of potential contaminants of concern all fell below the generic assessment criteria for a commercial end use, which is widely accepted as the most appropriate for site work. No particular measures are therefore considered necessary as regards site workers.

With all construction schemes involving earthworks in potential Made Ground precautions should be undertaken should any varying Made Ground or contaminated land be encountered. Operatives working with, or likely to come into contact with Made Ground with the potential to harness raised concentrations of contaminants, should observe particular precautions concerning personal hygiene. They should be issued with the appropriate personal protective equipment and should be instructed in safe working methods.

Instructions should be issued in the recognition of potentially hazardous materials including oily and odorous soil and water and also any discoloured or fibrous substances for example. Operatives should be warned to avoid contact between hands and mouth before washing. The consumption of food must be confined to designated clean areas with suitable welfare including washing facilities should be provided.

7.6.3 Risk to the Environment and Controlled Waters

The risk to controlled waters, i.e., nearby water courses, is defined by the potential for any contaminants present on site to either leach from the soils beneath the site onto controlled waterways or indeed historic trapped contaminated waters within the shallow soils migrate to controlled waterways.

Soil leachate testing carried out as part of this investigation revealed no raised contaminants compared to Environmental Water Standard for freshwater, although the detection limits of certain potential contaminants were above the relevant criteria threshold.

To address this and to better characterise the groundwater quality beneath the site, supplementary testing of the groundwater taken from the borehole standpipe installations has also been carried out (see Table 12). The results all fell below the environmental quality standard for freshwater.

Considering both the leachate test results and these most recent groundwater test results, it is considered that there is a very low risk to the groundwater and controlled waters from any potential contaminants that may be present in the shallow soils.

While the initial ground investigation did record some slightly elevated levels of PAHs relative to surface water and groundwater standards, considering the most recent test results and the historic land use and industrial setting of the wider area, it is unlikely that the previously recorded levels of mobile contamination are significant regionally.

7.6.3 Groundwater Risk From SuDS Drainage

SuDS drainage is proposed to be utilised on the site. On the basis of the leachate test results and the groundwater testing, there is a low risk from the mobilisation of any potential contaminants from percolation of surface run-off through the soils to an extent that would impact controlled waters.

7.7 Ground Gas Risk Assessment

The ground gas risk assessment contained within the initial ESP ground investigation report was presented without the benefit of the full set of gas monitoring results. The client has passed these on to Quantum and we have included these with our updated gas risk assessment which includes gas flows and concentrations from the deeper alluvial soils undertaken by ourselves.

7.7.1 Gas Concentrations

ESP Investigation

The gas monitoring certificates from the monitoring of shallow standpipes with response zones within the made ground are presented along with Quantum's monitoring in Appendix VI.

A summary of the readings is tabulated below which presents the maximum peak and steady-state concentration and maximum flow rate recorded over the monitoring period of six visits between December 2022 and April 2023.

Table 12: Summary of ESP Gas Monitoring (Made Ground)

ESP BH	Response Zone (m bgl)	Max. Gas Flow Litres/Hour	Max Methane % CH_4	Max. Carbon Dioxide % CO_2
201	0.5 – 1.3	0.4	0.0	0.8
202	0.5 – 1.7	0.1	0.0	0.9
203	0.5 – 1.4	0.5	0.1	0.9

Quantum Investigation

As part of the second phase of ground investigation, gas monitoring standpipe installations were placed in the two boreholes that penetrated the made ground.

Spot readings of gas concentrations were taken over a three-month period following completion of the ground investigation.

Table 13: Summary of Quantum Gas Monitoring (Alluvium)

Quantum BH	Response Zone (m bgl)	Max. Gas Flow Litres/Hour	Max Methane % CH_4	Max. Carbon Dioxide % CO_2
BH01	1.0 – 7.0	0.1	0.4	1.1
BH02C	1.0 – 8.0	0.0	0.4	1.0

The results from within the alluvial soils show maximum Methane concentration (CH_4) of 0.0%v/v and Carbon Dioxide concentrations (CO_2) of 1.1%v/v. Maximum measured flow rate was recorded as 0.1 litres/hr. Oxygen (O_2) levels ranged between 19.9% and 21.2%v/v. Carbon Monoxide (CO) and Hydrogen Sulphide (H_2S) both recorded 0ppm.

7.7.2 Updated Gas Risk Assessment

The potential risks posed by any recorded presence of potentially harmful gases can be assessed on a semi-quantitative basis by reference to the guidance in documents CIRIA 665 and BS8485. The assessment comprises multiplying the maximum measured steady gas flow rate (expressed as litres per hour) by the maximum steady gas concentration (expressed as percentage-by-volume; divided by 100) to derive a Gas Screening Value (GSV).

Considering the concentrations measured in the made ground in the shallow window sample borehole installations, the maximum Methane concentration over the whole monitoring period was 0.1% with a maximum gas flow of 0.5ltr/hr . The Methane case GSV is therefore calculated as 0.0005.

Likewise considering the Carbon Dioxide concentrations measured in the made ground in the shallow window sample borehole installations, the maximum concentration over the whole monitoring period was 0.9% with a maximum gas flow of 0.5ltr/hr. The Carbon Dioxide case GSV is therefore calculated as 0.0045.

For the deeper wells installed by Quantum with the response zone within the alluvial soils, the maximum Methane concentration over the whole monitoring period was 0.4% with a maximum gas flow of 0.1ltr/hr. The Methane case GSV is therefore calculated as 0.0004.

Likewise considering the Carbon Dioxide concentrations measured in the made ground in the shallow window sample borehole installations, the maximum concentration over the whole monitoring period was 1.1% with a maximum gas flow of 0.1ltr/hr. The Carbon Dioxide case GSV is therefore calculated as 0.0011.

Adopting the worst-case scenario from all calculated GSV's in all cases, the resulting assessment is: *Very Low* risk classification. This indicates a characteristic situation of CS1.

The foundation and construction detail should conform to the requirements for a level of protection for the CS1 case in accordance with BS 8485:2015+A1:2019.

7.8 Review of Risk Matrix / Conceptual Site Model

The supplementary investigation findings have been used to update the risk matrix presented in the initial ground investigation for the scheme.

Source-Risk	Pathway	Receptor	Pre 2nd GI Risk Category	Current Risk Level / Observations
Potentially Contaminated Shallow Soils	Contact/Ingestion	Site User (Residents)	Moderate/Low Risk	**Low - Moderate Risk**. Slightly elevated selected heavy metal concentrations have been identified. Mitigation measures such as suitable clean soil cover should be implemented.
		Site Workers	Low Risk	**Low Risk**. No acute risk. Appropriate PPE & Welfare arrangements needed.
	Leaching of Soil Contaminants	Groundwater	Moderate Risk	Some elevated levels identified in initial GI. No elevated concentrations in 2nd GI from leachate or groundwater. **Low Risk**
		River Tawe	Moderate Risk	
Asbestos in Soils	Inhalation of Fibres	Construction Workers	Low Risk	No further action. **Low Risk**
Ground Gases	Asphyxiation/ Poisoning. Explosion	Site User	High Risk	Gas Risk Assessment concludes CS1 classification. **Low Risk**
		Construction Workers	High Risk	
	Explosion	Building	High Risk	
Radon Gas	Migration into Buildings	Site Users	Moderate/High Risk	Full Radon Protection Measures

The conclusions to be drawn from the revised Conceptual Site Model are that a low risk exists to groundwater and controlled waters from residual contamination in the soils or groundwater body. A low risk is also concluded from potentially harmful ground gases.

A low to moderate risk could be realised from possible contamination from heavy metals in soils to the site end users adopting a residential end use without plant uptake scenario, as indicated to be more applicable by the

Local Authority CLO.

7.9 Remediation Options Appraisal

In order to address the potential risk from contamination within the soils to the site end users, some form of mitigation should be considered to sever the linkage between source (the soils) and receptor (end users).

This can be achieved by adoption of a cover system. There are two broad categories of cover system available for use in the remediation of contaminated land: an engineered cover system, or a simple cover system. The former is used to provide complete separation of receptor from the source. These can limit upward migration of contaminants and control downward infiltration of water. The soils have been found to only be marginally above the adopted assessment criteria threshold, and the groundwater has been concluded to not be impacted by leachable contamination. Therefore a simple cover system would seem to be appropriate in this case.

A simple cover system provides a reduction of risk to human health and to provide a suitable medium for plant growth.

As a general rule, a cover system of 600mm in garden areas is recommended by Local Authorities. As this development will not include private garden areas and where vegetable growth will not take place, then a *minimum* cover system layer of 450mm may be applied.

If no planting of vegetables is permitted as part of the development, the need for a no-dig barrier, such as a separating membrane, is not warranted.

Any soils imported to form the cover system will require to be tested or certified that they are ‘suitable for use’.

