A CAF GROUP COMPANY

ENVIRONMENT

Lightsource BP
Prosiect Maen Hir – South A
Anglesey
Phase 1 Geo-Environmental Assessment

www.bwbconsulting.com

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Notice

EXECUTIVE SUMMARY

Executive Summary	
Proposed Development	The proposed development is anticipated to comprise solar, battery storage, possibly green hydrogen, and possibly other alternative green technologies.
Current Site Setting	The site predominantly comprises agricultural land utilised for grazing animals. Several ponds are present across the site, with occasional derelict buildings in the south and central areas. Several small water courses are present along field boundaries.
Site History	The site has remained largely undeveloped over the historical mapping period, predominantly utilised for agricultural purposes, with limited farm buildings present. Several small old quarries have been identified across the site which have either been infilled or become ponds. A former quarry in the south west was subsequently utilised as a landfill (inert, commercial, industrial and household wastes). A brickworks and clay pit were also present in the south west of site. The surrounding land uses are broadly similar, comprising agricultural land with associated farm buildings. Small quarries and ponds are mapped in the surrounding area, with some possibly now infilled. Tanks are identified near to the site associated with agricultural premises.
Ground Conditions	Ground conditions are anticipated to predominantly comprise Devensian Till overlying bedrock of the Ordovician Rocks. Igneous intrusions are mapped in the north east and the Central Anglesey Shear Zone and Berw Shear Zone in the south west. Localised Made Ground is expected in the vicinity of the former brickworks, landfill site and old quarries. The Till is categorised as an undifferentiated Secondary Aquifer whilst all bedrock geologies mapped underlying the site are categorised as Secondary B Aquifers.
Geotechnical Review	Shallow spread foundations are likely to be viable across most of the site, except possibly in the areas of the landfill, brickworks and other areas of infilled ground. Shallow bedrock may need breaking out to facilitate this locally. Earthworks are likely to be required where steep gradients are present.
Environmental Review	Limited sources of contamination have been identified across most of the site given the lack of historic development. However, the landfill does represent a potential source of contamination. The risk to human health receptors is considered to be low across most of the site, increased to moderate/low within the former landfill area. The risk to controlled water receptors is considered to be very low based on the lack of a significant contamination source across most of the site, increased to moderate/low in areas associated with the former landfill.
Recommendations	Once the development masterplan is defined, it is recommended that ground investigation is undertaken to quantify the contaminant linkages identified within conceptual site model. It is recommended that intrusive ground investigation is undertaken in areas where bedrock outcrops are known/suspected to be present in order to inform foundation design.
This summary should be read in conjunction with BWB's full report (ref. MSF-BWB-ZZ-XX-RP-YE-0004_Ph1-South A) and reflects an assessment of the site based on information received by BWB at the time of production.	

CONTENTS

FIGURES

TABLES

DRAWINGS

APPENDICES

1. INTRODUCTION

Instruction

1.1 BWB Consulting (BWB) was instructed by Lightsource BP (the Client) to carry out a Phase 1 Geo-Environmental Assessment for the site at Prosiect Maen Hir – South A, Anglesey.

1.2 The proposed development is anticipated to comprise solar, battery storage (BESS), possibly green hydrogen, and possibly other alternative green technologies.

Objectives

1.3 This report has been completed to present pertinent information into the environmental risks and liabilities associated with the site. It has been completed to fulfil the requirements of a preliminary risk assessment in accordance with BS 10175:2011+A2:2017 *'Investigation of potentially contaminated sites, code of practice'* and EA Guidance on Risk Management of Land Contamination https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm.

1.4 The report has also been prepared with reference to land contamination technical guidance available through https://www.gov.uk/government/collections/land-contamination-technical-guidance.

1.5 The objectives of this report are to:

- Assess historical activities at the site with respect to their potential impact on the site environment;
- Characterise the environmental setting of the site, identify migration pathways and vulnerable receptors for contamination originating at the site, focusing on potential soil and groundwater liabilities;
- Assess historical and current surrounding land use in relation to known or potential off-site contamination issues that may impact the site;
- Review existing site investigation and remediation information for the site, where available;
- Develop a preliminary Conceptual Site Model (CSM); and
- Assess potential environmental liabilities associated with the site.

