

PREPARED BY:	Quantum Geotechnic Ltd	DATE:	29 th August 2019
CLIENT:	Mr Martin Hanford	AUTHOR:	Phil Darby
PROJECT TITLE:	Land Adjacent to 103 Brecon Road	OUR REF:	Q0057/LR01
RE:	Ground Investigation Geoenvironmental Letter Report		

1.0 Introduction

Upon the instructions of the Client, Mr Martin Hanford, Quantum Geotechnic Limited (QGL) was commissioned to undertake a Geoenvironmental ground investigation on land adjacent to 103 Brecon Road, Pontardawe, SA8 4PD.

A two storey detached dwelling, including a rear balcony and a detached garage have been constructed on the site.

The investigation is required to satisfy the planning conditions for the development and QGL were requested to attend site and undertake investigative work to determine the ground conditions environmentally which included investigating the nature and extent of any contamination and assessing the potential risk posed by the generation of ground gases.

The development has been referred to during the planning process as 'Land Adjacent to 103 Brecon Road Pontardawe Swansea SA8 4PD', Planning Application No. P2016/0457.

The general location of the site is set out in Figure 1 below with a selection of drawings of the proposed development, as provided by the Client, also presented within Appendix I for further detail.

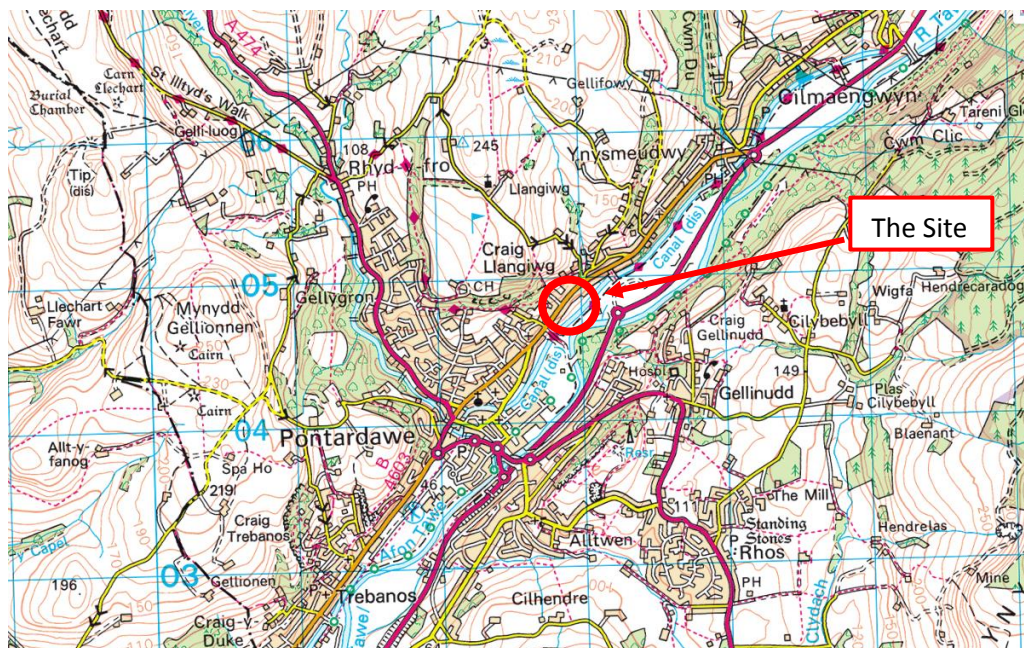


Figure 1: Site location. Not to Scale © Ordnance Survey

This report sets out the existing conditions on site, the findings of the intrusive ground investigation and offers recommendations and guidance relating to geo-environmental parameters identified to aid with meeting the required planning conditions and the development requirements.

A Phase 1 Desk Study Report was carried out on the 6th of June 2019 by STM Environmental Consultants Ltd, report reference PH1-2019-000045. The conclusions of which found that the site and immediate adjacent land have been subject to previous potentially contaminative land uses (PCLUs), No on site PCLUs were identified whilst off site PCLUs include a workhouse and potentially infilled land. The recommendations of the report were to carry out an intrusive site investigation with the objective of determining the presence and extent of any soil contamination.

1.1 Site Setting

The site is located adjacent to 103 Brecon Road in Pontardawe. The storey detached dwelling is currently constructed in the north western area of the site. The site is bounded to the North West by Brecon Road, to the south east by trees and the Swansea Canal and to the north east and south west by neighbouring residential housing.

The National Grid reference of the site is E272865, N204760.

Figure 2 provides added detail to the site location.



Figure 2: Site location detail.

1.2 Published Geology Review

Geological Survey Sheet SN-70-SW at 1:10,560 scale, indicates the site to be underlain by Glaciofluvial Deposits typically comprising Sand and Gravel. Also, due to the historical use of the plot and surrounding area, some Made Ground material is likely to be present. The solid geology below the site is mapped as the Brithdir Member of the Upper Coal Measures, typically comprising Sandstone.

2.0 Ground Investigation Works Undertaken

The fieldworks were undertaken on 11th July 2019 and comprised the following;

- 5 No. Windowless Sample Boreholes,
- 3 No. Shallow combined ground gas and groundwater monitoring standpipe installations

No incidents or near misses were recorded during the fieldworks. No deviations from Standards and Procedures adopted for the works were recorded. Each area of investigation was fully CAT ('Cable Avoidance Tool') scanned prior to breaking ground. Site supervision and attendance by an Engineering Geologist from Quantum was provided on all aspects of the site works. The planning and execution of the works was carried out following the guidance and procedures within BS10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of practice.

An exploratory hole location plan is presented as Figure 3.

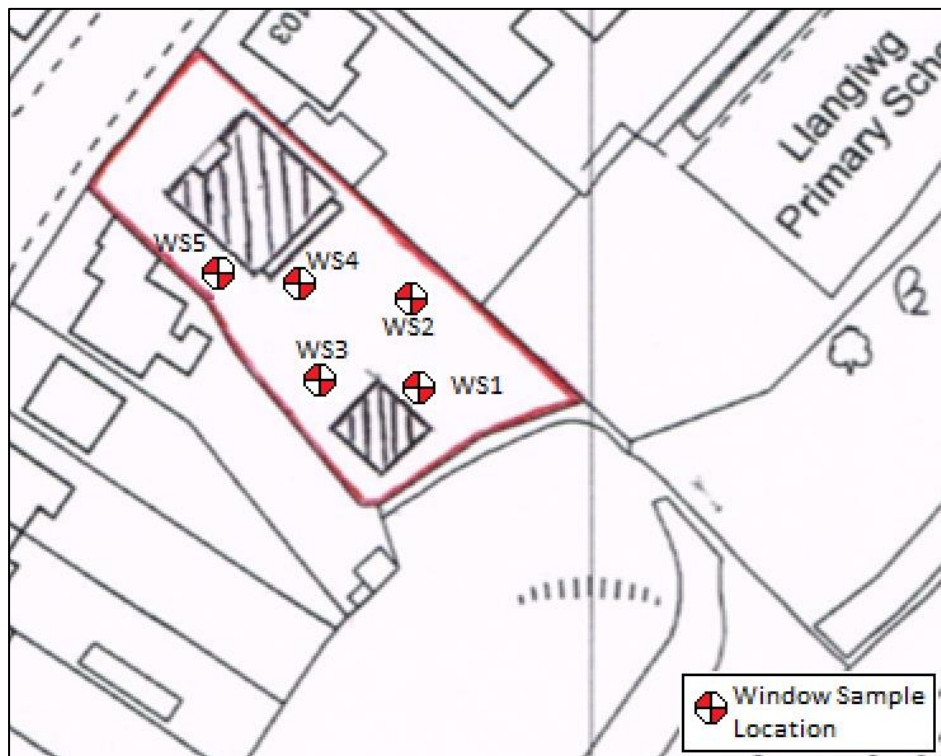


Figure 3: Exploratory Hole Locations

2.1 Intrusive Investigation Methods

Windowless Sampling

Windowless Sampling techniques involve a sampler dynamically driven down to depth using sampling tubes, nominally 116mm in diameter and reducing as depth increases. This technique allows a relatively undisturbed sample of soil to be taken in a plastic liner, or alternatively sub sampled as a disturbed jar sample. Within competent granular-cohesive soils the portable equipment used for Windowless Sampling is limited by the nature of the ground and robustness of the driving tool. The recovered sample liners were subsequently split and logged on site in accordance with BS5930: 2015; BS EN ISO 14688-1:2002 and BS EN ISO 14688-2:2005, by a Quantum Engineering Geologist. Each

Windowless Sample location was reinstated with Bentonite or ground gas / water monitoring equipment and surface replaced as per pre-existing construction.

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented Appended. The logs highlight the nature of the soils encountered and provide descriptions of the strata revealed at the site. Details of the Windowless Sample Boreholes, including final depths in metres below ground level (m.bgl) are provided below in Table 1:

Table 1: Windowless Sample Borehole Detail

Exploratory Hole ID	Terminated Depth (m.bgl)	Reason for Termination
WS1	1.20	Encountered Refusal – unable to progress due to ground conditions of Glaciofluvial Deposits
WS2	1.30	Encountered Refusal – unable to progress due to ground conditions of Glaciofluvial Deposits
WS3	0.90	Encountered Refusal – unable to progress due to ground conditions of Glaciofluvial Deposits
WS4	1.60	Encountered Refusal – unable to progress due to ground conditions of Glaciofluvial Deposits
WS5	1.20	Encountered Refusal – unable to progress due to ground conditions of Glaciofluvial Deposits

Three windowless sample boreholes were installed with 50mm Ø HDPE combined land-gas and groundwater monitoring standpipes to permit post-fieldwork monitoring visits. Table 2 details the installations undertaken. The response zones were selected in order to target any gasses being released within the made ground material that may migrate and pose a significant risk to the future development.

Table 2: Borehole Installation Detail

Exploratory Hole ID	Installation Depth (m.bgl)	Installation Response Zone (m.bgl)
WS1	1.2	0.4-1.2
WS4	1.6	0.3-1.6
WS5	1.2	0.5-1.2

Each post-fieldwork monitoring visit included the measurement of the following parameters:

- O₂ (% v/v)
- CH₄ (% v/v)
- H₂S (ppm)
- CO (% v/v)
- Flow Rate (l/hr)
- Atmospheric Pressure (mb)
- Groundwater Level (m.bgl/ mAOD)

2 No. post-fieldwork monitoring visits had been undertaken. The results of these visits are within the Appendix.

3.0 Ground Conditions Encountered

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs Appended. The logs highlight the nature of the soils encountered and provide descriptions of the strata revealed at the site.

This section gives a summary of the ground conditions encountered across the site. The general sequence of the ground conditions encountered across the site are summarised in Table 3 below.

Table 3: General sequence of strata revealed in Windowless Sample Boreholes

General Strata Description	Elevation of base of strata (m.bgl) in each trial pit				
	WS1	WS2	WS3	WS4	WS5
Topsoil	0.10	--	--	--	--
Made Ground	1.05	0.50	0.35	0.40	0.40
Glaciofluvial Deposits	1.20+	1.30+	0.90+	1.60+	1.20+

+Base of strata not determined during investigation

--Strata not encountered

Topsoil

Topsoil was encountered within a single exploratory hole, Windowless Sample Borehole WS1 undertaken in the south eastern area of the site. The Topsoil was described dark brown sandy slightly gravelly Clay with frequent rootlets. The Topsoil was encountered to a depth of 0.1mbgl.