In accordance with the Welsh Land Contamination Working Group publication ‘Requirements for the Chemical testing of Imported Materials for Various End Uses and Validation of Cover Systems’ the number of representative samples required for analysis is dependent on the volume of each source soil.

The document states: “It is strongly recommended that, before importing any material to site, the intended sampling regime for that material is discussed and agreed in advance with the Local Authority LPA/CLO/EHO”

Sampling and analysis of the soil/aggregate/stone once imported will be required in addition to any taken at source.

The thickness of the soil cover layer will require validation.

8.0 REFERENCES

British Geological Survey:

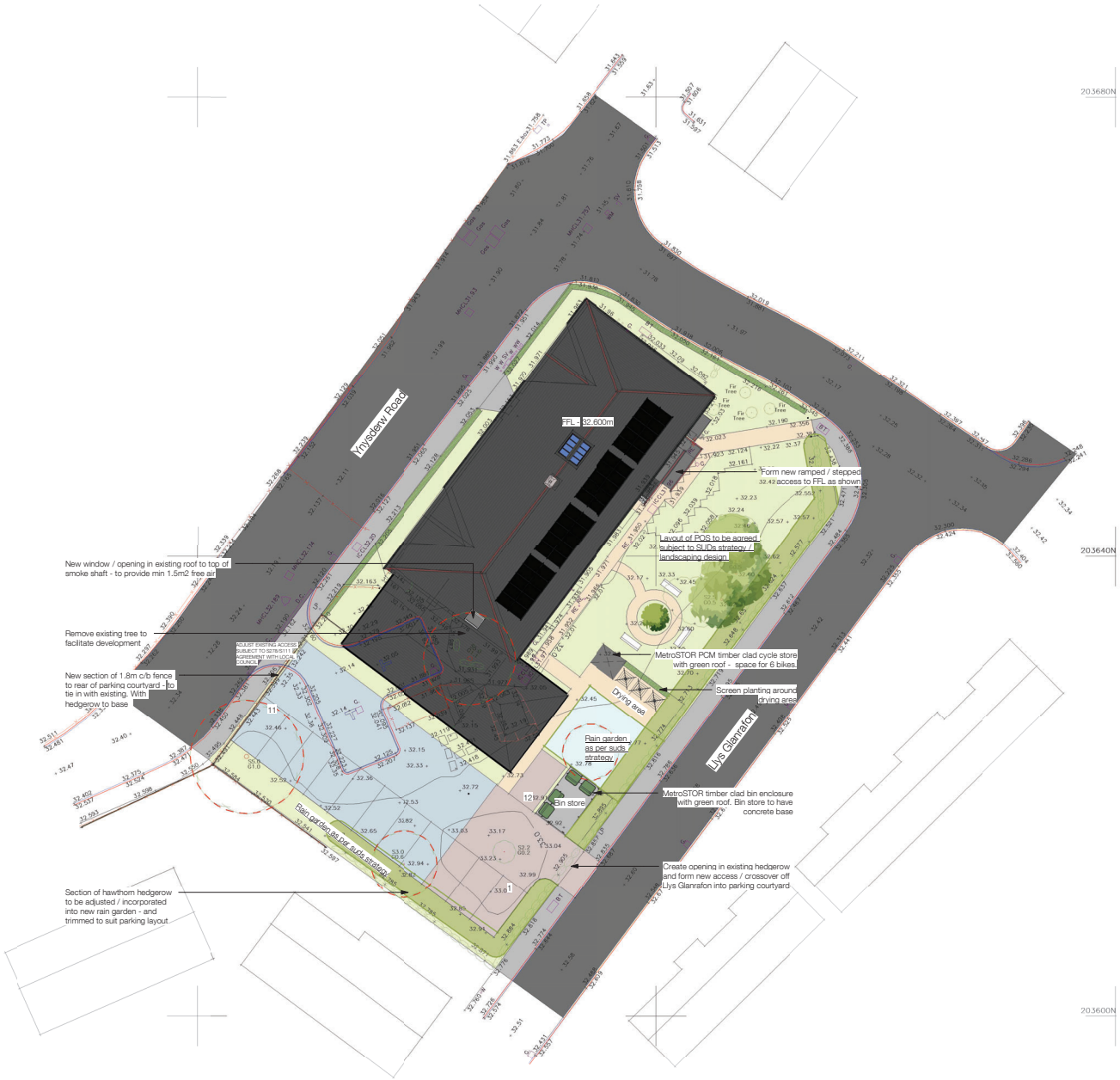
- British Geological Survey (BGS) Sheet SN70SW at 1:10,560 scale
- BGS Lexicon of Named Rock Units (www.bgs.ac.uk/lexicon)
- BGS Geology of Britain Viewer (www.bgs.ac.uk)

Specialist Publications: -

- BS 5930:2015+A1:2020 *'Code of Practice for Site Investigations'*
- BS 1377:1990 *'Methods of test for soils for civil engineering purposes'*
- BS 10175:2011+A2:2017 *'Code of Practice for Investigation of Potentially Contaminated Sites'*
- BS EN ISO 14688-1:2018 *Geotechnical investigation and testing. Identification and classification of soil. Identification and description*
- BS EN ISO 14688-2:2018 *Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.*
- BS EN ISO 14689-1:2018 *Ground Investigation and Testing – Identification and classification of rock*
- Health and Safety Executive Guidance Note EH40/90
- BRE (2005) Special Digest 1:2005, 3rd Edition, Concrete in aggressive ground. BRE, Garston.
- BS 6031: 2009 Code of Practice for Earthworks.
- ICE UK Specification for Ground Investigation Second Edition.
- Specification for Highways Works Series 600 Earthworks.
- LCRM website https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
- LQM/CIEH S4ULs for Human Health Risk Assessment (2015).
- Welsh Land Contamination Working Group (2013) 'Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems'
- BRE 465 'Cover Systems for Land Regeneration, Thickness of Cover Systems for Contaminated Land' (2004).

APPENDIX I – SITE PLANS

Revisions



Proposed site plan

1 : 200

Hard & Soft landscpaing key

- Red brindle colour Tobermore Hydropave Pedesta permeable block paving to parking courtyard with kerb edgings - extend of permeable paving as per SUDs layout
- Red brindle Tobermore block paving (non-permable) to parking courtyard
- Tobermore Tegula block paving to paths / gardens (exact colour to be agreed)
- Indicates grassed areas - Provide topsoil and turfing as section Q30 and D20
- Indicates rain gardens as per SUDs strategy (See engineering / landscaping layout for full details)

- See Catherine Elchal landscaping layouts for detail of all planting / species

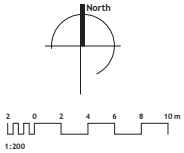
- See Hydrock drawings for details of SUDs strategy

Schedule of accommodation

6no. 2b3p Apartments
6no. 1b2p Apartments

Total 12 homes

12 Parking spaces
Bin store
Amenity space



Notes

Do not scale from this drawing. Use figured dimensions only, which are displayed in millimeters unless stated otherwise.
The contractor is requested to check all dimensions before work is put in hand. Any discrepancies within the drawing should be reported prior to commencement of works.