Scope of Work

1.6 The scope of work included:

- A site visit to inspect the current site and immediate surroundings, identify potential hazards associated with ground conditions or contamination and to determine potential constraints with regards to ground investigation (photographs presented as **Appendix 1**);
- A review of the following information:
    - Groundsure Report ref. GS-QZQ-PUX-655-UU6 (**Appendix 2**);

- Historical Ordnance Survey Mapping (**Appendix 3**);
- Historical aerial photographs (Google Earth) and other imagery (Groundsure Report);
- British Geological Survey (BGS) 1:50 000 Scale, '*Anglesey*', (Sheets 92, 93, 94, 105 & 106), Drift, (1974);
- British Geological Survey (BGS) 1:50 000 Scale, '*Anglesey*', (Sheets 92, 92, 94, 105 & 106), Solid, (1980);
- BGS online geological maps and exploratory hole records (www.bgs.ac.uk);
- MAGIC website (www.natureonthemap.naturalengland.org.uk/magicmap); and
- Coal Authority Interactive Map Viewer (http://mapapps2.bgs.ac.uk/coalauthority/home.html);

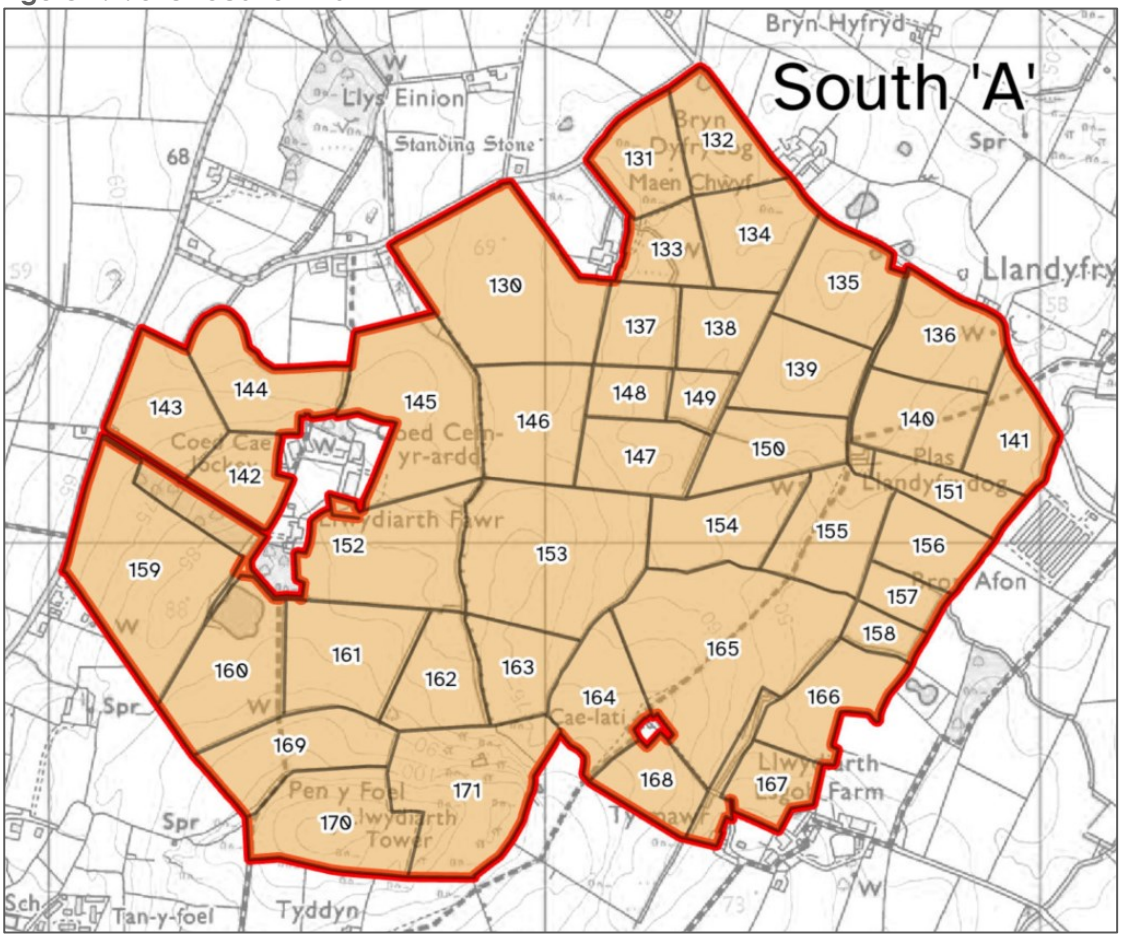
- A summary of the key hazards or uncertainties that require additional investigation in order to further characterise the associated risks; and
- Production of a Geo-Environmental Assessment (this report), concluding in a qualitative assessment of the risks from contamination and ground-related constraints which may impact on the site.