Made Ground

Made was encountered within each of the exploratory holes formed across the site to depths of between 0.35 and 1.05mbgl. The Made Ground generally comprised loose to medium dense black and dark brown silty slightly gravelly Sand, with the gravel constituent consisting of slag, brick, ceramics, sandstone and mudstone. Within Windowless Sample Boreholes WS4 and WS5 the upper layer of the Made Ground comprised stiff black and dark brown slightly sandy gravelly Clay and grey gravelly Clay with medium cobble content respectively.

Glaciofluvial Deposits

Brown and orangish brown slightly sandy gravelly Clay with low cobble content, interpreted to be Glaciofluvial Deposits, was encountered within each exploratory hole underlying the Made Ground and proven to depths of between 0.9 and 1.6mbgl.

Groundwater

Groundwater was not encountered within any of the exploratory holes undertaken.

Groundwater conditions observed within the exploratory holes are those appertaining to the period of investigation and post-fieldwork monitoring visits. 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.

4.0 Laboratory Testing Detail

4.1 General

The laboratory testing was scheduled by QGL and comprised a number of geo-environmental tests on selected soil samples recovered from the investigation. The sampling testing suites were selected in order to assess the typical contaminants associated with the potentially contaminative land uses of concern to the site being investigated. As there was no specific historic land use on or near the site, a general testing suite was used.

4.2 Geo-Environmental Laboratory Testing

To assess the risk to human health, a suite of geo-environmental testing was undertaken on selected soil and soil leachate samples. All environmental testing was undertaken at a fully accredited UKAS and MCERTS laboratory.

Details of the determinants and the number of tests undertaken are presented in Table 4 over page for Soils and Table 4A for Soil Leachates.

Table 4: Geo-Environmental Tests Undertaken on Soil Samples

Analytical Parameter (Soil Analysis)	Accreditation Status	No of Tests	Analytical Parameter (Soil Analysis)	Accreditation Status	No of Tests
General			Heavy Metals / Metalloids		
pH - Automated	MCERTS	5	Arsenic (aqua regia extractable)	MCERTS	5
Total Cyanide	MCERTS	5	Boron (water soluble)	MCERTS	5
Organic Matter	MCERTS	5	Cadmium (aqua regia extractable)	MCERTS	5
Asbestos in Soil	MCERTS	5	Chromium (hexavalent)	MCERTS	5
Asbestos Quantification of Samples	MCERTS	5	Zinc (aqua regia extractable)	MCERTS	5
Water Sol. Sulphate as SO ₄	MCERTS	5	Chromium (aqua regia extractable)	MCERTS	5
			Copper (aqua regia extractable)	MCERTS	5
Total Phenols			Lead (aqua regia extractable)	MCERTS	5
Total Phenols (monohydric)	ISO 17025	5	Mercury (aqua regia extractable)	MCERTS	5
Speciated PAHs			Nickel (aqua regia extractable)	MCERTS	5
Naphthalene	MCERTS	5	Selenium (aqua regia extractable)	MCERTS	5
Acenaphthylene	MCERTS	5			
Acenaphthene	MCERTS	5			
Fluorene	MCERTS	5	Petroleum Hydrocarbons		
Phenanthrene	MCERTS	5	TPH-CWG - Aliphatic >EC5 - EC6	MCERTS	5
Anthracene	MCERTS	5	TPH-CWG - Aliphatic >EC6 - EC8	MCERTS	5
Fluoranthene	MCERTS	5	TPH-CWG - Aliphatic >EC8 - EC10	MCERTS	5
Pyrene	MCERTS	5	TPH-CWG - Aliphatic >EC10 - EC12	MCERTS	5
Benzo(a)anthracene	MCERTS	5	TPH-CWG - Aliphatic >EC12 - EC16	MCERTS	5
Chrysene	MCERTS	5	TPH-CWG - Aliphatic >EC16 - EC21	MCERTS	5
Benzo(b)fluoranthene	MCERTS	5	TPH-CWG - Aliphatic >EC21 - C35	MCERTS	5
Benzo(k)fluoranthene	MCERTS	5	TPH-CWG - Aliphatic (EC5 - EC35)	MCERTS	5
Benzo(a)pyrene	MCERTS	5	TPH-CWG - Aromatic >EC5 - EC7	MCERTS	5
Indeno(1,2,3-cd)pyrene	MCERTS	5	TPH-CWG - Aromatic >EC7 - EC8	MCERTS	5
Dibenz(a,h)anthracene	MCERTS	5	TPH-CWG - Aromatic >EC8 - EC10	MCERTS	5
Benzo(ghi)perylene	MCERTS	5	TPH-CWG - Aromatic >EC10 - EC12	MCERTS	5
Total PAH			TPH-CWG - Aromatic >EC12 - EC16	MCERTS	5
Speciated Total EPA-16 PAHs	MCERTS	5	TPH-CWG - Aromatic >EC16 - EC21	MCERTS	5
Volatiles			TPH-CWG - Aromatic >EC21 - EC35	MCERTS	5
Volatile Organic Compounds (VOCs)	MCERTS	5			
Semi-Volatile Organic Compounds (SVOCs)	MCERTS	5			

Table 4A: Geo-Environmental Tests Undertaken on Soil Leachate Samples

Analytical Parameter (Soil Leachate Analysis)	Accreditation Status	No of Tests	Analytical Parameter (Soil Leachate Analysis)	Accreditation Status	No of Tests
			Boron (dissolved)	MCERTS	2
General			Cadmium (dissolved)	MCERTS	2
pH - Automated	MCERTS	2	Chromium (dissolved)	MCERTS	2
Total Cyanide	MCERTS	2	Copper (dissolved)	MCERTS	2
Sulphate as SO ₄	MCERTS	2	Lead (dissolved)	MCERTS	2
Hardness - Total	MCERTS	2	Mercury (dissolved)	MCERTS	2
			Nickel (dissolved)	MCERTS	2
			Selenium (dissolved)	MCERTS	2
Total Phenols			Vanadium (dissolved)	MCERTS	2
Total Phenols (monohydric)	MCERTS	2	Zinc (dissolved)	MCERTS	2
Speciated PAHs			Petroleum Hydrocarbons		
Naphthalene	MCERTS	2	TPH-CWG - Aliphatic >EC5 - EC6	MCERTS	2
Acenaphthylene	MCERTS	2	TPH-CWG - Aliphatic >EC6 - EC8	MCERTS	2
Acenaphthene	MCERTS	2	TPH-CWG - Aliphatic >EC8 - EC10	MCERTS	2
Fluorene	MCERTS	2	TPH-CWG - Aliphatic >EC10 - EC12	MCERTS	2
Phenanthrene	MCERTS	2	TPH-CWG - Aliphatic >EC12 - EC16	MCERTS	2
Anthracene	MCERTS	2	TPH-CWG - Aliphatic >EC16 - EC21	MCERTS	2
Fluoranthene	MCERTS	2	TPH-CWG - Aliphatic >EC21 - EC35	MCERTS	2
Pyrene	MCERTS	2	TPH-CWG - Aliphatic (EC5 - EC35)	MCERTS	2
Benzo(a)anthracene	MCERTS	2	TPH-CWG - Aromatic >EC5 - EC7	MCERTS	2
Chrysene	MCERTS	2	TPH-CWG - Aromatic >EC7 - EC8	MCERTS	2
Benzo(b)fluoranthene	MCERTS	2	TPH-CWG - Aromatic >EC8 - EC10	MCERTS	2
Benzo(k)fluoranthene	MCERTS	2	TPH-CWG - Aromatic >EC10 - EC12	MCERTS	2
Benzo(a)pyrene	MCERTS	2	TPH-CWG - Aromatic >EC12 - EC16	MCERTS	2
Indeno(1,2,3-cd)pyrene	MCERTS	2	TPH-CWG - Aromatic >EC16 - EC21	MCERTS	2
Dibenz(a,h)anthracene	MCERTS	2	TPH-CWG - Aromatic >EC21 - EC35	MCERTS	2
Benzo(ghi)perylene	MCERTS	2			
Total PAH					
Speciated Total EPA-16 PAHs	MCERTS	2			
Heavy Metals / Metalloids					
Arsenic (dissolved)	MCERTS	2			
Barium (dissolved)	MCERTS	2			
Beryllium (dissolved)	MCERTS	2			

A full set of geo-environmental laboratory test certificates are presented in Appendix IV.

5.0 Geo-environmental Considerations

Pre-Intrusive Investigation Conceptual Site Model

The CSM is a representation of the current understanding of the site and its surrounding environment with regards to geology, groundwater, surface waters, and potential contamination on-site and adjacent off-site and any migration pathways, based on the findings of the Phase I PRA Desk Study undertaken in July 2019.

The potential risks to the proposed development and adjacent land have been assessed by consideration of the potential pollution linkages. For a risk to exist there must be a source of contamination, a receptor that may be harmed, and a pathway by which the receptor could be exposed to the contaminant. Only when all three factors are present (i.e. source, pathway, and receptor) can a pollution linkage, and consequently an unacceptable risk, exist. The conceptual site model considers all three elements and the potential for pollution linkages that may exist. If no linkage is identified then there is considered to be no or negligible risk.

The Conceptual Site Model has been developed for the proposed end use. Receptors specific for the proposed end use considered in the assessment are as follows:

- Human Health – end users
- Controlled Waters – ground water and surface waters
- Buildings and Services

The Phase I PRA Desk Study revealed the following;

The historical plans and Groundsure reviews indicate limited potential sources of contamination either on or at a distance off site that may have a limited impact on the site itself.

Historical mapping indicates the site to have very little development since 1898, with only an unspecified building at the centre of the site in 1942, followed by a smaller unspecified building to the north west corner in 1973, which was then demolished in 1989-94. The main building was also demolished between 2010-2014. Any buried material resulting from of the demolition may pose an unacceptable risk to the development and ultimately the future site end users i.e. residents.

Other historical land uses in the wider area include a workhouse, quarries and electrical transformer. Similarly, the Groundsure Report has listed current land uses including electricity sub-station within a 250m radius and also listed any pollution incidents in a 500m radius of the site boundary, however, all of these are at a significant distance from site. Details of the sources, pathways, and receptors associated with each of the components are highlighted Tables 9 to 11 using the following risk phrases and matrix used to qualitatively assess the level of risk to each source pathway receptor link, based on the likelihood and potential severity of the risk being realised.

Classification of Probability of Risk	
Classification	Definition
High Likelihood	There may be a pollutant linkage present and an event appears very likely in the short term or almost inevitable in the long term; or there is already evidence of harm to receptor.
Moderate Likelihood	Pollutant linkage may be present, and it is probable that there will be a long term risk and possibly a short term risk.
Low Likelihood	Pollutant linkage may be present, and it is possible that there will be a long term risk, though not certain
Unlikely	Pollutant linkage may be present, but the circumstances are such that an event is improbable, even in the long term.
No Risk Identified	No contaminants identified above guideline values likely to pose a risk to human health, fauna, flora, the water resources or the future built environment.

Classification of Severity of Consequence	
Classification	Definition
Severe	Acute risks to human health Catastrophic damage to buildings and property Major pollution of controlled waters
Medium	Chronic risk to human health Pollution of sensitive controlled waters Significant effects on sensitive ecosystems or species Significant damage to buildings or structures
Mild	Pollution of non-sensitive waters Minor damage to buildings or structures
Minor	Requirement for protective equipment during site works to mitigate health effects Damage to non-sensitive ecosystems or species
None Identified	Damage to human health, and the wider environment not expected. Requirement for basic protective equipment during site works still required as good practice.