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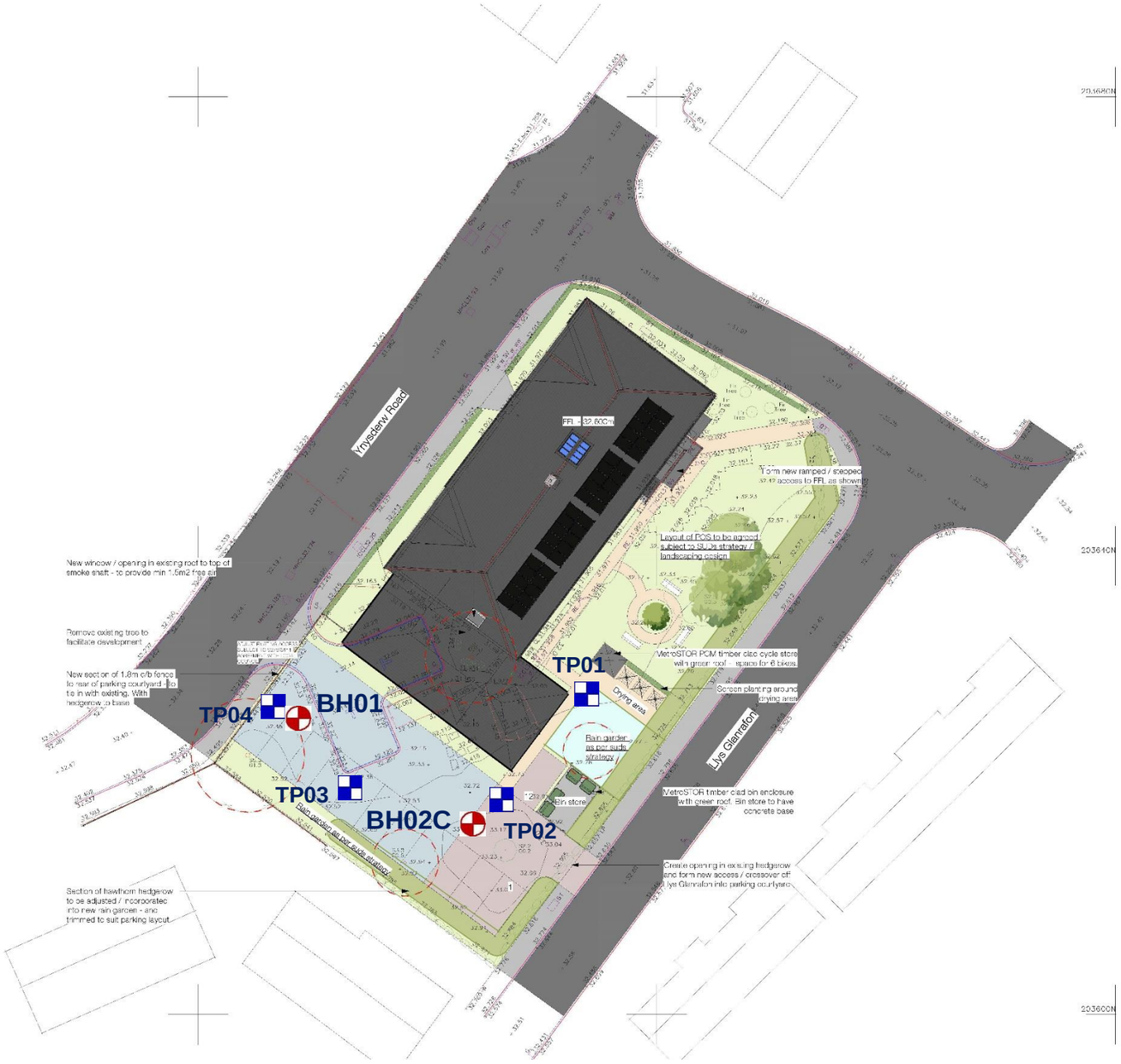
Project	TY MAWR, PONTARDAWE
Project number	N331 - T
Client	POBL GROUP LTD
Title	Proposed site plan
Drawing number	A055
Scale	1 : 200 at A1
Revision	
Status	TENDER
Drawn	MM
Date	25.03.2023



Quantum Geotech	**Quantum Geotechnic Ltd** Plas Newydd, Llanedi Pontarddulais, Swansea, SA4 0FQ ✉:enquiries@quantumgeotech.co.uk	**Project: TY MAWR, PONTARDAWE**	No: Q1422	Date: Nov'23
		DRAFT EXPLORATORY HOLE LOCATION PLAN		Drawn By: JS
				Scale: NTS
				Figure No: 1

APPENDIX II – ROTARY BOREHOLE LOGS

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH01

Dates : 11/13/23 - 11/14/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level : 32.40 m A.L.D. *Level to Local Datum*

Coordinates: *Approximate Co-ordinates Only* 272248.00 E 203626.00 N *Co-ordinates to Local Grid*

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Insitu Tests: Depth	Test Results	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water	Install/ Backfill
0												Loose to medium dense dark grey sandy angular fine to medium GRAVEL (Colliery Spoil) [MADE GROUND]				
1							1.1	SPT (S) 6 (2-1-**2-1-1-2**)	1.10 1.10 - 2.60	D1 D2	(3.20)	Becoming fine to coarse GRAVEL with depth		(3.20)		
2							2.6	SPT (S) 29 (5-2-**5-6-8-10**)	2.60 2.60 - 4.10	D3 D4						
3											3.20	Medium dense grey sandy gravelly SILT [ALLUVIUM]		3.20		
4							4.1	SPT (S) 5 (4-6-**1-2-1-1**)	4.10 4.10 - 5.60	D5 D6	(2.80)			(2.80)		
5							5.6	SPT (S) 12 (3-3-**2-4-3-3**)	5.60 5.60 - 7.10	D7 D8						
6											6.00	Medium dense grey and grey-brown sandy very gravelly (fine to coarse angular to sub angular) SILT		6.00		
7							7.1	SPT (S) 24 (4-5-**9-4-5-6**)	7.10 7.10 - 8.60	D9 D10	(2.60)			(2.60)		
8							8.6	SPT (S) 50/230mm (15-10/65mm-**16-15-17-2/5mm**)	8.60 8.60 - 10.10	D11 D12	8.60	Dense brown and grey slightly silty sandy to very sandy fine to coarse angular to sub-rounded GRAVEL		8.60		
9																

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed
3.50	3.50	Fast Inflow	

Flush

Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

Operator: | Logged By. | Sheet No. 1 Of 2 | m Per Page 10 | All measurements in metres unless otherwise stated | AGS

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH01

Dates : 11/13/23 - 11/14/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level : 32.40 m A.L.D. *Level to Local Datum*

Coordinates: *Approximate Co-ordinates Only* 272248.00 E 203626.00 N *Co-ordinates to Local Grid*

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Insitu Tests: Depth	Test Results	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water	Install/ Backfill
10							10.1	SPT (S) 50/235mm (9-16/35mm-**14-14-15-7/10mm**)	10.10 10.10 - 11.60	D13 D14	(4.40)	Dense brown and grey slightly silty sandy to very sandy fine to coarse angular to sub-rounded GRAVEL		(4.40)		
11							11.6	SPT (S) 31 (4-5-**11-8-7-5**)	11.60 11.60 - 13.10	D15 D16						
12																
13							13.1	SPT (S) 24 (5-5-**6-9-5-4**)	13.10 13.10 - 14.60	D17 D18	13.00	Medium dense dark grey and black SAND and fine to coarse angular to sub-angular GRAVEL (fine to coarse Gravel is coally)		13.00		
14																
15							14.6	SPT (S) 17 (3-4-**4-4-5-4**)	14.60 - 16.10 14.60	D D19	(3.10)			(3.10)		
16							16.1	SPT (S) 16 (4-4-**4-5-3-4**)			16.10	BH terminated at 16.1m depth		16.10		
17																
18																
19																

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
		2 Of 2	10	

AGS

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH02

Dates : 11/14/23 - 11/14/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level :

Coordinates:

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water
0										MADE GROUND...			
										BH terminated at 2m depth on metal obstruction			
1									(2.00)			(2.00)	
2									2.00	BH terminated on Obstruction		2.00	
3													
4													
5													
6													
7													
8													
9													

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
		1 Of 1	10	

AGS

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH02A

Dates : 11/14/23 - 11/14/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level :

Coordinates:

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water
0										MADE GROUND...			
									(0.70)	BH terminated at 0.7m depth on metal obstruction		(0.70)	
									0.70	BH terminated on Obstruction		0.70	
1													
2													
3													
4													
5													
6													
7													
8													
9													

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	10		

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH02B

Dates : 11/14/23 - 11/14/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level :

Coordinates:

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water
0										MADE GROUND...			
										BH terminated at 3m depth on metal obstruction			
1													
									(3.00)			(3.00)	
2													
3									3.00	BH terminated on Obstruction		3.00	
4													
5													
6													
7													
8													
9													

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	10		

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH02C

Dates : 11/14/23 - 11/15/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level : 33.10 m A.L.D. *Level to Local Datum*

Coordinates: *Approximate Co-ordinates Only* 272259.00 E 203619.00 N *Co-ordinates to Local Grid*

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Insitu Tests: Depth	Test Results	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water	Install/ Backfill
0												Loose to medium dense dark grey sandy angular fine to medium GRAVEL (Colliery Spoil) [MADE GROUND]				
1							1.2	SPT (S) 13 (2-1-1-5-3-4)				Becoming fine to coarse GRAVEL with depth				
2											(4.00)			(4.00)		
							2.6	SPT (S) 18 (3-4-5-5-4-4)								
3																
4							4.1	SPT (S) 17 (6-2-5-3-5-4)			4.00	Medium dense grey sandy gravelly SILT [ALLUVIUM]		4.00		
5																
							5.6	SPT (S) 15 (3-5-3-3-4-5)	5.60 - 7.10	D1	(3.10)			(3.10)		
6																
7							7.1	SPT (S) 18 (3-1-3-5-4-6)	7.10 7.10 - 8.60	D2 D3	7.10	Dense brown and grey slightly silty sandy to very sandy fine to coarse angular to sub-rounded GRAVEL {ALLUVIAL FAN DEPOSITS]		7.10		
8							8.6	SPT (S) 27 (5-3-5-6-9-7)	8.60 8.60 - 10.10	D4 D5						
9																

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed
4.00	4.00	Fast Inflow	

Flush

Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech
Tel:
email:

Operator: | Logged By. | Sheet No. 1 Of 2 | m Per Page 10 | All measurements in metres unless otherwise stated | AGS

Contract : Ty Mawr, Pontardawe

Client : TAD Builders Ltd

Borehole No. BH02C

Dates : 11/14/23 - 11/15/23

Location :