2. THE SITE

Site Location

2.1 The site comprises numerous field parcels located to the north west of Llanerchymedd, in Anglesey, centred at approximate National Grid Reference 243046 385054. The approximate location of the site is shown below in **Figure 2:1.**

Figure 2:1: Site Location Plan



Site Description

2.2 The site comprises an irregular shaped parcel of land covering an area of approximately 191 hectares. BWB undertook a site walkover on 18th and 19th July 2024, selected photographs are presented in **Appendix 1**. A site layout plan is presented within **Drawing 1**.

2.3 The site predominantly comprised agricultural fields which were undulating in nature and utilised for grazing cattle/sheep. Abandoned/derelict farm buildings and a shipping container were present centrally, southeast of Field 150. A farming structure used to store wool, as well as a small gravel stockpile was present just beyond the northwest of Field 160.

2.4 Possible quarrying features were present in several field parcels. Several boulders were present in field 131 and 135, possibly indicative of historical quarrying activity. Ponds were present in areas of historical quarrying activity in Fields 132 and 135. A pond was present in the northwest of Field 160.

2.5 Overhead services were present crossing numerous fields, predominately in the east of the site. Rock outcrops were observed in the south of the site (Fields 170 and 171), as well as a derelict building, Llwydiarth Tower, and potential remnant waste materials associated with the former quarry. Several minor water courses cross the site which were generally in the form of ditches along field boundaries.

2.6 The surrounding areas predominantly comprised agricultural land, similar to those present on site, with farm buildings located adjacent to some of the fields across site.