Risk Matrix of Probability and Consequence		Consequences				
		Severe	Medium	Mild	Minor	None
Probability of Risk	High Likelihood	Very High	High	Moderate	Low	Very Low
	Moderate Likelihood	High	Moderate	Low	Very Low	Negligible
	Low Likelihood	Moderate	Low	Very Low	Negligible	Negligible
	Unlikely	Low	Very Low	Negligible	Negligible	Negligible
	No Risk Identified	Very Low	Negligible	Negligible	Negligible	Negligible

Figures 2a – 2c: Risk Probability and Consequence Assessment Tool

Table 9: Existing Pollutant Linkages – on-site to on-site

Potential Sources on-site	MADE GROUND ASSOCIATED WITH DEMOLITION OF FORMER BUILDINGS AND DUST DEBRIS	
Potential Pathways on-site to on-site	Risk Probability & Consequence Classification	Possible Receptors on-site
Ingestion of soils containing contaminants	Low - Moderate	People: Future Site Users including residents, visitors, staff and construction workers.
	Very Low	Ecology: Fauna
Dermal contact with contaminated soils	Low - Moderate	People: Future Site Users including residents, visitors, staff and construction workers.
	Very Low	Ecology: Fauna
Migration of leachable mobile contaminants through into groundwater	Very Low	Groundwater: Bedrock: 'Secondary A' aquifer
Windblown dust migration of contaminated soil particularly during construction	Low	People: Future Site Users including residents, visitors, staff and construction workers.
	Very Low	Ecology: Flora and Fauna
Migration of ground gas	Low - Moderate	People: Residents

Table 10: Existing Pollutant Linkages – on-site to off-site

Potential Sources on-site to off-site	MADE GROUND ASSOCIATED WITH DEMOLITION OF FORMER BUILDINGS AND DUST DEBRIS	
Potential Pathways on-site to off-site	Risk Probability & Consequence Classification	Possible Receptors off-site
Ingestion of soils containing contaminants	Low	People: Nearby residents and visitors
	Negligible	Ecology: Fauna
Dermal contact with contaminated soils	Low	People: Future Site Users including residents, visitors, staff and construction workers.
	Negligible	Ecology: Fauna
Migration of leachable mobile contaminants through into groundwater	Very Low	Groundwater: Bedrock: 'Secondary A' aquifer
Windblown dust migration of contaminated soil particularly during construction	Low	People: Nearby residents and visitors
	Very Low	Ecology: Flora and Fauna
Migration of ground gas	Very Low	People: Nearby residents

Table 11: Existing Pollutant Linkages – off-site to on-site

Potential Sources on-site to off-site	HISTORICAL UNSPECIFIED GROUND WORKINGS INCL. POTENTIALLY INFILLED LAND AND WORKHOUSE MADE GROUND ASSOCIATED WITH HISTORIC BUILDINGS DEMOLISHED NEARBY HISTORIC CONSTRUCTION RELATED LAND USES	
Potential Pathways on-site to off-site	Risk Probability & Consequence Classification	Possible Receptors off-site
Ingestion of soils containing contaminants	Low - Moderate	People: Nearby residents and visitors
	Negligible	Ecology: Fauna
Dermal contact with contaminated soils	Very Low	People: Future Site Users including residents, visitors, staff and construction workers.
	Negligible	Ecology: Fauna
Migration of leachable mobile contaminants through into groundwater	Low	Groundwater: Bedrock: 'Secondary A' aquifer
Windblown dust migration of contaminated soil particularly during construction	Low	People: Nearby residents and visitors
	Negligible	Ecology: Flora and Fauna
Migration of ground gas	Low	People: Nearby residents

Conceptual Model Summary (CSM)

No asbestos containing materials were encountered during the investigation. However, there is the possibility of encountering ACM (Asbestos Containing Materials), derived from the demolition that has taken place on site since 2014 during the construction works, and if so, appropriate measure must be carried out. The highest determined risk probability has been assessed as 'Low to moderate' at present.

The aforementioned CSM will be reviewed following assessment of the laboratory test results findings and information gathered from the intrusive investigation in the following sections.

Human Health Risk Assessment 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'

Human Health Risk Assessment Criteria

For the purposes of Quantum Geotechnic (QG) human health risk assessments, the most recent and applicable Soil Guideline Values (SGVs), Generic Assessment Criteria values (GACs), Suitable for Use Levels (SU4Ls) and Category 4 Screening Levels (C4SLs) are used based on site end use, development and overall suitability. These are all referenced within the text. SU4Ls take precedence in QGL assessments. Where these are not available or suitable, C4SLs are adopted.

By adopting the Contaminated Land Exposure Assessment (CLEA) approach to human health risk assessment as defined in **CLR11**, a human health risk assessment has been undertaken for the proposed development adopting the most sensitive land use model of '*Residential End Use with Pany Uptake*' threshold value.

The 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.*

5.1 Soil Sample Test Results Comparison

Heavy Metals and Inorganic Compounds

The results of potential contaminants tested have been compared to generic assessment criteria as described above, for a Residential end use with plant uptake as being considered the most appropriate threshold for human health relating to the development. The test certificates are included in Appendix IV. The concentrations of heavy metal and inorganic compounds are summarised in the Table 5.

Table 5: Summary of Heavy Metal and Inorganic Soil Test Results

Determinant	Results Range (mg/kg)	LQM/CIEH (2015) GAC (mg/kg) Residential End Use with Plant Uptake ⁽¹⁾	Exceedances
Arsenic	30 - 67	37	2 WS2 0.3mbgl WS4 0.3mbgl
Boron (water soluble)	0.6 – 1.1	290	0
Cadmium	<0.2 – 2.6	11	0
Chromium	13 – 20	910	0
Chromium (Hexavalent)	<4.0	6	0
Copper	18 - 130	2,400	0
Lead	21 – 200	200	0
Mercury	<0.3 – 0.6	40	0
Nickel	14 - 150	130	1 WS1 0.3mbgl
Selenium	<1.0 – 3.2	250	0
Zinc	25 - 830	3,700	0

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

Polycyclic Aromatic Hydrocarbons (PAH)

The results of levels of potential polycyclic aromatic hydrocarbon (PAH) contaminants have been compared to the generic assessment as described. A Soil Organic Matter (SOM) content of 2.5% has been used in this scenario as the minimum recorded was 3.8%. The concentrations of speciated Polycyclic Aromatic Hydrocarbons are summarised and compared in Table 6.

Table 6: Summary of Polycyclic Aromatic Hydrocarbon Soil Test Results

Determinant	Site Results Range (mg/kg)	LQM/CIEH (2015) GAC Residential with Plant Uptake (mg/kg)	Exceedances
		2.5% SOM	
Organic Matter	3.8 - 10.0		
Naphthalene	<0.05 - 0.29	5.6	0
Acenaphthylene	<0.05 - 0.49	420	0
Acenaphthene	<0.05	510	0
Fluorene	<0.05 - 0.23	400	0
Phenanthrene	<0.05 - 2.9	220	0
Anthracene	<0.05 - 0.67	5,400	0
Fluoranthene	<0.05 - 6.7	560	0
Pyrene	<0.05 - 5.4	1,200	0
Benzo(a)anthracene	<0.05 - 4.4	11	0
Chrysene	<0.05 - 5.0	22	0
Benzo(b)fluoranthene	<0.05 - 6.3	3.3	0
Benzo(k)fluoranthene	<0.05 - 3.5	93	0
Benzo(a)pyrene	<0.05 - 5.1	2.7	2 WS1 0.3mbgl WS2 0.3mbgl
Indeno(1,2,3-cd)pyrene	<0.05 - 3.2	36	0
Dibenz(a,h)anthracene	<0.05 - 0.96	3.5	0
Benzo(ghi)perylene	<0.05 - 3.3	1,200	0

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

Total Petroleum Hydrocarbons (TPH)

The results of levels of potential hydrocarbons contaminants (as aromatic and aliphatic compounds) have been compared to generic assessment criteria as described. A Soil Organic Matter (SOM) content of 2.5% has also been used in this scenario as the minimum recorded was 3.8%. The concentrations of speciated petroleum hydrocarbons are summarized and compared in Table 7 over page.

Table 7: Summary of Petroleum Hydrocarbon Soil Test Results

Determinand	Site Results Range (mg/kg)	LQM/CIEH (2015) GAC ⁽¹⁾ Residential End Use with Plant Uptake (mg/kg)	Exceedances
		1% SOM	
Organic Matter	3.8-10.0		
TPH – Aliphatic EC5-6	<0.001	78	0
TPH – Aliphatic >EC6-8	<0.001	230	0
TPH – Aliphatic >EC8-10	<0.001	65	0
TPH – Aliphatic >EC10-12	<1.0	330	0
TPH – Aliphatic >EC12-16	<2.0 - 4.5	2,400	0
TPH – Aliphatic >EC16-21	<8.0 - 18	92,000	0
TPH – Aliphatic >EC21-35	<8.0 - 200	92,000	0
TPH – Aromatic >EC5-7	<0.001	140	0
TPH – Aromatic >EC7-8	<0.001	290	0
TPH – Aromatic >EC8-10	<0.001	83	0
TPH – Aromatic >EC10-12	<1.0	180	0

TPH – Aromatic >EC12-16	<2.0 – 9.3	330	0
TPH – Aromatic >EC16-21	<10 – 53	540	0
TPH – Aromatic >EC21-35	<10 - 330	1,500	0
TPH – Aromatic >EC5-EC35	<10 - 390	1,500	0

Notes: (1). GAC from LQM/CIEH S4ULs 2015. (2). GAC for C16 – C35 only quoted.

Total Phenols

Total Phenols (monohydric) all recorded values of <1.0mg/kg in the soil samples.

Asbestos

Asbestos identification undertaken on each of the samples tested recorded 'not detected'.

5.2 Human Health Risks to Site End Users

Concentrations of Arsenic exceeded the relevant assessment criteria for Residential End Use with Plant Uptake within the samples of Made Ground obtained from WS2 and WS4. The concentration of Nickel measured within the sample of Made ground from WS1 exceeded the relevant assessment criteria for Residential End Use with Plant Uptake. The concentrations of Benzo(a)pyrene measured within the samples of Made Ground from WS1 and WS2 also exceeded the relevant assessment criteria for Residential End Use with Plant Uptake.

Based on the findings on the testing undertaken, the Made Ground deposits across the site are a potential source of contamination which may pose a significant risk to future site users.

In order to reduce the risk to future site users to acceptable levels, it is recommended either the potential contamination source is removed / excavated and disposed of off-site or the potential contamination pathway is removed by placing the material under a suitably designed capping layer or an impermeable surface.

5.3 Human Health Risks of Workers during Construction

In general, operatives working with, or likely to come into contact with the 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.

5.4 Summary Assessment of Risk to Human Health

The risks to human health of site end users is based upon a 'source – pathway - receptor' analogy, whereby the contaminants would be the **source**, the **pathway** would typically be dermal contact, inhalation and ingestion in this scenario and the **receptor** being the future site users. To reduce the risk to acceptable levels, one element of this model must be removed.

The Made Ground has been identified as a potential contamination source, which it should be assumed to be site wide. A potential pathway exists, notably within the proposed garden areas / soft

landscaping for the site end user to come into contact with the contaminated soils over the long term. Therefore a source-pathway-receptor (S-P-R) linkage has been identified through this ground investigation.

In order to reduce the risk to future site users to acceptable levels, it is recommended either the potential contamination source is removed/excavated and disposed of off-site, or the potential contamination pathway is severed by placing the material under a suitably designed capping layer or an impermeable surface.