Job Number : Q1422

Engineer : Quantum Geotech

Ground Level : 33.10 m A.L.D. *Level to Local Datum*

Coordinates: *Approximate Co-ordinates Only* 272259.00 E 203619.00 N *Co-ordinates to Local Grid*

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Insitu Tests: Depth	Test Results	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	Water	Install/ Backfill
10							10.1	SPT (S) 28 (2-4-6-6-8-8)	10.10 10.10 - 11.60	D6 D7	(6.00)	Dense brown and grey slightly silty sandy to very sandy fine to coarse angular to sub-rounded GRAVEL {ALLUVIAL FAN DEPOSITS]		(6.00)		
11							11.6	SPT (S) 38 (9-9-12-13-6-7)	11.60 11.60 - 13.10	D8 D9						
12																
13							13.1	SPT (S) 17 (5-3-4-3-4-6)	13.10 13.10 - 14.60	D10 D11	13.10	Medium dense grey sandy SILT		13.10		
14											(1.50)			(1.50)		
							14.6	SPT (S) 13 (3-3-3-4-3-3)	14.60	D12	14.60	BH Terminated at 14.6m depth		14.60		
15																
16																
17																
18																
19																

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant:

Remarks:

Quantum Geotech

Tel:

email:

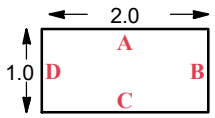
Operator: | Logged By. | Sheet No. 2 Of 2 | m Per Page 10 | All measurements in metres unless otherwise stated | AGS

APPENDIX III – TRIAL PIT LOGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP01
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272273.00 E 203631.00 N *Co-ordinates to Local Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	WATER
	0.50 -	B1 ES1				Grass ove: Loose to compact dark grey and black slightly silty sandy to very sandy (& ashy) angular fine to coarse GRAVEL of colliery spoil, brick, clinker and slag, with some to many COBBLES and some BOULDERS comprising brick, concrete & slag [MADE GROUND] Significant instability and overbreak in pit sides below 0.6m depth			
1	1.00 -	B2			2.50			(2.50)	
2	2.00 -	B3							
					2.50	Pit terminated at 2.5m due to instability		2.50	

PLAN



Groundwater: Dry

Stability: Unstable below 0.6m

Shoring: None

Remarks:

Equipment Used: 9T Tracked Excavator

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP01
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: 272273.00 E *Approximate Co-ordinates Only* 203631.00 N *Co-ordinates to Local Grid*	

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 2 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

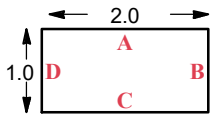
Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP01
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272273.00 E 203631.00 N *Co-ordinates to Local Grid*	

Quantum Geotech	Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 3 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP02
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.70 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272263.00 E 203622.00 N *Co-ordinates to Local Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Legend	Depth (Thick-ness)	WATER
						Grass over: Soft to firm brown and grey sandy (ash) gravelly CLAY. [MADE GROUND]			
					0.60			(0.60)	
	0.50 -	B1 ES1				Base of CLAY varies from 0.5m at W to 0.7m at E ends of Pit			
					0.60	Medium dense to dense dark grey sandy to very sandy (ash) fine to coarse angular GRAVEL and COBBLES of sandstone, brick, concrete, and slag, and some BOULDERS of sandstone, concrete and slag		0.60	
1	1.00 -	B2				Signifcant instability below 0.8m depth and overbreal of pit sides			
					1.00			(1.00)	
	1.50 -	B3				COBBLE & BOULDER content increasing from 1.5m depth			
					1.60	Trial pit terminated at 1.6m depth in dense strata and due to instability		1.60	

PLAN



Groundwater: Dry

Stability: Unstable below 0.8m

Shoring: None

Remarks:

Equipment Used: 9T Tracked Excavator

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP02
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.70 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272263.00 E 203622.00 N *Co-ordinates to Local Grid*	

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 2 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

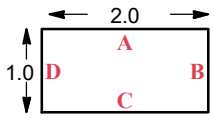
Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP02
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.70 m A.L.D. *Level to Local Datum* Coordinates: 272263.00 E *Approximate Co-ordinates Only* 203622.00 N *Co-ordinates to Local Grid*	

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 3 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP03
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.50 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272254.00 E 203620.00 N *Co-ordinates to Local Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Depth (Thickness)	WATER
					0.40	Loose to medium dense/dense dark grey sandy to very sandy (ashy) fine to coarse angular GRAVEL with some to many COBBLES, of sandstone, brick, and slag [MADE GROUND]		(0.40)	
	0.50 -	B1 ES1			0.40	Medium dense to dense dark grey sandy to very sandy (ash) fine to coarse angular GRAVEL, COBBLES and BOULDERS of sandstone, brick, concrete, and slag [MADE GROUND] Significant instability below 0.7m with large overbreak of pit sides		0.40	
1	1.00 -	B2			1.40			(1.40)	
	1.50 -	B3							
					1.80	Pit terminated at 1.8m depth in dense strata and due to instability		1.80	

PLAN



Groundwater: Dry

Stability: Unstable below 0.7m

Shoring: None

Remarks:

Equipment Used: 9T Tracked Excavator

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd		Trial Pit No. TP03
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.50 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272254.00 E 203620.00 N *Co-ordinates to Local Grid*

Quantum Geotech	Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 2 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

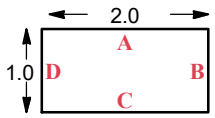
Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP03
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.50 m A.L.D. *Level to Local Datum* Coordinates: 272254.00 E *Approximate Co-ordinates Only* 203620.00 N *Co-ordinates to Local Grid*	

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 3 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP04
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272247.00 E 203627.00 N *Co-ordinates to Local Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Depth (Thickness)	WATER
					0.20	Grass over: tarmacadam (0.05m thick) and dark grey Gravel/Hardcore		(0.20)	
					0.20	[MADE GROUND]		0.20	
	0.50 -	B1 ES1				Medium dense to dense dark grey sandy to very sandy (ash) fine to coarse angular GRAVEL, COBBLES and BOULDERS of sandstone, brick, concrete, and slag [MADE GROUND] Band of brown gravelly SAND at 0.3/0.4m depth on E face of Pit			
1	1.00 -	B2			1.50			(1.50)	
	1.50 -	B3							
					1.70	Pit terminated at 1.7m in dense strata and due to instability		1.70	

PLAN



Groundwater: Dry

Stability: Unstable below 0.7m

Shoring: None

Remarks:

Equipment Used: 9T Tracked Excavator

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	AGS

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP04
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272247.00 E 203627.00 N *Co-ordinates to Local Grid*	

Contract : Ty Mawr, Pontardawe Client : TAD Builders Ltd			Trial Pit No. TP04
Dates : 11/21/23 - 11/21/23 Location :	Job Number : Q1422 Engineer : Quantum Geotech	Ground Level : 32.30 m A.L.D. *Level to Local Datum* Coordinates: *Approximate Co-ordinates Only* 272247.00 E 203627.00 N *Co-ordinates to Local Grid*	

Quantum Geotech Tel: email:	Operator: GRJ	Logged By. J Stark	Sheet No. 3 Of 3	m Per Page	All measurements in metres unless otherwise stated	AGS

APPENDIX IV – GEOTECHNICAL LABORATORY TEST RESULTS

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES
A PHENNA GROUP COMPANY

Contract Number: 69788

Client Ref: **Q1422**
Client PO: **Q1422**

Date Received: **23-11-2023**
Date Completed: **21-12-2023**
Report Date: **21-12-2023**

Client: **Spencer Quantum Ltd**

Contract Title: **Ty Mawr, Pontardawe**
For the attention of: **John Stark**

Test Description	Qty
Moisture Content of Soil (BS1377 : Part 2 : Clause 3.2 : 1990) - * UKAS	1
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	1
Organic Matter Content Sub-contracted Test	6
LOI Sub-contracted Test	6
Water Soluble Sulphate 2:1 extract Sub-contracted Test	6
pH value of soil Sub-contracted Test	6
BRE Full Suite **includes pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate** Sub-contracted Test	4
Determination of the Swelling Potential of Fill Material (Slag Expansion Test 14 day test) BR 481 - Part B - Appendix B	2
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 TBA info@gstl.co.uk https://gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	69788	
Project Name	Ty Mawr, Pontardawe	
Date Tested	08/12/2023	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
TP02	1	B	0.50	-		Brown fine to medium gravelly silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