3. ANTICIPATED GROUND CONDITIONS

3.1 The anticipated ground conditions for the site and controlled waters vulnerability is discussed within this Section.

Geology

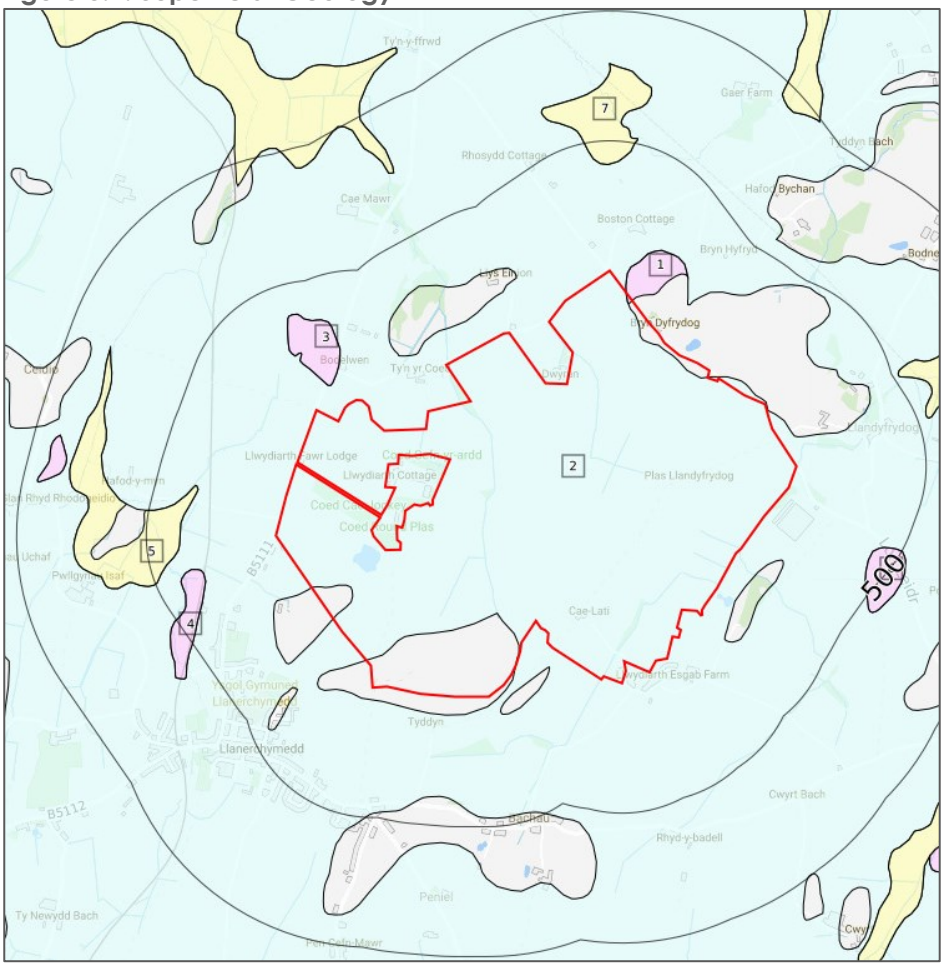
Made Ground

3.2 Made Ground is not mapped on site but there are expected to be localised areas of Made Ground around the landfill site, former buildings, brick works, quarries and access tracks.

Superficial Geology

3.3 Information published by the BGS indicates that a large proportion of the site is underlain by Devensian Till superficial deposits, indicated by the pale blue areas on **Figure 3:1** below. Localised Glaciofluvial Deposits (sand and gravel) are mapped partially overlapping the north eastern site boundary (pink areas). Superficial deposits are locally absent in the south, south west and north east of site.