5.5 Risks to the Environment & Controlled Waters

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

Once the leaching potential is known the risk from this can be assessed in terms of pathways by which it may migrate, the impact on the receptors and if need be, addressed by remedial actions.

The results of the selected soil leachate tests obtained from site should be compared to UK Drinking Water Standards (UKDWS) and Environmental Quality Standards (EQS), in order to assess risks to local waterways.

Table 8 summarises the testing completed on the groundwater samples recovered.

The results are presented together with the threshold levels given by the United Kingdom Drinking Water Standards (UKDWS) as well as the Environmental Quality Standards (EQS) guideline values. For the purposes of this assessment and location of site the most applicable standards are the freshwater EQS.

Table 8: Summary of Leachate Test Results

Determinand	Units	Results (g/kg)	Environmental Quality Standards – Freshwater ¹	Environmental Quality Standards – Saltwater ¹	UK Drinking Water Standards ²	Exceedances
Arsenic	µg/l	7.2 – 7.7	50	25	10	0
Cadmium	µg/l	<0.08	5	2.5	5	0
Chromium	µg/l	2.5 – 2.8	5 – 10 ^A	15	50	0
Copper	µg/l	5.5 – 9.1	1 - 6 ^A	5	2000	1 WS1 0.3mbgl
Lead	µg/l	12 – 20	4 - 10 ^A	25	10	2 WS1 0.3mbgl WS4 0.3mbgl
Mercury	µg/l	<0.5	1	0.3	1	0
Nickel	µg/l	1.8 – 5.9	50 - 100	30	20	0
Zinc	µg/l	55 – 65	8 – 50	Not Available	5000	2 WS1 0.3mbgl WS4 0.3mbgl
Boron	µg/l	<10	2,000	7,000	1,000	0
Napthalene	µg/l	<0.01	Not Available	Not Available	Not Available	
Acenaphthylene	µg/l	<0.01	Not Available	Not Available	Not Available	
Acenaphthene	µg/l	<0.01	Not Available	Not Available	Not Available	
Fluorene	µg/l	<0.01	Not Available	Not Available	Not Available	
Phenanthrene	µg/l	<0.01	Not Available	Not Available	Not Available	
Anthracene	µg/l	<0.01	Not Available	Not Available	Not Available	
Fluoranthene	µg/l	<0.01	Not Available	Not Available	Not Available	
Pyrene	µg/l	<0.01	Not Available	Not Available	Not Available	

Benzo(a)anthracene	µg/l	<0.01	Not Available	Not Available	Not Available	
Chrysene	µg/l	<0.01	Not Available	Not Available	Not Available	
Benzo(b)fluoranthene	µg/l	<0.01	Not Available	Not Available	Not Available	
Benzo(k)fluoranthene	µg/l	<0.01	Not Available	Not Available	Not Available	
Benzo(a)pyrene	µg/l	<0.01	Not Available	Not Available	Not Available	
Indeno(1,2,3-cd)pyrene	µg/l	<0.01	Not Available	Not Available	Not Available	
Dibenz(a,h)anthracene	µg/l	<0.01	Not Available	Not Available	Not Available	
Benzo(ghi)perylene	µg/l	<0.01	Not Available	Not Available	Not Available	
Total PAH Speciated	µg/l	<0.2	Not Available	Not Available	0.1	0
Petroleum Range Organics (C6 - C10)	µg/l	<10	Not Available	Not Available	Not Available	
Diesel Range Organics (C10 – C25)	µg/l	<10	Not Available	Not Available	Not Available	
Oil Range Organics (C25 – C40)	µg/l	<10	Not Available	Not Available	Not Available	

¹Figures for Environmental Quality Standards (EQS) are Annual Average Concentrations derived from the Environment Agency

²UK 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). NT – Not Tested. I/S – Insufficient Sample. * - Minimum detection level is higher than threshold value. ^ Denotes EQS adjusted for hardness content of soil leachate samples tested (min. value = 50.6mgCaCO₃/l)

5.6 Summary Assessment of Risk to Controlled Waters

Soil leachate testing identified concentrations of Copper, Lead and Zinc within the Made Ground in WS1 and the concentrations of Lead and Zinc within the Made Ground in WS4 were above the relevant EQS values. Therefore, a risk may exist to controlled waters from potential mobile contaminants held within the soils.

The strata underlying the Made Ground (potential contamination source) was identified as anticipated low permeability Clays and therefore the risk of any mobile contaminants entering on-site groundwater is considered negligible. However, given the increase in depth to the Clay layer from north west to south east, towards the stream in the south eastern area of the site / site boundary, the potential risk exists for any mobile contaminants to flow across the upper surface of the clay into the stream.

Given the low levels of leachate concentrations measured, when one considers the natural attenuation and dilution of any leachate that might ultimately reach a controlled water, the risk is in all likelihood very low.

Given no groundwater was identified across the site, preventing the downward movement of water through the Made Ground will reduce the potential for leachate generation. It is recommended, if a capping layer is installed, it is of low permeability. In addition, soakaway drainage is not recommended as the introduction of concentrated quantities of water into the ground will significantly increase the potential for leachate containing elevated contaminant concentrations to be generated.

Considering the remedial measures outlined in Section 5.4, once these are completed, then the risk from any leachate will be further reduced.

5.8 Ground Gas Assessment

2 No. post-fieldwork monitoring ground gas visits have been undertaken to allow a preliminary assessment to be undertaken. Appendix III presents the monitoring records with the results discussed below.

The results show CH₄ concentrations of 0%v/v and CO₂ concentrations between 0.0 and 2.8%v/v. Maximum measured flow rate was recorded as 0.0l/hr whilst O₂ levels ranged between 16.5 and 21.3%v/v. No H₂S or Carbon Monoxide (CO) was recorded.

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). The GSV can then be used to determine a risk classification and a Characteristic Situation for the site as defined in Table 16.

Table 16: Gas Screening Value and Characteristic Situation Classification

Characteristic Situation	Risk Classification	Gas Screening Value (l/hr) - GSV
1	Very low	<0.07
2	Low	>0.07, <0.7
3	Moderate	>0.7, <3.5
4	Moderate to High	>3.5, <15
5	High	>15, <70
6	Very High	>70

Based on the ground gas monitoring findings to date, the site is classified as Characteristic Situation 1, Low risk, with GSV's of 0.0.

5.9 Review of Conceptual Site Model (CSM)

The on site investigation and subsequent laboratory testing has identified that heavy metals of Arsenic and Nickel is a potential soil contaminant and was above the prescribed Soil Guideline Values for Residential with plant uptake. As such a possible pollutant linkage of dermal contact and ingestion of soil, to future site users is a risk.

Other potential pollutant linkages have been dismissed through the soil testing process, i.e. chemical attack of building materials. The site-derived chemical dataset did not highlight any potentially deleterious chemicals/ contaminants within the soil matrix onsite to be at concentrations, which may lead to chemical attack and corrosion of building materials, in particular, concrete and mortar, as well as buried services and utilities.

In conclusion, based on the Phase I Desk Study and the findings of the Phase II Investigation, the only source-pathway-receptor (S-P-R) linkage identified for the site is that of the heavy metals on site, which can be avoided with the removed/excavated and disposed of off-site, or the potential contamination pathway is severed by placing the material under a suitably designed capping layer or an impermeable surface.

6.0 Summary Conclusions

The following summarises the findings of the ground investigation:

- The shallow soils have been revealed to comprise an initial variable thickness of Made Ground overlying predominantly silty sandy gravelly Clays (Glaciofluvial Deposits). The Made Ground was encountered to a maximum depth of 1.05mbgl, with the thickness of Made Ground generally increasing towards the rear of the property.
- Groundwater was not encountered within any of the exploratory holes during the investigation.
- Laboratory testing of soil samples obtained from the Made Ground identified potentially significant elevated concentrations of Arsenic, Nickel and Benzo(a)pyrene within the Made Ground deposits. The measured concentrations of the aforementioned potential contaminants were above the relevant assessment criteria for Residential Land Use with Plant Uptake. The potential contaminants may pose a significant risk to future site users. In order to reduce the risk to future site users to acceptable levels, it is recommended either the potential contamination source is removed / excavated and disposed of off-site or the potential contamination pathway is removed by placing the material under a suitably designed capping layer or an impermeable surface.
- Laboratory testing of soil leachate samples from the Made Ground identified Copper, Lead and Zinc concentrations which exceed the relevant Environmental Quality Standards for Freshwater and therefore potential contaminants within the Made Ground may be readily mobilised however these are considered unlikely to pose a significant risk to controlled waters. Given no groundwater was identified across the site, preventing the downward movement of water through the Made Ground will reduce the potential for leachate generation. It is recommended, if a capping layer is installed, it is of low permeability. In addition, soakaway drainage is not recommended as the introduction of concentrated quantities of water into the ground will significantly increase the potential for leachate containing elevated contaminant concentrations to be generated. Alternatively, the Made Ground from across the site may be removed and fully eliminate the of leachate generation.

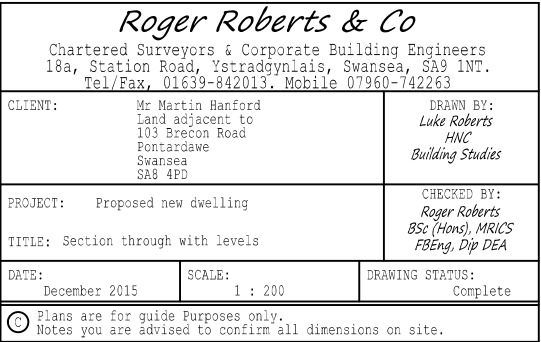
We trust that the above is of assistance; however, if you need any further clarification or have any queries please do not hesitate to contact us.