Operator
Aaron Hodge

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	69788	
Project Name	Ty Mawr, Pontardawe	
Date Tested	08/12/2023	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
TP02	1	B	0.50	-		25	53	21	32	90	CH High Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							
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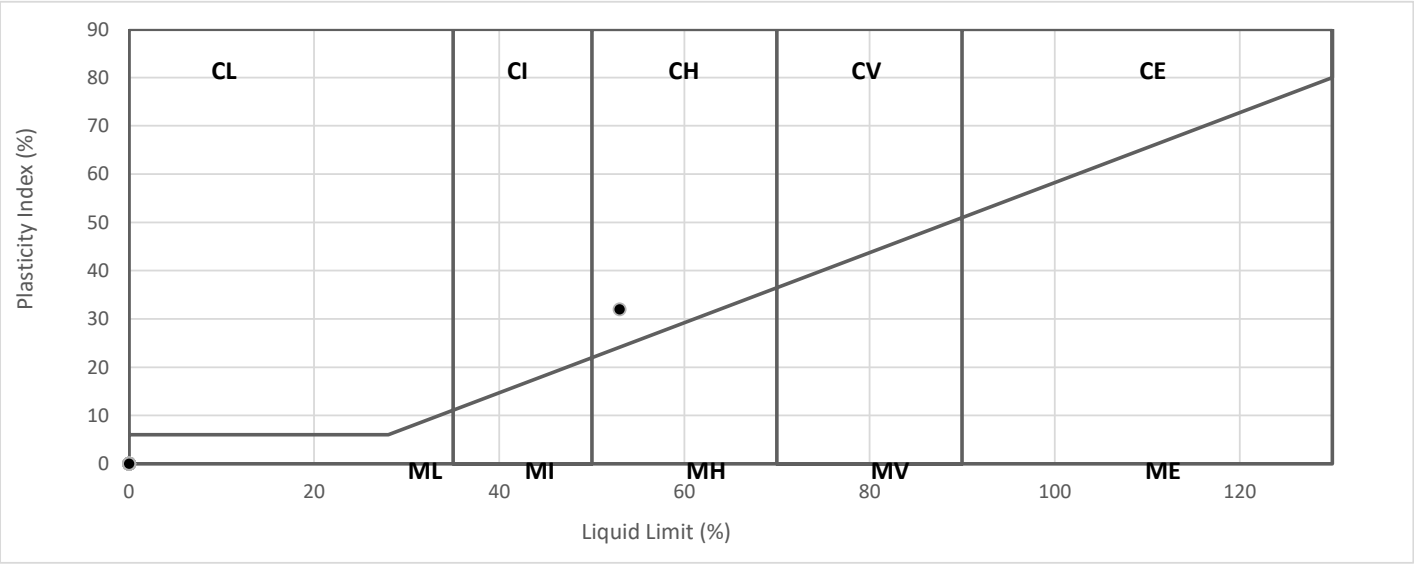
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



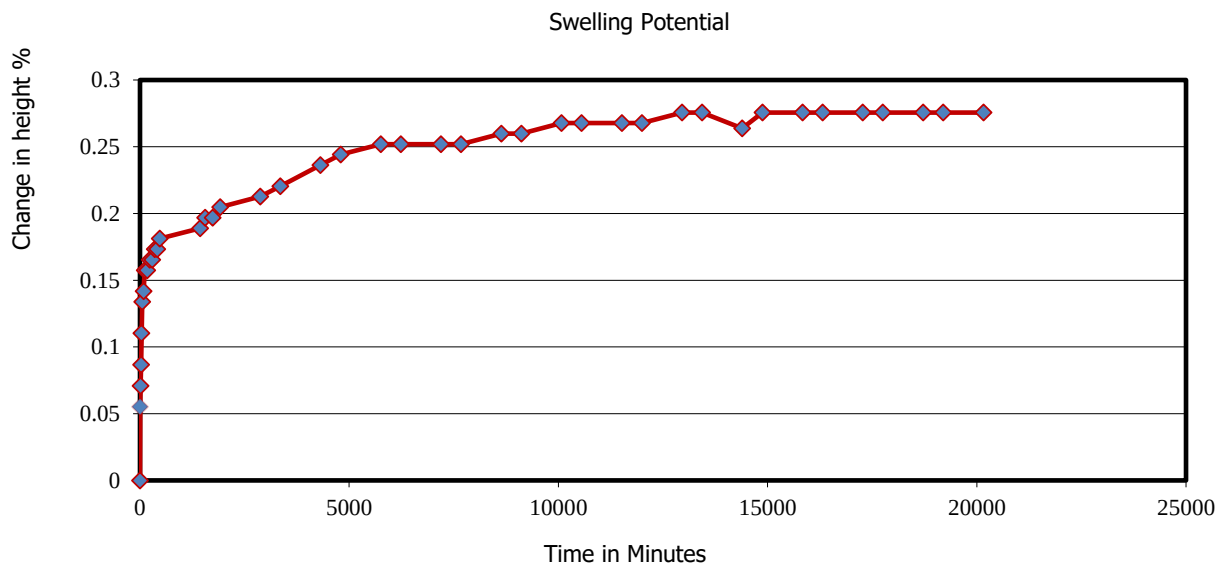
Operator
Aaron Hodge

UKAS TESTING 2788

Test Report: **Determination of the Swelling Potential of Fill Material. , In house Method**

Client:	Spencer Quantum Ltd
Client ref:	Q1422
Project Name:	Ty Mawr, Pontardawe
Contract Number:	69788
Date Test Started:	05/12/23
BH/TP:	TP02
Sample Number:	2 + 3
Depth (m) :	1.0 + 1.5
Sample Type:	B
Operator:	DE
Description:	Brown fine to medium gravelly SILT/CLAY

INITIAL CONDITIONS.		**FINAL CONDITIONS.**	
Initial Height - mm:	127.00	Final Height - mm:	127.35
Moisture Content - %:	20.1	Moisture Content - %:	22
Bulk Density - Mg/m3:	2.05	Bulk Density - Mg/m3:	2.05
Dry Density - Mg/m3:	1.71	Dry Density - Mg/m3:	1.70
Test Temperature C°:	90		



Swelling after 336 Hours -%
0.28

For and behalf of GEO Site & Testing Services Ltd

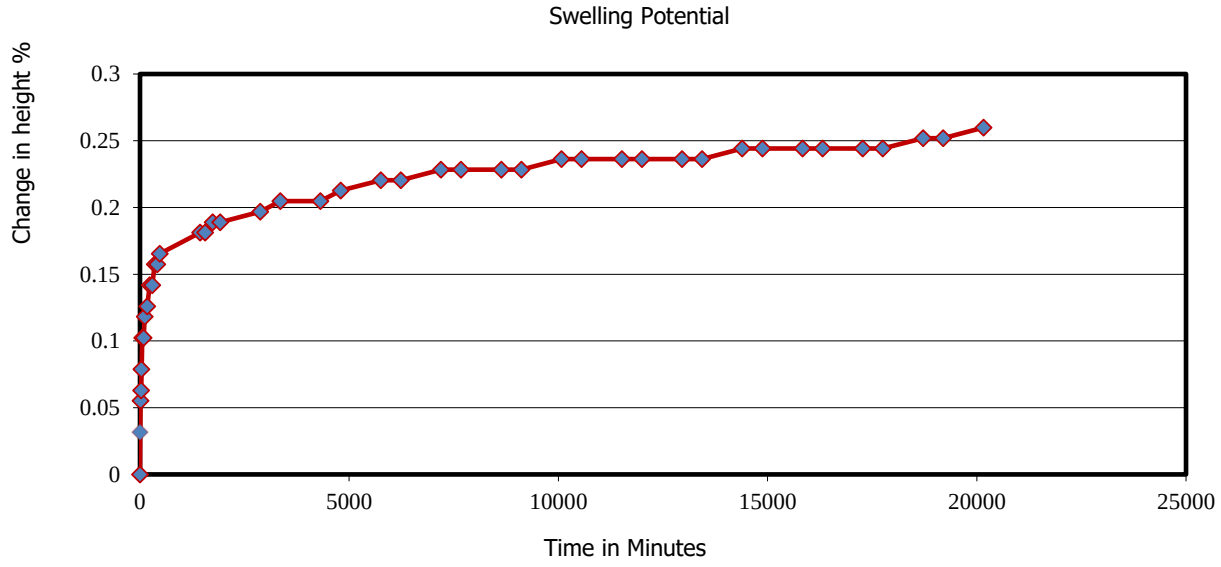
Remarks:

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES

Test Report: **Determination of the Swelling Potential of Fill Material. , In house Method**

Client:	Spencer Quantum Ltd
Client ref:	Q1422
Project Name:	Ty Mawr, Pontardawe
Contract Number:	69788
Date Test Started:	05/12/23
BH/TP:	TP04
Sample Number:	2 + 3
Depth (m) :	1.0 + 1.5
Sample Type:	B
Operator:	DE
Description:	Brown fine to medium gravelly SILT/CLAY

INITIAL CONDITIONS.		**FINAL CONDITIONS.**	
Initial Height - mm:	127.00	Final Height - mm:	127.33
Moisture Content - %:	24.3	Moisture Content - %:	26
Bulk Density - Mg/m3:	2.29	Bulk Density - Mg/m3:	2.08
Dry Density - Mg/m3:	1.84	Dry Density - Mg/m3:	1.83
Test Temperature C°:	90		