Figure 3:1: Superficial Geology

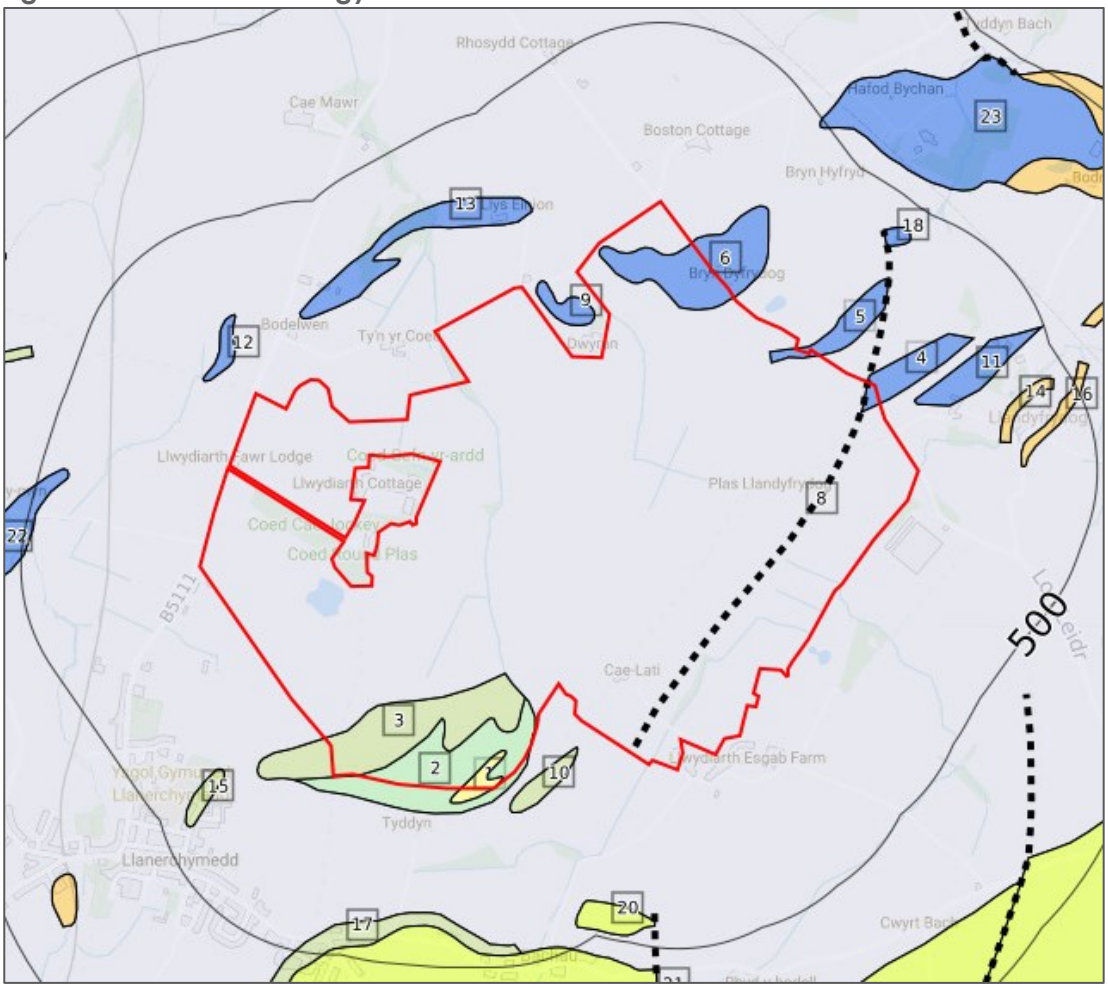


Bedrock Geology

3.4 The underlying bedrock predominantly comprises Ordovician Rocks (interbedded mudstone and sandstone – pale gey areas on **Figure 3:2**). Interbedded sandstone and conglomerate of the Ordovician Rocks are mapped in the south of the site (pale green, ref. 3) alongside schist and mica (pale green areas, ref. 2) and schist and quartz (yellow area, ref. 1) of the Central Anglesey Shear Zone and Berw Shear Zone in the south of site.

3.5 Igneous intrusions (picrite) are mapped in the north east of the site. A fault is mapped in the south east of site, trending in a north east to south west direction (black dashed line).

Figure 3:2: Bedrock Geology



Site Specific Ground Investigation Data

3.6 There are no publicly available BGS boreholes located within the site boundary.

Hydrogeology

3.7 The Till is categorised as an undifferentiated Secondary Aquifer, whilst the Glaciofluvial Deposits are categorised as a Secondary A Aquifer. All bedrock geologies mapped underlying the site are categorised as Secondary B Aquifers.

3.8 The site is not indicated to be within, or within close proximity to a groundwater Source Protection Zone, as designated by Natural Resources Wales.

3.9 There are no current or historical abstraction licences relating to groundwater on site or within 1km and there are no active discharge consents relating to groundwater on or near the site.

Surface Waters

3.10 Numerous water courses are present within the site and immediate surrounding area. The springs emanating from site tend to flow towards the north or north east. Two springs are mapped in the south west of site, with springs also mapped off site to the north east.

3.11 There are no potable surface water abstractions located near the site.

3.12 There are no surface water discharge consents listed on site. The closest discharge consents are mapped adjacent to the eastern boundary, listed as agricultural effluent issuing into tributaries of Afon Goch.

3.13 A pollution incident is listed in the north of the site, dating back to 2002. No pollutant description is provided, with a minor impact recorded to a water receptor and so there is unlikely to be any significant on-going contamination source.

3.14 Two Water Framework Directive (WFD) surface water body catchments are mapped on site;

- Upstream Llyn Alaw, covering the western half of the site: which had an overall rating of good, a 'good' chemical rating and a 'good' ecological rating in 2016; and
- Goch Dulas, covering the eastern half of the site: which had an overall rating of moderate with a 'good' chemical rating and a 'moderate' ecological rating in 2016.

Ground Gas and Radon

3.15 Localised Made Ground and a former landfill are present on site which represent a potential source of elevated ground gasses.

3.16 Radon levels across the majority of the site are indicated to be less than 1%. However, this is increases to 1-3% in the south west and north east of the site where the igneous intrusions and the Central Anglesey Shear Zone and Berw Shear Zone are mapped. Radon protection measures are not indicated to be required.

Mining and Mineral Extraction

3.17 The entire site is indicated to be located in an area where sporadic or localised underground mining of restricted extent is possible.

3.18 The former Pen Y Foel quarry is mapped in the south of the site, formerly extracting igneous/metamorphic rock. Coed Cae Jockey Brickworks was present with localised clay and shale extraction in the west of the site, extracting clay and shale.

3.19 The Groundsure Report lists several small historical quarries both on and near to the site which largely correlate to the historical mapping as discussed in **Section 4**, with most dating back to pre-1880s.

Environmental Sensitivity

3.20 The entire island of Anglesey is part of Geomon Global Geopark as designated by UNESCO.

3.21 Three small areas of woodland are mapped within and immediately adjacent to the western site boundary which are categorised as an Ancient Semi Natural Woodland or Restored Ancient Woodland.