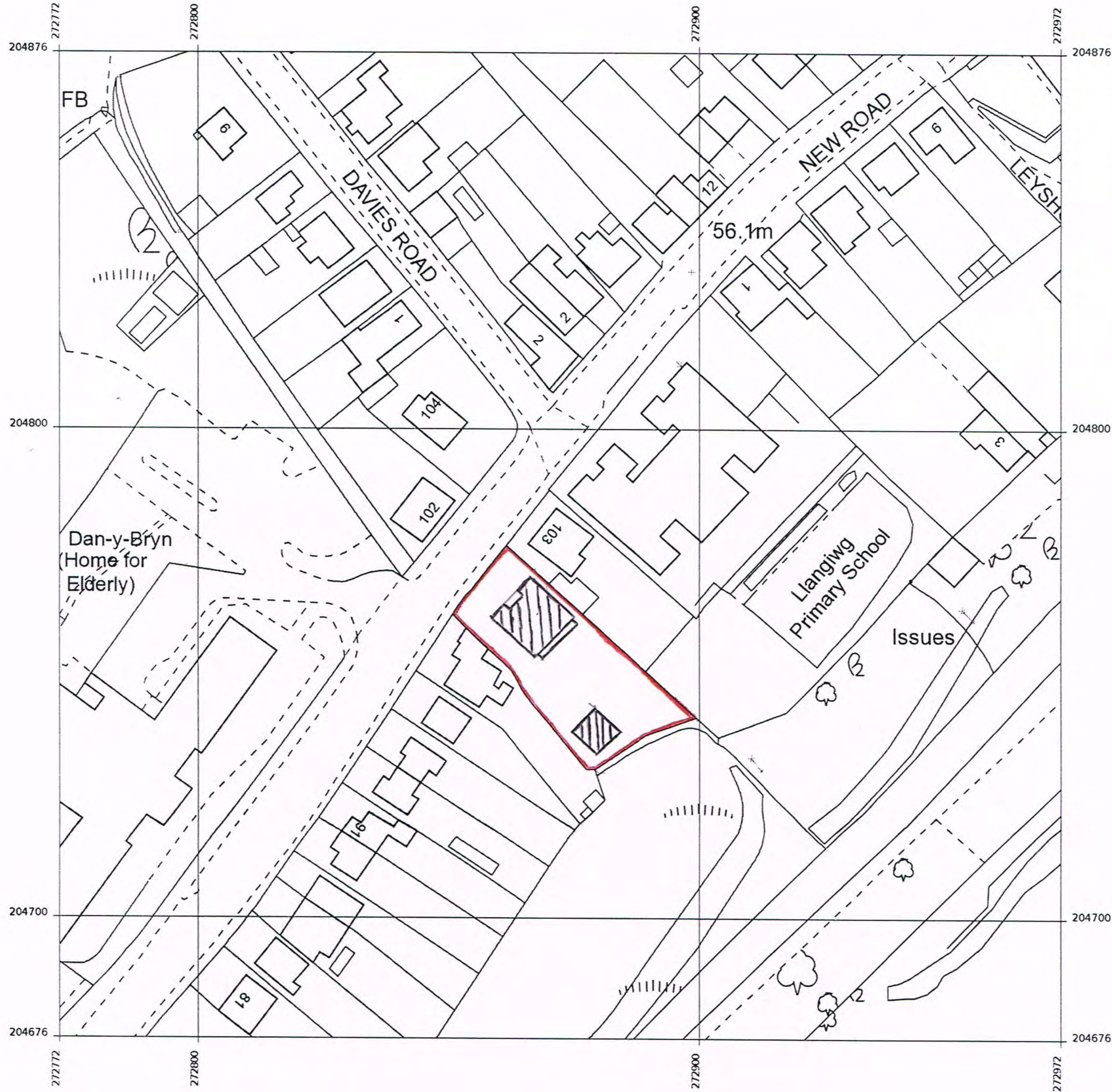
DOCUMENT CONTROL

Contract Name: Land Adjacent to 103 Brecon Road, Pontardawe
Contract Reference: Q0057
Report Type: Ground Investigation Interpretative Letter Report
Report Reference: Q0057GI/LR01
Date of Report Production: August 2019
Client: Martin Hanford

Version:	Date:	Prepared by:	Checked by:	Approved by:
Final Issue	29/08/19	J. Phillips	P. Darby	J. Stark
				
		Engineering Geologist B.Sc.(Hons). M.Sc., FGS	Senior Engineering Geologist B.Sc.(Hons.),M.Sc., C.Geol., F.G.S.	Technical Manager B.Sc.(Hons.), C.Geol., F.G.S.
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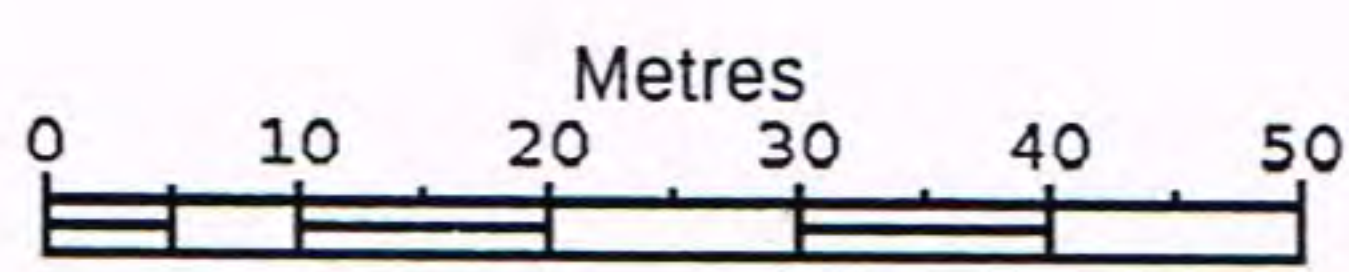
APPENDIX I – Development Plans





Produced 17 May 2016 from the Ordnance Survey MasterMap (Topography) Database and incorporating surveyed revision available at this date.

The representation of a road, track or path is no evidence of a right of way. The representation of features as lines is no evidence of a property boundary.

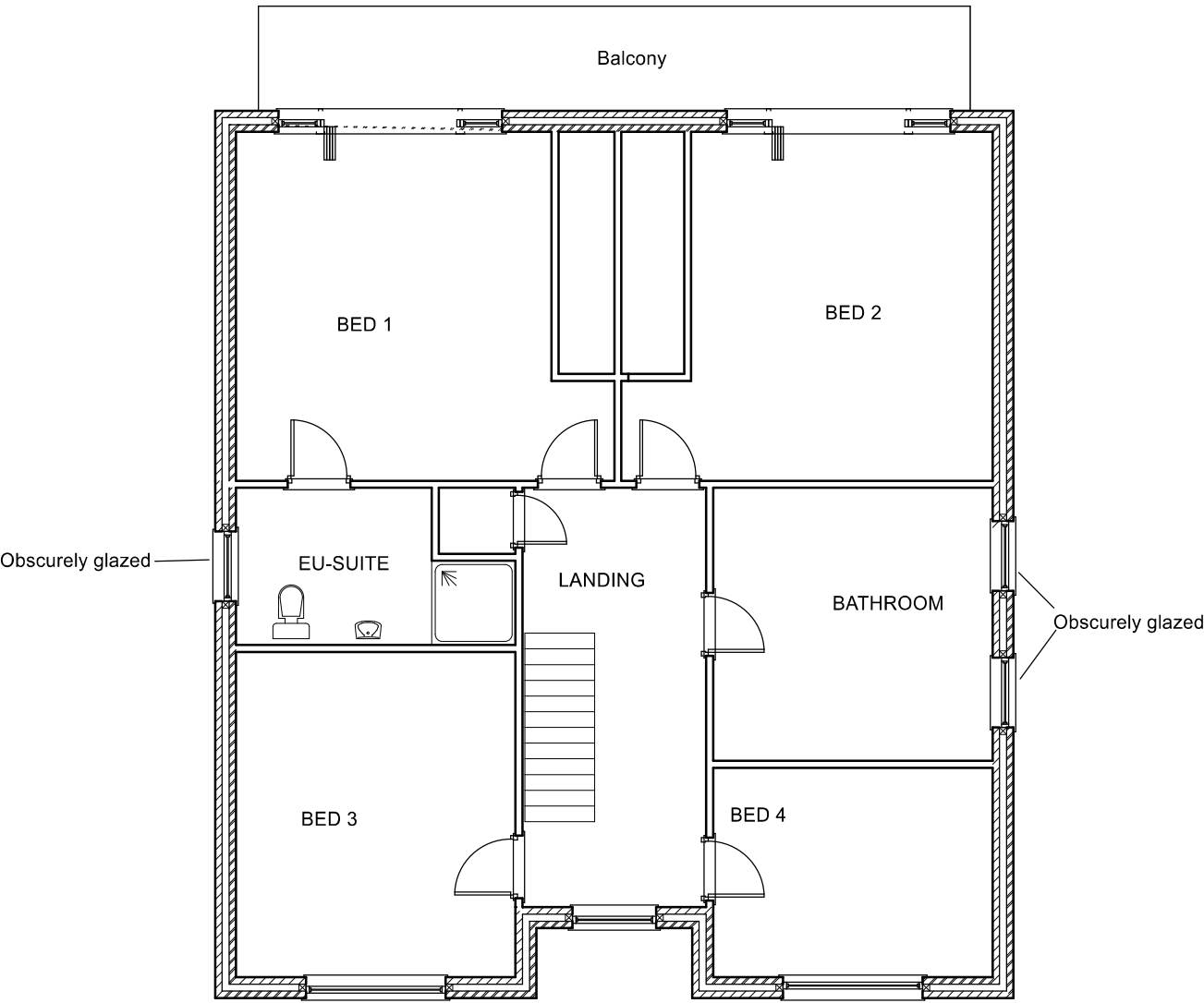
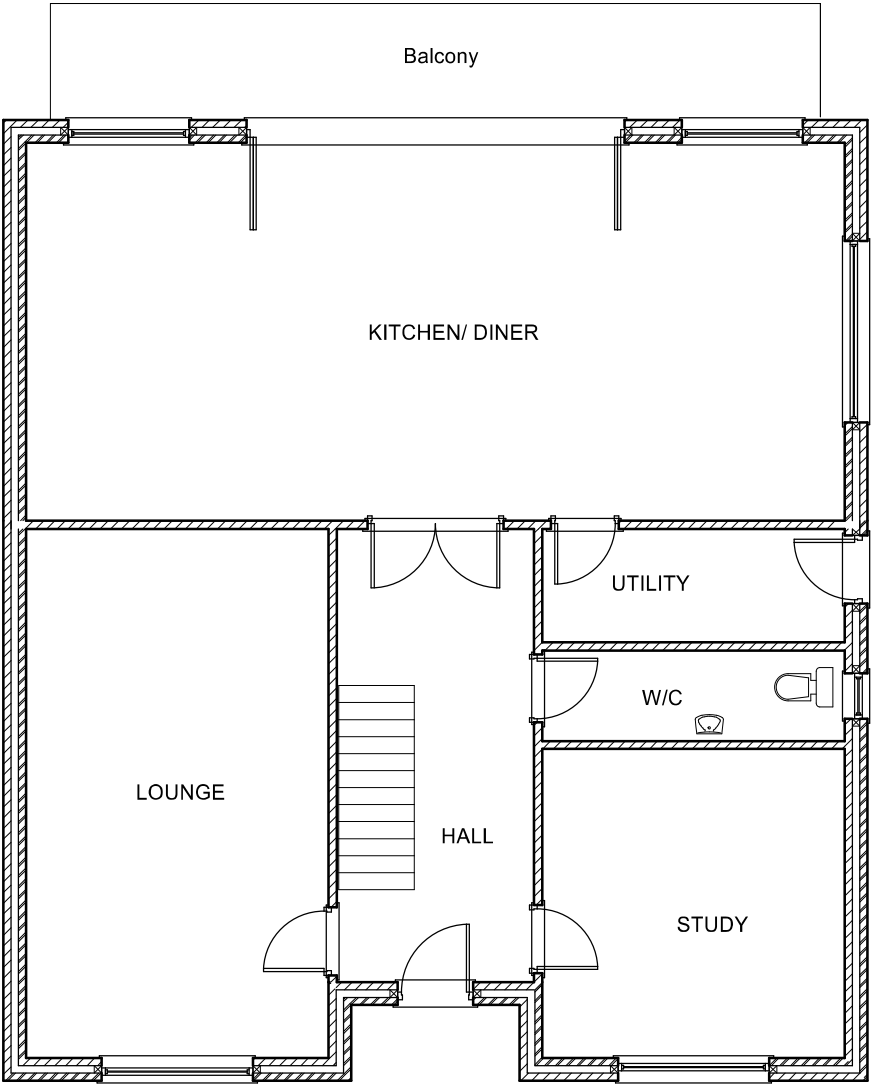