Swelling after 336 Hours -%
0.26

For and behalf of GEO Site & Testing Services Ltd

Remarks:

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES

4161

7 - 11 Harding Street
Leicester
LE1 4DH

GSTL
Unit 3-4 Heol Aur
Dafen Ind Estate
Dafen
SA14 8QN

Analytical Test Report:	**L23/07346/GSL - 23-39621**		
Your Project Reference:	**TY MAWR,PONTARDAWE Q1422**		
Your Order Number:	69788	Samples Received / Instructed:	27/11/2023 / 27/11/2023
Report Issue Number:	1	Sample Tested:	27/11 to 06/12/2023
Samples Analysed:	10 soil samples	Report issued:	06/12/2023

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 30.10.2023

Issued by: J. Gane

Issue No: 4

Rev No: 5

4161

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Leicester
LE1 4DH

L23/07346/GSL - 23-39621

Project Reference - TY MAWR,PONTARDAWE Q1422

Analytical Test Results - Solid

Lab Reference			328903	328904	328906	328908	328909	328911
Client Sample ID			-	-	-	-	-	-
Client Sample Location			TP01	TP01	TP02	TP03	TP03	TP04
Client Sample Type			B	B	B	B	B	B
Client Sample Number			1	2	1	1	2	1
Depth - Top (m)			0.50	1.00	0.50	0.50	1.00	0.50
Depth - Bottom (m)			0.50	1.00	0.50	0.50	1.00	0.50
Date of Sampling			-	-	-	-	-	-
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Sand	Sand	Clay	Sand	Sand	Sand
Determinant	**Units**	**Accreditation**						
SOM (via TOC)	(%)	UKAS	43	43	15	44	26	47

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Project Reference - TY MAWR,PONTARDAWE Q1422

Analytical Test Results - Chemical Analysis

Lab Reference			328903	328904	328905	328906	328907	328908	328909
Client Sample ID			-	-	-	-	-	-	-
Client Sample Location			TP01	TP01	TP01	TP02	TP02	TP03	TP03
Client Sample Type			B	B	B	B	B	B	B
Client Sample Number			1	2	3	1	2	1	2
Depth - Top (m)			0.50	1.00	2.00	0.50	1.00	0.50	1.00
Depth - Bottom (m)			0.50	1.00	2.00	0.50	1.00	0.50	1.00
Date of Sampling			-	-	-	-	-	-	-
Time of Sampling			-	-	-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Clay	Sand	Sand	Sand
Determinant	**Units**	**Accreditation**							
Water soluble sulphate (as SO_4)	(mg/l)	u	100	120	190	23	420	90	26
Acid Soluble Sulphate	(%)	u	-	0.05	-	-	0.35	-	0.07
Total Sulphur	(%)	UKAS	-	0.38	-	-	0.42	-	0.18
pH Value	pH Units	MCERTS	8.0	8.1	8.1	7.9	7.7	8.2	8.1
Water Soluble Chloride	(mg/l)	u	-	13	-	-	2.7	-	5.0
Water Soluble Nitrate (As NO_3)	(mg/l)	u	-	5.2	-	-	8.8	-	4.3
Water Soluble Magnesium	(mg/l)	u	-	< 20	-	-	< 20	-	< 20
Loss on Ignition (BS 1377)	(%)	UKAS	13	14	-	10	-	20	13

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Project Reference - TY MAWR,PONTARDAWE Q1422

Analytical Test Results - Chemical Analysis

Lab Reference			328910	328911	328912
Client Sample ID			-	-	-
Client Sample Location			TP03	TP04	TP04
Client Sample Type			B	B	B
Client Sample Number			3	1	2
Depth - Top (m)			1.50	0.50	1.00
Depth - Bottom (m)			1.50	0.50	1.00
Date of Sampling			-	-	-
Time of Sampling			-	-	-
Sample Matrix			Sand	Sand	Sand
Determinant	**Units**	**Accreditation**			
Water soluble sulphate (as SO_4)	(mg/l)	u	170	41	82
Acid Soluble Sulphate	(%)	u	-	-	0.07
Total Sulphur	(%)	UKAS	-	-	0.54
pH Value	pH Units	MCERTS	8.3	8.1	8.2
Water Soluble Chloride	(mg/l)	u	-	-	3.7
Water Soluble Nitrate (As NO_3)	(mg/l)	u	-	-	5.7
Water Soluble Magnesium	(mg/l)	u	-	-	< 20
Loss on Ignition (BS 1377)	(%)	UKAS	-	26	-

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Project Reference - TY MAWR,PONTARDAWE Q1422

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
328903	-	TP01	B	1	Black very gravelly silty sand	22	8.6	59
328904	-	TP01	B	2	Black very gravelly silty sand	25	5.8	61
328905	-	TP01	B	3	Black very gravelly silty sand	-	-	58
328906	-	TP02	B	1	Made Ground- dark brown slightly gravelly sandy silty clay with rare organic matter	24	8.1	87
328907	-	TP02	B	2	Black very gravelly silty sand with rare organic matter	-	-	61
328908	-	TP03	B	1	Black very gravelly silty sand with rare organic matter	15	24	47
328909	-	TP03	B	2	Black very gravelly silty sand with rare organic matter	16	6.5	88
328910	-	TP03	B	3	Dark brown very gravelly silty sand with rare organic matter	-	-	51
328911	-	TP04	B	1	Black very gravelly silty sand with rare mudstone	12	22	56
328912	-	TP04	B	2	Black very gravelly silty sand with rare mudstone	-	-	34

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L23/07346/GSL - 23-39621

Project Reference - TY MAWR,PONTARDAWE Q1422

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
328903	-	TP01	B	1	
328904	-	TP01	B	2	
328905	-	TP01	B	3	
328906	-	TP02	B	1	
328907	-	TP02	B	2	
328908	-	TP03	B	1	
328909	-	TP03	B	2	
328910	-	TP03	B	3	
328911	-	TP04	B	1	
328912	-	TP04	B	2	

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Project Reference - TY MAWR,PONTARDAWE Q1422

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
SUBCON-ENV	Subcontract - ENV Lab	-	-	Subcontract testing
1377LOI	BS1377 LoI	Oven dried	Passing 2mm test sieve	Testing was in accordance with BS 1377: Part 3: 2018 + A1 :2021 Clause 6. Determination of the mass loss on ignition. Some information required by BS1377: 2016: Part 1 has not been reported. This information is available on request.
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)

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L23/07346/GSL - 23-39621

Project Reference - TY MAWR,PONTARDAWE Q1422

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
328903	-	TP01	B	1		A
328904	-	TP01	B	2		A
328905	-	TP01	B	3		A
328906	-	TP02	B	1		A
328907	-	TP02	B	2		A
328908	-	TP03	B	1		A
328909	-	TP03	B	2		A
328910	-	TP03	B	3		A
328911	-	TP04	B	1		A
328912	-	TP04	B	2		A

APPENDIX V – GEO-ENVIRONMENTAL LABORATORY TEST RESULTS

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-39075-1		
Initial Date of Issue:	01-Dec-2023		
Re-Issue Details:			
Client	Spencer Quantum Ltd		
Client Address:	Parcau Farm Penrhiwllan Llandysul Ceredigion SA44 5NW		
Contact(s):	John Stark		
Project	Q1422 Ty Mawr, Pontardawe		
Quotation No.:		**Date Received:**	24-Nov-2023
Order No.:		**Date Instructed:**	24-Nov-2023
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	30-Nov-2023
Date Approved:	01-Dec-2023		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: Q1422 Ty Mawr, Pontardawe

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-39075	23-39075	23-39075	23-39075
Quotation No.:					**Chemtest Sample ID.:**	1736061	1736063	1736065	1736067
Order No.:					Client Sample Ref.:	2	2	2	2
					Client Sample ID.:	ES2	ES2	ES2	ES2
					Sample Location:	TP01	TP02	TP03	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.5	0.5	0.5	0.5
					Date Sampled:	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**				
pH at 20C	U	1010	10:1		4.0	8.0	7.9	7.9	7.8
Sulphate	U	1220	10:1	mg/l	1.0	6.3	2.3	1.9	2.6
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050	0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	4.5	1.1	2.2	0.73
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	16	17	12	18
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	0.90	1.1	11	< 0.50
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	0.79	0.60	1.5	0.54
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	3.4	0.72	5.0	< 0.50
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	8.5	7.1	13	12
Chromium (Total)	N	1455	10:1	µg/l	0.50	1.4	2.6	2.4	3.1
Chromium (Hexavalent)	U	1490	10:1	µg/l	20	< 20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	10	< 10	< 10	< 10	< 10
Naphthalene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Leachate