3.22 Agricultural land classification on site ranges from a Grade 5 (very poor quality) to a Grade 2 (good quality).

4. SITE HISTORY

4.1 Historical Ordnance Survey (OS) mapping for the site area has been reviewed. These maps and plans date from 1887 to 2024. The historical plans reviewed are provided in **Appendix 3**. The key points of the historical development of the site and surrounding area are summarised below, with pertinent locations shown on **Drawing 1**.

On site

4.2 The site has remained relatively undeveloped throughout mapped history and has been utilised predominantly for agricultural purposes. The following site features have been identified on the historical mapping.

- **Old Quarries** – An old quarry (Pen y Foel) is mapped along the southern boundary from the earliest mapping and listed as a **Refuse Tip** from the 1970s. A former old quarry is mapped adjacent to the south eastern boundary, which may have extended onto the site. Several former quarries are mapped in the centre, north and north east of site, some appearing to be infilled or some have become ponds.
- **Brick Works, Kiln and Clay Pit** – mapped within the west of the site from 1900 plans. The brick works have been demolished by the 1970s, with the clay pit indicated to be a pond.
- **Farm buildings** – Most farm buildings are not included within the site boundary, although small buildings are mapped in the west, south, south east, and east of site. Llwydiarth Tower is mapped in the south of site.
- **Surface water features** – Ponds are mapped in the north and north east of site which could represent former small quarries. A spring is mapped in the centre of the site described as a well from the 1970s.

Off-site

4.3 The surrounding land areas have seen similar historical land usages, predominantly being utilised for agricultural purposes with associated farm buildings. The following site features have been identified on the historical mapping.

- **Farm Buildings** – farm buildings are encompassed by the site and present adjacent to site boundaries. Llwydiarth Fawr is indicated to have **tanks** present on site from the 1970s. A **poultry farm** (Bron Afon) with associated **tanks** is mapped adjacent to the eastern boundary form the 1970s.
- **Small quarries/pits** – Numerous small old quarries are located near to the site boundary, including with Llwydiarth Fawr.
- **Surface water features** – Two springs are mapped with Llwydiarth Fawr, with further springs and water courses in the surrounding area.
- **Workhouse, Hospital and Infirmary** – mapped adjacent to the western boundary from the earliest plans, indicated to have been used as council offices from the 1970s.

Operational / Company Records

4.4 No operational records have been made available for review as part of this assessment.

Summary of Site History

4.5 The site has remained largely undeveloped over the historical mapping period, predominantly utilised for agricultural purposes, with a small number of buildings present. A former brickworks was present in the west of the site, and a refuse tip is mapped along the southern boundary in the area of a former quarry. Several small old quarries have been identified across the site, with some having possibly been infilled.

4.6 The surrounding land uses are broadly similar, comprising agricultural land with associated farm buildings and associated tanks. Small quarries and ponds are mapped in the surrounding area, with some possibly now infilled.

5. REGULATORY SETTING

Permits Consents and Authorisations

5.1 A full listing of permits, consents and authorisations including discharge consents, pollution incidences and other environmental information, is included in the Groundsure report, presented in **Appendix 2**.

5.2 Several Part A1 permits are listed 80m east of site associated with the Bron Afon Poultry Farm. No other significant features have been identified which are considered likely to have had a detrimental impact on the site.

Landfilling and Waste Management

5.3 A full listing of EA, BGS and Local Authority recorded landfills are provided in the Groundsure report presented in **Appendix 2**.

5.4 A former landfill is mapped in the south of site within the former Pen y Foel quarry. The waste type is listed as inert, industrial, commercial, household, and liquid sludge, indicated to have been operational between 1948 and 1975. Based on the area of landfilling mapped, it is likely that landfilling occurred to restore site levels following quarrying so that the site could be used for agricultural purposes. The area of landfilling is indicated on historical mapping to have been circa 100m long (east to west) and 50m wide (north to south) and so is reasonably limited in its extents.

5.5 There are no waste exemption permits listed on site, however, there are a number identified in the surrounding area. They relate to various small-scale agricultural processes including; deposits of dredging's from water courses, spreading waste on agricultural land to confer benefit, use of waste for a specified purposes, burning waste in the open, use of waste in construction, storage of waste in a secure place/containers, all listed within 200m of the site.