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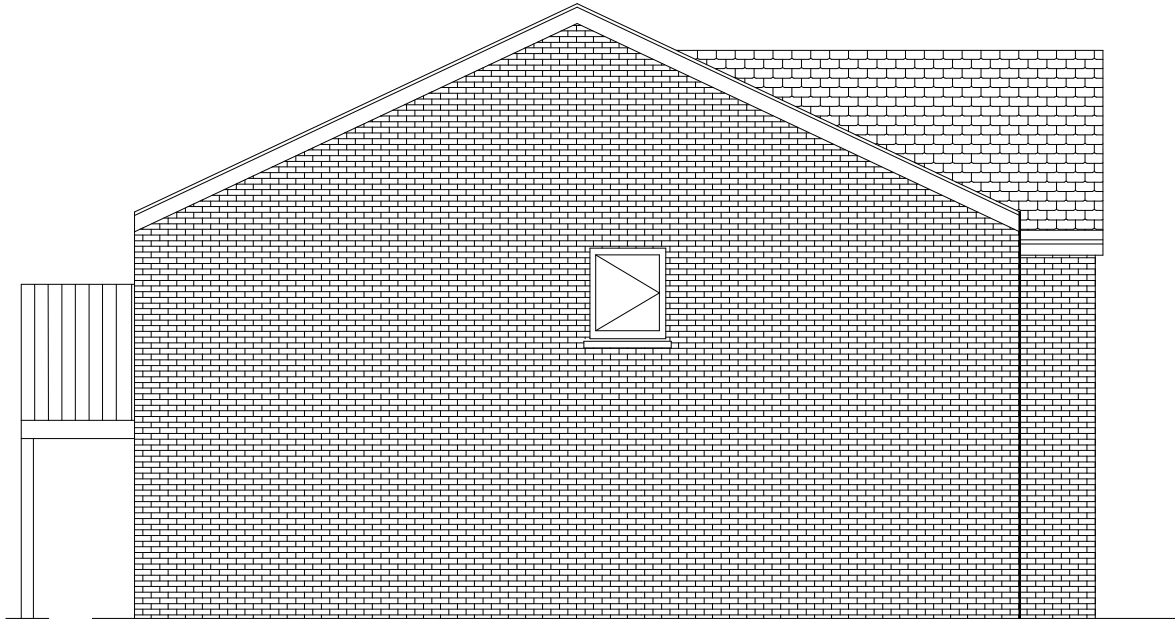
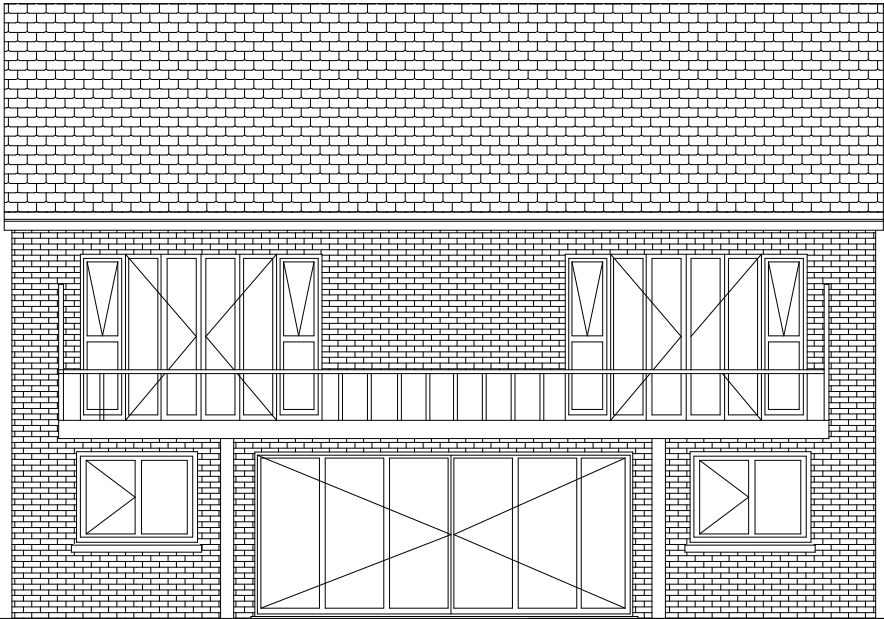
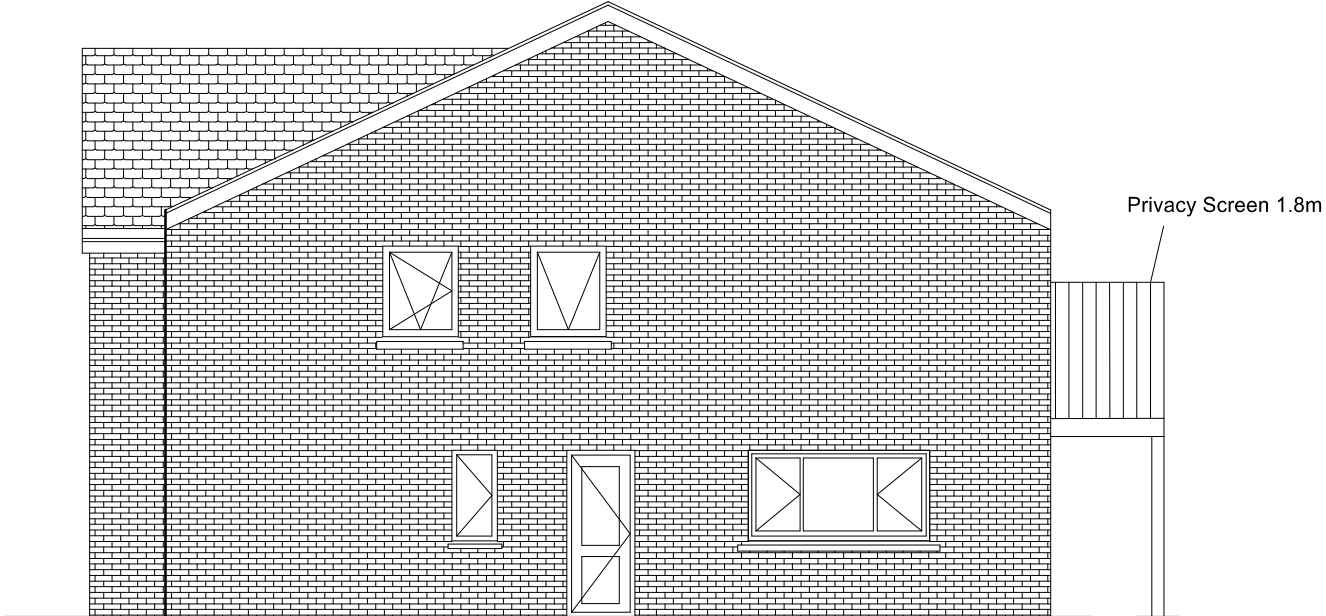
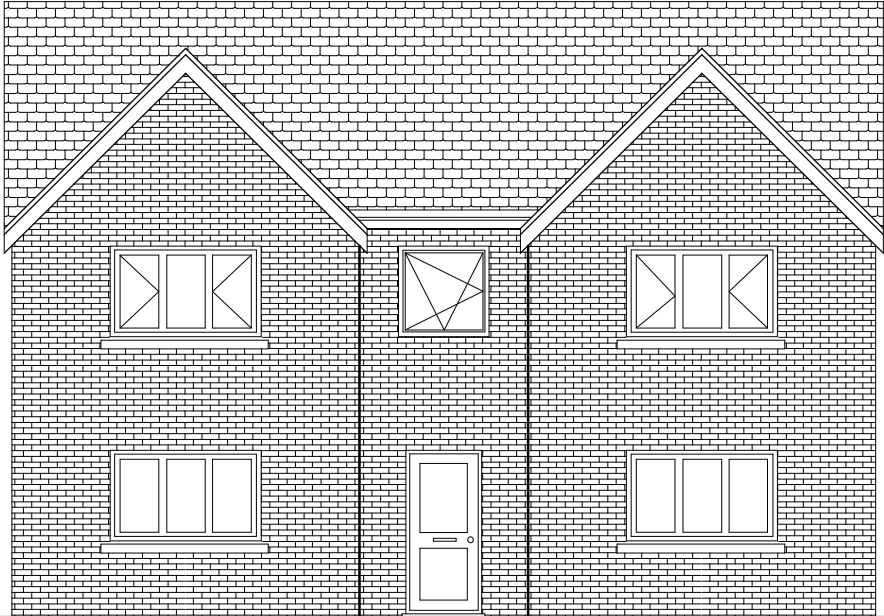


103, Brecon Rd, Pontardawe, Swansea
SA8 4PD

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Reference: OI997604
Centre coordinates: 272872 204776



Roger Roberts & Co Chartered Surveyors & Corporate Building Engineers 18a, Station Road, Ystradgynlais, Swansea, SA9 1NT. Tel/Fax, 01639-842013. Mobile 07960-742263		
CLIENT:	Mr Marcia Hanford Land adjacent to 103 Brecon Road Pontardawe Swansea SA9 4PD	DRAWN BY: <i>Luke Roberts HNC Building Studies</i>
PROJECT:	Proposed new dwelling	CHECKED BY: <i>Roger Roberts BSc (Hons), MRICS FBEng, Dip DEA</i>
TITLE: Proposed floor plans		
DATE:	SCALE:	DRAWING STATUS:
December 2015	1 : 100	Complete
© Plans are for guide Purposes only. Notes you are advised to confirm all dimensions on site.		



Roger Roberts & Co Chartered Surveyors & Corporate Building Engineers 18a, Station Road, Ystradgynlais, Swansea, SA9 1NT. Tel/Fax, 01639-842013. Mobile 07960-742263		
CLIENT:	Mr Martin Hanford Land adjacent to 103 Brecon Road Pontardawe Swansea SA8 4PD	DRAWN BY: <i>Luke Roberts JMC Building Studies</i>
PROJECT:	Proposed new dwelling	CHECKED BY: <i>Roger Roberts Bsc (Hons), MRICS FBEng, Dip DEA</i>
TITLE: Proposed elevations		
DATE: December 2015	SCALE: 1 : 100	DRAWING STATUS: Complete
© Plans are for guide Purposes only. Notes you are advised to confirm all dimensions on site.		

**NEATH PORT TALBOT COUNTY BOROUGH COUNCIL
CYNGOR BWRDEISTREF SIROL CASTELL-NEDD PORT TALBOT**

**TOWN AND COUNTRY PLANNING ACT 1990
THE TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT
PROCEDURE) (WALES) ORDER 2012**

APPROVAL OF FULL PLANNING PERMISSION

Name and address of the applicant Name and address of the agent

**Mr Martin Hanford
5 East Crossways
Pontardawe
SA8 4NJ**

**Mr Roger Roberts
18a Station Road
Ystradgynlais
SA9 1NT**

Whereas on the Wednesday, 06 July 2016 you submitted an application for the following development:-

PROPOSAL Detached two storey dwelling, including rear balcony
 plus detached garage
LOCATION Land adjacent to 103 BRECON ROAD
 PONTARDAWE SWANSEA

THE NEATH PORT TALBOT COUNTY BOROUGH COUNCIL AS THE LOCAL PLANNING AUTHORITY IN PURSUANCE OF ITS POWER UNDER THE ABOVE MENTIONED ACT AND ORDER HEREBY PERMITS THE DEVELOPMENT TO BE CARRIED OUT IN ACCORDANCE WITH THE APPLICATION AND THE PLANS SUBMITTED THEREWITH, SUBJECT TO COMPLIANCE WITH THE CONDITIONS SPECIFIED HEREUNDER:

Conditions:-

Time Limit Conditions

(1)The development hereby permitted shall be begun before the expiration of five years from the date of this permission.

Reason

To comply with the requirements of Section 91 of the Town and Country Planning Act 1990.