Project: Q1422 Ty Mawr, Pontardawe

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-39075	23-39075	23-39075	23-39075
Quotation No.:					**Chemtest Sample ID.:**	1736061	1736063	1736065	1736067
Order No.:					Client Sample Ref.:	2	2	2	2
					Client Sample ID.:	ES2	ES2	ES2	ES2
					Sample Location:	TP01	TP02	TP03	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.5	0.5	0.5	0.5
					Date Sampled:	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**				
Fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	10:1	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Q1422 Ty Mawr, Pontardawe

Client: Spencer Quantum Ltd				**Chemtest Job No.:**	23-39075	23-39075	23-39075	23-39075	23-39075	23-39075	23-39075	23-39075
Quotation No.:				**Chemtest Sample ID.:**	1736060	1736061	1736062	1736063	1736064	1736065	1736066	1736067
Order No.:				Client Sample Ref.:	1	2	1	2	1	2	1	2
				Client Sample ID.:	ES1	ES2	ES1	ES2	ES1	ES2	ES1	ES2
				Sample Location:	TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
				Date Sampled:	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023
				Asbestos Lab:	DURHAM		DURHAM		DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-		-		-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.020	30		18		14		14	
Soil Colour	N	2040		N/A	Black	Black	Brown	Brown	Black	Black	Black	Black
Other Material	N	2040		N/A	Stones	Stones	Stones and Roots	Stones	Stones	Stones and Roots	Stones	Stones
Soil Texture	N	2040		N/A	Loam	Loam	Clay	Clay	Loam	Loam	Loam	Loam
pH at 20C	M	2010		4.0	7.3		7.3		8.3		7.9	
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40		< 0.40		< 0.40		0.45	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.011		0.11		< 0.010		< 0.010	
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Arsenic	M	2455	mg/kg	0.5	35		30		53		61	
Cadmium	M	2455	mg/kg	0.10	5.8		0.80		1.7		0.57	
Chromium	M	2455	mg/kg	0.5	25		30		40		19	
Copper	M	2455	mg/kg	0.50	200		98		350		59	
Mercury	M	2455	mg/kg	0.05	0.22		0.28		0.20		0.27	
Nickel	M	2455	mg/kg	0.50	71		48		73		21	
Lead	M	2455	mg/kg	0.50	130		750		180		140	
Zinc	M	2455	mg/kg	0.50	530		320		630		210	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	0.18		0.13		0.14		0.15	
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25		< 0.25		< 0.25		< 0.25	
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	< 2.0		< 2.0		< 2.0		< 2.0	
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	< 1.0		< 1.0		1.2		< 1.0	
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0		< 2.0		< 2.0		< 2.0	
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	< 3.0		< 3.0		< 3.0		< 3.0	
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10		< 10		< 10		< 10	
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	< 5.0		< 5.0		6.4		< 5.0	
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	< 10		< 10		< 10		< 10	
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05		< 0.05		< 0.05		< 0.05	

Results - Soil

Project: Q1422 Ty Mawr, Pontardawe

Client: Spencer Quantum Ltd			**Chemtest Job No.:**		23-39075	23-39075	23-39075	23-39075	23-39075	23-39075	23-39075	23-39075
Quotation No.:			**Chemtest Sample ID.:**		1736060	1736061	1736062	1736063	1736064	1736065	1736066	1736067
Order No.:			Client Sample Ref.:		1	2	1	2	1	2	1	2
			Client Sample ID.:		ES1	ES2	ES1	ES2	ES1	ES2	ES1	ES2
			Sample Location:		TP01	TP01	TP02	TP02	TP03	TP03	TP04	TP04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
			Date Sampled:		22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023	22-Nov-2023
			Asbestos Lab:		DURHAM		DURHAM		DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25		< 0.25		< 0.25		< 0.25	
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0		< 1.0		1.1		< 1.0	
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0		< 1.0		1.9		< 1.0	
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	3.5		5.8		10		13	
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	8.6		14		170		33	
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	19		< 1.0		41		1.2	
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	12		19		180		47	
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	31		19		220		48	
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50		< 0.50		< 0.50		< 0.50	
Total EPH >C10-C35	U	2690	mg/kg	10.00	13		20		190		47	
Total EPH >C10-C40	N	2690	mg/kg	10.00	32		20		230		48	
Organic Matter	M	2625	%	0.40	59		20		45		47	
Naphthalene	M	2800	mg/kg	0.10	0.32		0.51		6.6		0.47	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10		< 0.10		0.21		0.13	
Acenaphthene	M	2800	mg/kg	0.10	< 0.10		0.16		0.34		0.46	
Fluorene	M	2800	mg/kg	0.10	< 0.10		0.14		0.41		0.38	
Phenanthrene	M	2800	mg/kg	0.10	0.96		1.1		3.8		2.5	
Anthracene	M	2800	mg/kg	0.10	0.13		0.24		0.98		0.43	
Fluoranthene	M	2800	mg/kg	0.10	0.81		1.5		4.9		3.2	
Pyrene	M	2800	mg/kg	0.10	0.80		1.2		3.9		2.2	
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.65		0.86		3.3		2.0	
Chrysene	M	2800	mg/kg	0.10	0.73		0.93		3.1		1.9	
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	0.81		1.4		4.4		0.95	
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.34		0.62		2.3		0.84	
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.74		1.1		3.4		1.8	
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	0.52		0.86		2.8		1.2	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.31		0.35		1.5		0.31	
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	0.39		0.77		2.4		0.87	
Total Of 16 PAH's	N	2800	mg/kg	2.0	7.5		12		44		20	
Total Phenols	M	2920	mg/kg	0.10	< 0.10		< 0.10		< 0.10		< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH at 20°C	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH at 20°C	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35–C40	Acetone/Heptane extraction / GCxGC FID detection
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	23-39081-1		
Initial Date of Issue:	02-Dec-2023		
Re-Issue Details:			
Client	Spencer Quantum Ltd		
Client Address:	Parcau Farm Penrhiwllan Llandysul Ceredigion SA44 5NW		
Contact(s):	John Stark		
Project	Q1422 Ty Mawr, Pontardawe		
Quotation No.:		**Date Received:**	24-Nov-2023
Order No.:		**Date Instructed:**	24-Nov-2023
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	04-Dec-2023
Date Approved:	02-Dec-2023		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - 2 Stage WAC

Project: Q1422 Ty Mawr, Pontardawe

Chemtest Job No:	23-39081
Chemtest Sample ID:	1736099
Sample Ref:	3
Sample ID:	ES3
Sample Location:	TP01
Top Depth(m):	0.5
Bottom Depth(m):	
Sampling Date:	22-Nov-2023

Determinand	**SOP**	**Accred.**	**Units**				**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			36	3	5	6
Loss On Ignition	2610	U	%			16	--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0043	0.0067	0.0081	0.063	0.5	2	25
Barium	1455	U	0.11	0.041	0.20	0.50	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.059	0.0027	0.11	0.086	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.042	0.0077	0.080	0.13	0.5	10	30
Nickel	1455	U	0.11	0.0056	0.20	0.21	0.4	10	40
Lead	1455	U	< 0.0005	0.0016	< 0.0005	0.013	0.5	10	50
Antimony	1455	U	0.0016	0.0005	0.0030	0.0068	0.06	0.7	5
Selenium	1455	U	0.0012	0.0005	0.0023	0.0063	0.1	0.5	7
Zinc	1455	U	0.010	0.006	0.019	0.061	4	50	200
Chloride	1220	U	2.4	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.28	0.11	< 1.0	1.3	10	150	500
Sulphate	1220	U	40	4.2	75	94	1000	20000	50000
Total Dissolved Solids	1020	N	140	40	260	540	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	29

Leachate Test Information	
Leachant volume 1st extract/l	0.279
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.257

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: Q1422 Ty Mawr, Pontardawe

Chemtest Job No:	23-39081
Chemtest Sample ID:	1736100
Sample Ref:	3
Sample ID:	ES3
Sample Location:	TP02
Top Depth(m):	0.5
Bottom Depth(m):	
Sampling Date:	22-Nov-2023

Determinand	**SOP**	**Accred.**	**Units**				**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			9.1	3	5	6
Loss On Ignition	2610	U	%			13	--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0006	0.0011	0.0061	0.5	2	25
Barium	1455	U	0.038	0.009	0.074	0.12	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	0.0008	0.0025	0.0016	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0022	0.0013	0.0043	0.014	0.5	10	30
Nickel	1455	U	0.0012	< 0.0005	0.0024	0.0016	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0005	< 0.0005	0.0010	0.0007	0.06	0.7	5
Selenium	1455	U	0.0017	< 0.0005	0.0033	0.0022	0.1	0.5	7
Zinc	1455	U	< 0.003	0.004	< 0.003	0.030	4	50	200
Chloride	1220	U	8.7	< 1.0	17	11	800	15000	25000
Fluoride	1220	U	0.32	0.21	< 1.0	2.2	10	150	500
Sulphate	1220	U	43	2.9	83	79	1000	20000	50000
Total Dissolved Solids	1020	N	200	49	390	680	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	3.3	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.302
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.221