Approved Plans

(2) The development shall be carried out in accordance with the following approved plans and documents:

- 001 - Location Plan
- 002 - Block Plan
- 003 - Elevations - Amended Plan dated 13/10/16
- 004 - Floor Plan - Amended Plan dated 13/10/16
- 005 - Garage Plan
- 006 - Section Plan
- 007 - Site Section Plan
- 008 - Block Plan Showing Levels
- 009 - Street Scene dated 13/10/16

Reason

In the interests of clarity.

Pre-Commencement Conditions

(3) Prior to the commencement of work on site a scheme to assess the nature and extent of any contamination on the site, and confirmation of whether or not it originates on the site shall be submitted to and agreed in writing with the Local Planning Authority. The investigation and risk assessment must be undertaken by competent persons in accordance with the following document:- Land Contamination: A Guide for Developers (WLGA, WAG & EAW, July 2006) and shall be submitted as a written report which shall include:

(i) A desk top study to identify all previous uses at the site and potential contaminants associated with those uses and the impacts from those contaminants on land and controlled waters. The desk study shall establish a 'conceptual site model' (CSM) identifying all plausible pollutant linkages to be assessed.

(ii) a survey of the extent, scale and nature of contamination;

(iii) an assessment of the potential risks to:

- human health,
- ground waters and surface waters
- adjoining land,
- property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,

Reference No: P2016/0457

- ecological systems,
- archaeological sites and ancient monuments;

(iv) an appraisal of remedial options, and proposal of the preferred remedial option(s).

Reason

To ensure that information provided for the assessment of the risks from land contamination to the future users of the land, neighbouring land, controlled waters, property and ecological systems is sufficient to enable a proper assessment.

(4) Prior to the commencement of work on site a remediation scheme to bring the site to a condition suitable for the intended use by removing any unacceptable risks to human health, buildings, other property and the natural and historical environment shall be prepared and submitted to and agreed in writing with the Local Planning Authority. The scheme shall include all works to be undertaken, proposed remediation objectives, remediation criteria and site management procedures. The measures proposed within the remediation scheme shall be implemented in accordance with an agreed programme of works.

Reason

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors.

(5) Prior to the commencement of work, a scheme shall be submitted showing details of the boundary treatment including any front boundary treatment. This scheme shall be submitted and approved in writing by the Local Planning Authority and implemented prior to occupation of the dwelling as such and retained in perpetuity.

Reason

In the interest of clarity

Action Conditions

(6) Prior to beneficial use of the proposed development commencing, a verification report which demonstrates the effectiveness of the agreed remediation works carried out in accordance with condition (Please insert the condition number requiring remediation to be carried out) shall be submitted to and agreed in writing with the Local Planning Authority.

Reason

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors.

(7) No development shall take place until samples of the materials to be used in the construction of the external surfaces of the dwelling hereby permitted including the balcony details and finishes and garage finishes, have been submitted to and approved in writing by the local planning authority. Development shall be carried out in accordance with the approved details.

Reason

In the interest of the visual amenity of the area.

(8) Prior to first beneficial occupation of the dwelling hereby permitted, the shared driveway, 3 no. parking spaces (two in the garage and one parking space and turning area shall be laid out and be available for use. The spaces / turning area shall thereafter be retained for their intended use in perpetuity. The approved car parking spaces, turning area and driveway shall be hard surfaced in porous asphalt or permeable block paving or a provision must be made to direct run-off water from the hard standing to a permeable or porous area within the curtilage of the dwelling house to a maximum gradient of 1 in 9 and no less than 1 in 150. The drive/hard standing shall be drained so that no surface water including roof and yard flows out onto the public highway or vice versa and maintained as such thereafter.

Reason

In the interest of highway and pedestrian safety.

Regulatory Conditions

(9) In the event that contamination is found at any time when carrying out the approved development that was not previously identified, work on site shall cease immediately and shall be reported in writing to the Local Planning Authority. A Desk Study, Site Investigation, Risk Assessment and where necessary a Remediation Strategy must be undertaken in accordance with the following document:- Land Contamination: A Guide for Developers (WLGA, WAG & EAW, July 2006). This document shall be submitted to and agreed in writing with the Local Planning Authority. Prior to occupation of the development, a verification report which demonstrates the effectiveness of

Reference No: P2016/0457

the agreed remediation, shall be submitted to and agreed in writing with the Local Planning Authority.

Reason

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other off site receptors.

(10) Adequate provision shall be made for the drainage of the site, to ensure that the drainage of any adjoining land is not interrupted or otherwise adversely affected by the development.

Reason

To ensure satisfactory drainage of the land.

(11) There must be no interference, alteration or diversion of any ditch, watercourse, stream or culvert crossing or bordering the site, without prior consultation and agreement with the Local Authority.

Reason

To ensure satisfactory drainage of the land.

(12) No surface water and land drainage run off shall be allowed to connect/discharge, either directly or indirectly to the public sewerage system.

Reason

To ensure satisfactory drainage.

(13) Foul water and surface water discharges must be drained separately from the site.

Reason

To ensure satisfactory drainage.

(14) The garage shall be constructed in accordance with the garage plan drawing dated December 2015 and retained for such use only, thereafter.

Reason

In the interest of highway and pedestrian safety.

(15) Prior to occupation of the dwelling a vehicular footway crossing shall be provided.

Reason

In the interest of highway and pedestrian safety.

Reference No: P2016/0457

(16) Any gates shall be of a type which open inwards only, can be seen through and maintained as such thereafter.

Reason

In the interest of highway and pedestrian safety.

(17) Prior to occupation 2.4 metres x 43 metres visibility splays shall be provided in either direction at each of the points of access and retained as such thereafter.

Reason

In the interest of highway and pedestrian safety.

(18) Prior to any storage of materials or plant machinery on the public highway to enable works to commence within the site, a condition survey of the existing highway shall be submitted to and approved in writing by the Local Planning Authority. Should any damage occur to the highway as a consequence of any works within the adjoining development, the damage will be required to be made good by the developer to the satisfaction of the Highway Authority.

Reason

In the interest of highway and pedestrian safety.

(19) Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 1995 (as amended for Wales) (or any order revoking and re-enacting that Order with or without modification), no doors, windows or dormer windows (other than those expressly authorised by this permission) shall be constructed.

Reason

In order to safeguard the amenities of the area by enabling the Local Planning Authority to consider whether planning permission should be granted for additional windows, having regard to the particular layout and design of the estate.

(20) Notwithstanding the details submitted and prior to the occupation of the proposed dwelling all first floor side facing windows shall be glazed with obscured glass and any opening vent shall be top hinged with the lowest part of the opening a maximum of 1.7 metres above the floor level of that room, and any replacement window or glazing shall be of a similar glazing and type.

Reason

In the interest of the amenities of the adjoining property and the safety of the occupiers of the applicant dwelling.

Informatives

(1) If the works are required within the highway, the written consent of the Highway Authority shall be sought; this includes the placement of any skips, scaffolding, hoarding or any traffic management on the highway. You should therefore contact the Highway Maintenance Unit of Neath Port Talbot County Borough Council at The Quays, Brunel Way, Baglan Energy Park, Neath, SA11 2GG, for the attention of Gary Thomas, tel no 01639 686327 or email g.thomas3@npt.gov.uk to discuss any licences or approval required. This is required to be undertaken before any works commence on the Highway.

(2) The applicant should note that any soakaway must be designed, constructed and located in accordance with the requirements and criteria contained within the Building Regulations. This will ensure no nuisance is created to any lower lying, vulnerable land or the public highway. If drainage then the applicant must provide alternative suitable proposals for dealing with surface water run-off.

(3) The applicant may wish to consider providing and installing simple water butt or butts to collect run off water from the roof areas. The applicant can then use collected water, for non-portable uses, such as garden irrigation.

(4) The Developer should be aware that Dwr Cymru Welsh Water has not responded to the application, however, a plan has been attached to this consent showing the approximate location of a sewer that crosses the application site. No development shall take place within 3 metres either side of the pipeline that crosses the application site, the approximate position of which is shown in red on plan dated 05/10/2016.

REASON FOR GRANTING PLANNING PERMISSION

The decision to grant planning permission has been taken in accordance with Section 38 of the Planning and Compulsory Purchase Act 2004, which requires that, in determining a planning application the determination must be in accordance with the Development Plan unless material considerations indicate otherwise.

It is considered that the proposal represents an appropriate form of in-fill development consistent with the relevant development plan policies and one that will safeguard the amenities of neighbouring residents, visual amenity of the area and highway and pedestrian safety. As such the proposed development would accord with the requirements of policies SP3, SC1, SP21, BE1, SP20 and TR2 of the Neath Port Talbot Local Development Plan.

Signed : 
Nicola Pearce – Head Of Planning

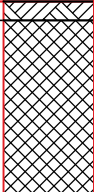
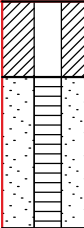
Date: 13/10/2016

Important Notes:

- (1) Please note that for all decisions issued after 16th March 2016 for outline or full planning permission, a revised decision notice will be issued whenever a subsequent consent is given, for example providing details of any Reserved Matters approvals (outline applications only) and/or approval of conditions (including on Reserved Matters). This will ensure that the current status of the conditions applied to a consent is clear. Accordingly you are advised to visit www.npt.gov.uk/planning to view the application documentation to see if this is the current version, or whether it has been superseded by a more up-to-date revision of this Decision Notice. For Reserved Matters approvals the revised Decision Notice will only be shown under the Outline approval.
- (2) The developer should have regard to Sections 4, 7, 8 and 8A of the Chronically Sick and Disabled Persons Act 1970 and to the British Standards Institution's Code of Practice for "Design of buildings and their approaches to meet the needs of disabled people" (BS 8300:2001).
- (3) Please note that any works carried out without compliance with the conditions attached to this approval will be entirely at the risk of the persons involved and may result in formal action being taken by the Local Planning Authority.
- (4) From 1st October 2012 it will be an offence to install a public sewer or lateral drain without having an adoption agreement in place. From the 1st October 2012 the vast majority of all existing private sewers and lateral drains which link with the public sewer network will transfer to Welsh Water. For further details on how this will affect your development please contact: Welsh Water developer Services, PO Box 3146, Cardiff, CF30 0EH. Telephone No. 0800 9172652 or email: developer.services@dwrcymru.com

APPENDIX II – Engineering Geologist’s Window Sample Logs & Photographs

Contract : Land adjacent to 103 Brecon Road Client : Martin Hanford			Window Sample No. WS1	
Dates : 11/7/19 - 11/7/19 Location :		Job Number : Q0057 Engineer : Quantum		Ground Level : Coordinates:

m B.G.L.	Samples		Sample Run		Strata				Water	Install/ Backfill
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)		
0					0.10	TOPSOIL: Dark brown sandy slight gravelly CLAY with frequent rootlets. Gravel is fine to coarse, sub-rounded to sub-angular, mudstone, sandstone, concrete. MADE GROUND: Loose to medium dense Black and dark brown silty slightly gravelly SAND. Gravel is fine to coarse, sub-angular to angular, slag, brick, ceramic, sandstone and mudstone.		0.10		
	0.30	ES 1			0.10			0.10		
	0.70	ES 2			0.95			0.95		
1					1.05	Brown and orangish brown slightly sandy gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, mudstone and sandstone.		1.05		
					0.15			0.15		
					1.20			1.20		
2										
3										
4										
5										
6										
7										

Equipment used: Dando Terrier Rig
Remarks:



Ty Berwig, Bynea, Llanelli
 SA14 9ST
 Tel: 01554744880
 Fax:
 email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

Sheet No.
1 Of 1

m Per Page
8

All measurements in metres unless otherwise stated



Contract : Land adjacent to 103 Brecon Road

Client : Martin Hanford

Borehole No.

WS1

Dates : 11/7/19 - 11/7/19

Job Number : Q0057

Ground Level :

Location :

Engineer : Quantum

Coordinates:



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email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

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All measurements in
metres unless
otherwise stated



Contract : Land adjacent to 103 Brecon Road Client : Martin Hanford							Window Sample No. WS2	
Dates : 11/7/19 - 11/7/19 Location :				Job Number : Q0057 Engineer : Quantum		Ground Level : Coordinates:		

m B.G.L.	Samples		Sample Run		Strata				Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0									
	0.30	ES 1			0.50	MADE GROUND: Loose to medium dense Black and dark brown silty slightly gravelly SAND. Gravel is fine to coarse, sub-angular to angular, slag, coal, brick, ceramic, sandstone and mudstone.		0.50	
	0.70	ES 2			0.50	Soft grey slightly gravelly slightly silty CLAY with occasional rootlets. Gravel is fine to coarse,		0.50	
					0.45			0.45	
1					0.95	Brown and orangish brown slightly sandy gravelly CLAY. Gravel is fine to coarse, rounded to sub-angular, mudstone and siltstone.		0.95	
					0.35			0.35	
					1.30	Refusal		1.30	
2									
3									
4									
5									
6									
7									

Equipment used: Dando Terrier Rig Remarks:									
---	--	--	--	--	--	--	--	--	--

	Ty Berwig, Bynea, Llanelli SA14 9ST Tel: 01554744880 Fax: email: enquiries@quantumgeotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		GB	J Phillips	1 Of 1	8		

Contract : Land adjacent to 103 Brecon Road

Client : Martin Hanford

Borehole No.

WS2

Dates : 11/7/19 - 11/7/19

Job Number : Q0057

Ground Level :

Location :

Engineer : Quantum

Coordinates:



Ty Berwig, Bynea, Llanelli
SA14 9ST
Tel: 01554 744880
Fax:
email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

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1 Of 1

m Per
Page
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All measurements in
metres unless
otherwise stated



Contract : Land adjacent to 103 Brecon Road Client : Martin Hanford							Window Sample No. WS3									
Dates : 11/7/19 - 11/7/19 Location :				Job Number : Q0057 Engineer : Quantum		Ground Level : Coordinates:										
m B.G.L.	Samples		Sample Run		Strata				Water							
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)								
0	0.50	ES 1			0.35	MADE GROUND: Loose to medium dense Black and dark brown silty slightly gravelly SAND. Gravel is fine to coarse, sub-angular to angular, slag, coal, brick, ceramic, sandstone and mudstone.		0.35								
0.35					Brown slightly silty slightly gravelly CLAY with low to medium cobble content. Gravel is fine to coarse, rounded to sub-angular, mudstone, coal, sandstone and siltstone. Cobbles of sub-angular sandstone.	0.35										
0.55						0.55										
0.90					Refusal	0.90										
1																
2																
3																
4																
5																
6																
7																
Equipment used: Dando Terrier Rig Remarks:																
Ty Berwig, Bynea, Llanelli SA14 9ST Tel: 01554744880 Fax: email: enquiries@quantumgeotech.co.uk					Operator: GB		Logged By: J Phillips		Sheet No. 1 Of 1		m Per Page 8		All measurements in metres unless otherwise stated			

Contract : Land adjacent to 103 Brecon Road

Client : Martin Hanford

Borehole No.

WS3

Dates : 11/7/19 - 11/7/19

Job Number : Q0057

Ground Level :

Location :

Engineer : Quantum

Coordinates:



Ty Berwig, Bynea, Llanelli
SA14 9ST
Tel: 01554 744880
Fax:
email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

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m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Land adjacent to 103 Brecon Road

Client : Martin Hanford

Borehole No.

WS4

Dates : 11/7/19 - 11/7/19

Job Number : Q0057

Ground Level :

Location :

Engineer : Quantum

Coordinates:



Ty Berwig, Bynea, Llanelli
SA14 9ST
Tel: 01554 744880
Fax:
email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

Sheet No.
1 Of 1

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Land adjacent to 103 Brecon Road Client : Martin Hanford								Window Sample No. WS5		
Dates : 11/7/19 - 11/7/19 Location :				Job Number : Q0057 Engineer : Quantum		Ground Level : Coordinates:				
m B.G.L.	Samples		Sample Run		Strata				Water	Install/Backfill
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)		
0					0.10	MADE GROUND: Grey gravelly CLAY with medium cobble content. Gravel is fine to coarse sub-angular to angular sandstone. MADE GROUND: Loose to medium dense Black and dark brown silty slightly gravelly SAND. Gravel is fine to coarse, sub-angular to angular, sandstone and mudstone. Cobbles sub-angular sandstone.		0.10		
				0.10				0.10		
				0.30				0.30		
					0.40	Brown and orangish brown slightly sandy gravelly CLAY. Gravel is fine to coarse, rounded to sub-angular, mudstone and siltstone.		0.40		
				0.80				0.80		
1					1.20	Refusal		1.20		
2										
3										
4										
5										
6										
7										
Equipment used: Dando Terrier Rig Remarks:										
		Ty Berwig, Bynea, Llanelli SA14 9ST Tel: 01554744880 Fax: email: enquiries@quantumgeotech.co.uk		Operator: GB	Logged By: J Phillips	Sheet No. 1 Of 1	m Per Page 8	All measurements in metres unless otherwise stated		

Contract : Land adjacent to 103 Brecon Road

Client : Martin Hanford

Borehole No.

WS5

Dates : 11/7/19 - 11/7/19

Job Number : Q0057

Ground Level :

Location :

Engineer : Quantum

Coordinates:



Ty Berwig, Bynea, Llanelli
SA14 9ST
Tel: 01554 744880
Fax:
email: enquiries@quantumgeotech.co.uk

Operator:
GB

Logged By:
J Phillips

Sheet No.
1 Of 1

m Per
Page
2

All measurements in
metres unless
otherwise stated



APPENDIX III – Post-Fieldwork Landgas & Groundwater Monitoring Records

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Page 1 of 1

Project Name:	Brecon Road
Project No.:	Q0057
BH/TP No.:	WS1
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Analyser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
	A	50mm	1.20	0.3-1.2

[illegible]

Page 1 of 1

Project Name:	Brecon Road
Project No.:	Q0057
BH/TP No.:	WS4
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Analyser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
	A	50mm	1.60	0.3-1.6

[illegible]

Page 1 of 1

Project Name:	Brecon Road
Project No.:	Q0057
BH/TP No.:	WS5
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Analyser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
	A	50mm	1.20	0.4-1.2

[illegible]

APPENDIX IV – Geo-Environmental Laboratory Test Results



James Phillips
Quantum Geotechnic Ltd
Ty Berwig
Bynea
Llanelli
SA14 9ST

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

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

e: jamesphillips@quantumgeotech.co.uk

Analytical Report Number : 19-49659

Project / Site name:	Land adjacent to Brecon Road	Samples received on:	15/07/2019
Your job number:	Q0057	Samples instructed on:	15/07/2019
Your order number:		Analysis completed by:	23/07/2019
Report Issue Number:	1	Report issued on:	23/07/2019
Samples Analysed:	2 leachate samples - 4 soil samples		

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (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.

Analytical Report Number: 19-49659

Project / Site name: Land adjacent to Brecon Road

Lab Sample Number				1265996	1265997	1265998	1265999	
Sample Reference				WS1	WS2	WS2	WS4	
Sample Number				1	1	2	1	
Depth (m)				0.30	0.30	0.70	0.30	
Date Sampled				12/07/2019	12/07/2019	12/07/2019	12/07/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	16	16	22	15	
Total mass of sample received	kg	0.001	NONE	0.97	0.94	1.2	0.47	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.3	7.2	7.1	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Total Sulphate as SO ₄	mg/kg	50	MCERTS	960	1200	480	750	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.019	0.15	0.078	0.042	
Sulphide	mg/kg	1	MCERTS	< 1.0	3.4	3.9	< 1.0	
Organic Matter	%	0.1	MCERTS	10	10	3.8	11	
Total Organic Carbon (TOC)	%	0.1	MCERTS	6.0	6.0	2.2	6.4	

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.28	0.29	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	0.35	0.49	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	1.8	2.9	< 0.05	0.78	
Anthracene	mg/kg	0.05	MCERTS	0.37	0.67	< 0.05	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	4.6	6.7	< 0.05	0.71	
Pyrene	mg/kg	0.05	MCERTS	3.9	5.4	< 0.05	0.59	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.9	4.4	< 0.05	0.55	
Chrysene	mg/kg	0.05	MCERTS	3.6	5.0	< 0.05	0.72	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	4.2	6.3	< 0.05	0.70	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.0	3.5	< 0.05	0.49	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.8	5.1	< 0.05	0.53	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	3.2	< 0.05	0.35	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.78	0.96	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.7	3.3	< 0.05	0.44	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	34.5	48.4	< 0.80	5.86	
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Analytical Report Number: 19-49659

Project / Site name: Land adjacent to Brecon Road

Lab Sample Number				1265996	1265997	1265998	1265999	
Sample Reference				WS1	WS2	WS2	WS4	
Sample Number				1	1	2	1	
Depth (m)				0.30	0.30	0.70	0.30	
Date Sampled				12/07/2019	12/07/2019	12/07/2019	12/07/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	40	57	30	67	
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.6	0.6	1.1	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.0	2.5	< 0.2	2.6	
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	20	13	14	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	130	18	110	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	180	200	21	120	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	0.5	0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	150	73	14	46	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	3.2	1.7	1.9	< 1.0	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	530	520	25	830	

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	160	170	< 10	28	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	27	23	< 10	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	130	140	< 10	18	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	160	170	< 10	28	



Analytical Report Number: 19-49659
Project / Site name: Land adjacent to Brecon Road

Lab Sample Number				1266000	1266001			
Sample Reference				WS1	WS4			
Sample Number				1	1			
Depth (m)				0.30	0.30			
Date Sampled				12/07/2019	12/07/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Hardness - Total	mgCaCO ₃ /l	1	NONE	45.2	56.6			
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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	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	7.2	7.7			
Barium (dissolved)	µg/l	0.05	ISO 17025	58	44			
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	2.8	2.5			
Copper (dissolved)	µg/l	0.7	ISO 17025	9.1	5.5			
Lead (dissolved)	µg/l	1	ISO 17025	20	12			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	5.9	1.8			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Vanadium (dissolved)	µg/l	1.7	ISO 17025	9.0	5.4			
Zinc (dissolved)	µg/l	0.4	ISO 17025	55	65			

Calcium (dissolved)	mg/l	0.012	ISO 17025	15	21			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.8	1.3			

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10)	µg/l	10	ISO 17025	< 10	< 10			
Diesel Range Organics (C10 - C25)	µg/l	10	NONE	< 10	< 10			
Oil Range Organics (C25 - C40)	µg/l	10	NONE	< 10	< 10			



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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1265996	WS1	1	0.30	Brown loam and sand with gravel and vegetation.
1265997	WS2	1	0.30	Brown loam and sand with gravel and vegetation.
1265998	WS2	2	0.70	Brown clay and sand with gravel and vegetation.
1265999	WS4	1	0.30	Black sandy loam with gravel and vegetation.

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
DRO (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphénylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	ISO 17025
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

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The results included within the report are representative of the samples submitted for analysis.

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Project / Site name: Land adjacent to Brecon Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests [™]	L009-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPH Oils (Leachate)	Determination of dichloromethane/hexane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.