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: Q1422 Ty Mawr, Pontardawe

Chemtest Job No:	23-39081
Chemtest Sample ID:	1736101
Sample Ref:	3
Sample ID:	ES3
Sample Location:	TP03
Top Depth(m):	0.5
Bottom Depth(m):	
Sampling Date:	22-Nov-2023

Determinand	**SOP**	**Accred.**	**Units**				**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			23	3	5	6
Loss On Ignition	2610	U	%			17	--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0018	0.0032	0.0035	0.030	0.5	2	25
Barium	1455	U	0.074	0.028	0.15	0.34	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.036	0.0037	0.070	0.047	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.013	0.0032	0.025	0.045	0.5	10	30
Nickel	1455	U	0.013	0.0009	0.025	0.024	0.4	10	40
Lead	1455	U	< 0.0005	0.0014	< 0.0005	0.012	0.5	10	50
Antimony	1455	U	0.0031	0.0012	0.0061	0.015	0.06	0.7	5
Selenium	1455	U	0.0010	< 0.0005	0.0020	0.0014	0.1	0.5	7
Zinc	1455	U	0.004	0.008	0.008	0.071	4	50	200
Chloride	1220	U	2.9	1.2	< 10	14	800	15000	25000
Fluoride	1220	U	0.80	0.30	1.6	3.7	10	150	500
Sulphate	1220	U	17	3.7	33	54	1000	20000	50000
Total Dissolved Solids	1020	N	160	47	310	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	3.0	< 2.5	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.313
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.232

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: Q1422 Ty Mawr, Pontardawe

Chemtest Job No:	23-39081
Chemtest Sample ID:	1736102
Sample Ref:	3
Sample ID:	ES3
Sample Location:	TP04
Top Depth(m):	0.5
Bottom Depth(m):	
Sampling Date:	22-Nov-2023

Determinand	**SOP**	**Accred.**	**Units**				**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			28	3	5	6
Loss On Ignition	2610	U	%			18	--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0003	< 0.0002	0.0006	0.0003	0.5	2	25
Barium	1455	U	0.024	< 0.005	0.048	0.025	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0010	0.0006	0.0021	0.0062	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0007	< 0.0005	0.0013	0.0007	0.06	0.7	5
Selenium	1455	U	0.0041	< 0.0005	0.0081	0.0042	0.1	0.5	7
Zinc	1455	U	< 0.003	0.005	< 0.003	0.044	4	50	200
Chloride	1220	U	18	1.2	36	29	800	15000	25000
Fluoride	1220	U	0.56	0.20	1.1	2.4	10	150	500
Sulphate	1220	U	30	1.7	59	46	1000	20000	50000
Total Dissolved Solids	1020	N	210	36	420	540	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	2.5	2.6	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	13

Leachate Test Information	
Leachant volume 1st extract/l	0.323
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.181

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity at 25°C and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

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

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

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

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WD18 8YS

t: 01923 225404
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e: reception@i2analytical.com

Analytical Report Number : 24-014205

Project / Site name:	Ty Mawr, Pontardawe	**Samples received on:**	16/04/2024
Your job number:	Q1422	**Samples instructed on/ Analysis started on:**	16/04/2024
Your order number:	Q1422 JS 12042024	**Analysis completed by:**	18/04/2024
Report Issue Number:	1	**Report issued on:**	18/04/2024
Samples Analysed:	2 water samples		

Signed:

Anna Goc
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 24-014205
Project / Site name: Ty Mawr, Pontardawe

Your Order No: Q1422 JS 12042024

Lab Sample Number				171053	171054
Sample Reference				BH01	BH02C
Sample Number				None Supplied	None Supplied
Depth (m)				3.70	4.40
Date Sampled				15/04/2024	15/04/2024
Time Taken				0915	0930
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
General Inorganics					
pH (L099)	pH Units	N/A	ISO 17025	7.8	7.4
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	43.3	32.5
Total Phenols					
Total Phenols (Monohydric) Low Level	µg/l	1	NONE	< 1.0	< 1.0
Speciated PAHs					
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Total PAH					
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16
Heavy Metals / Metalloids					
Arsenic (dissolved)	µg/l	0.15	ISO 17025	< 0.15	0.16
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02
Chromium (total)	µg/l	0.2	ISO 17025	2.7	5.7
Copper (dissolved)	µg/l	0.5	ISO 17025	1.1	1.5
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	2	2.2
Boron (dissolved)	µg/l	10	ISO 17025	44	38
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0

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Analytical Report Number: 24-014205
Project / Site name: Ty Mawr, Pontardawe

Your Order No: Q1422 JS 12042024

Lab Sample Number				171053	171054
Sample Reference				BH01	BH02C
Sample Number				None Supplied	None Supplied
Depth (m)				3.70	4.40
Date Sampled				15/04/2024	15/04/2024
Time Taken				0915	0930
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Petroleum Hydrocarbons					
TPH - Aliphatic >C5 - C6 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS_1D_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C12 - C16 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C16 - C21 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C21 - C35 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C35 - C40 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C35 - C44 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C40 - C44 $_{EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C5 - C44 $_{HS+EH_1D_AL_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC35 - EC44 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC40 - EC44 $_{EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC44 $_{HS+EH_1D_AR_MS}$	µg/l	10	NONE	< 10	< 10
TPH Total >C5 - C44 $_{HS+EH_1D_TOTAL_MS}$	µg/l	10	NONE	< 10	< 10
VOCs					
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0

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

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The results included within the report relate only to the sample(s) submitted for testing.

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Analytical Report Number : 24-014205
Project / Site name: Ty Mawr, Pontardawe

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
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Metals in water by ICP-MS (total)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Monohydric phenols (low level) in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	NONE
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 24-014205
Project / Site name: Ty Mawr, Pontardawe

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report

Analytical Report Number : 24-014205
Project / Site name: Ty Mawr, Pontardawe

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	N/A	W	171053	b	BTEX and/or Volatile organic compounds in water	L073B	b
BH02C	N/A	W	171054	b	BTEX and/or Volatile organic compounds in water	L073B	b

APPENDIX VI – GAS MONITORING DATA

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	**Ty Mawr, Pontardawe**
Project No.:	**Q1422**
BH/TP No.:	**BH01**
Instruments Used:	**Water Dip Meter Probe, GA2000 Gas Anaylser**

Installation Date:			12/11/2023	
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
32.4	A	50mm HDPE	6.00	1.0 - 6.0

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	24.11.23	10:00	1001	-0.01	0.0	0.1	0.1	20.9	0	0	3.86	28.54	5.73	26.67	Overcast	Overcast	
A	4.12.23	15:15	994	0.02	0.0	0.3	0.1	21.2	0	0	4.01	28.39	5.86	26.54	Overcast	Overcast	
A	22.12.23	13:00	999	0.04	0.0	0.3	0.0	19.9	0	0	3.81	28.59	5.84	26.56	Rain	Overcast	
A	3.1.24	14:30	987	-0.05	0.0	0.4	1.0	20.3	0	0	3.75	28.65	5.80	26.60	Rain	Overcast	
A	17.1.24	15:00	989	-0.02	0.0	0.4	0.2	20.9	0	0	4.16	28.24	5.70	26.70	Frosty	Sunny	
A	5.2.24	12:00	1015	-0.03	0.0	0.4	0.1	20.8	0	0	3.82	28.58	5.71	26.69	Overcast	Overcast	
A	15.4.24	09:15									3.70	28.70	5.80	26.60	Wet	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	**Ty Mawr, Pontardawe**
Project No.:	**Q1422**
BH/TP No.:	**BH02C**
Instruments Used:	**Water Dip Meter Probe, GA2000 Gas Anaylser**

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
33.1	A	50mm HDPE	7.00	1.0 - 7.0

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	24.11.23	10:10	1001	-0.01	0.0	0.1	0.0	21.1	0	0	4.48	28.62	7.95	25.15	Overcast	Overcast	
A	4.12.23	15:25	994	0.02	0.0	0.2	0.1	21.0	0	0	4.64	28.46	7.95	25.15	Overcast	Overcast	
A	22.12.23	13:10	999	0.04	0.0	0.3	0.1	20.4	0	0	4.40	28.70	7.91	25.19	Rain	Overcast	
A	3.1.24	14:40	987	-0.05	0.0	0.3	1.1	20.3	0	0	4.28	28.82	7.90	25.20	Rain	Overcast	
A	17.1.24	15:10	989	-0.02	0.1	0.3	0.1	20.7	0	0	4.77	28.33	7.90	25.20	Frosty	Sunny	
A	5.2.24	12:10	1015	-0.03	0.0	0.4	0.9	20.4	0	0	4.51	28.59	7.86	25.24	Overcast	Overcast	
A	15.4.24	09:30									4.40	28.70	7.90	25.20	Wet	Sunny	