6. GEOTECHNICAL APPRAISAL

6.1 The Groundsure report, site history, current site setting and geology setting have all been considered in order to provide an indication of the potential ground related constraints and opportunities in the context of the proposed development as set out in **Table 6:1**.

Table 6:1: Ground Related Constraints & Opportunities

Potential Constraint / Opportunity	Explanation	Potential Mitigation Options
Preliminary Foundation Solution	Shallow spread foundations are likely to be viable across the majority of the site, bearing onto the till or bedrock. Deeper foundations such as piles may be required in areas of deep Made Ground or landfill material.	Ground investigation should be undertaken to confirm ground conditions at the site and allow for in-situ and laboratory testing to inform foundation design.
Rock Outcrops	There are areas of the site where visible rock outcrops are present. Additionally, in areas where superficial deposits are absent or thin, hard bedrock deposits may be present at shallow depth.	Shallow hard bedrock may need to be broken out to facilitate the construction of foundations. It is recommended that ground investigation is undertaken in areas where superficial deposits are not mapped to see how deep the competent bedrock is.
Earthworks	Localised earthworks may be required in areas where increased gradients are present to create development plateaus.	Investigation may be required in areas of steep gradients and Made Ground to assess the viability of earthworks.
Topsoil / Made Ground	Topsoil is expected to be present across the majority of the site. Limited Made Ground is expected to be present across much of the site.	There is likely to be a surplus of Topsoil which could be retained on site or potentially sold as a commodity. Made Ground could potentially be reused on site, subject to investigation and chemical analysis. Material within the landfill is categorised as a waste and cannot be moved without a permit.
Ground Subsidence Risks	The Groundsure Report indicates a low to negligible risk on site associated with shrink/swell clays, running sands, collapsible deposits, landslides, compressible deposits and dissolution of soluble rocks across most of the site. A moderate landslide risk is reported in the south of the site, surrounding the former landfill.	Intrusive investigation is recommended to inform the potential compressibility risk.
Mineral Extraction	Notwithstanding the Pen y Foel landfill site, several former small quarries are present on site, some of which may have been infilled.	Ground investigation should be undertaken to confirm the ground conditions in these areas.

Potential Constraint / Opportunity	Explanation	Potential Mitigation Options
	This represents a risk of Made Ground being present in these areas, or shallow bedrock.	
Drainage and Soakaways	Soils on site are likely to have low permeability and soakaway drainage is unlikely to be viable.	Should soakaways be considered as part of the drainage strategy, it is recommended that infiltration testing in accordance with current guidance is undertaken.
UXO	Review of the unexploded ordnance risk maps available online indicates the site to be in an area of low risk from UXO.	No further assessment required.

7. PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

Introduction

7.1 The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance that has the potential to cause harm, while a risk is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.

7.2 Three impact potentials exist for any given site, all of which need to be considered in a risk assessment, which are:

- The site impacting upon itself;
- The site impacting on its surroundings; and
- The surroundings impacting on the site.

7.3 The following sections discuss all the identified potential on and off-site sources, pathways and receptors in the context of the proposed development and plausible contaminant linkages which may represent a risk to identified receptors such as human health and/or controlled waters from the data gained from the desk study.

7.4 The assessment is qualitative and aimed to determine all likely contaminant linkages, with consideration of significance and allowing for uncertainties.

7.5 **Sources (S):** These are potential or known sources of contamination that may relate to a former land use or present site feature or process (e.g. fuel storage tanks).

7.6 **Pathways (P):** A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by which the identified receptors may be impacted upon in the context of the proposed development.

7.7 **Receptors (R):** Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by contaminant(s).

Conceptual Site Model

7.8 Consideration has been given to the likely sources, pathways and receptors which may be present, based on the information in the previous sections. These are presented in **Table 7:1** and

7.9 **Table 7:**2 and further information about the risk classification scheme is included within **Appendix 4**, with reference to CIRIA C552 '*Contaminated land risk assessment - a guide to good practice*'.

7.10 A tabulated version of the Preliminary CSM based on the desk study and site observations is presented in **Table 7:3.**

Table 7:1: Potential Sources of Contamination

Location	Potential Source	Contaminants of Potential Concern (CoPC)
On-site	Localised **Made Ground** associated with **former brick works, buildings, tracks**, **infilled ponds** or **quarries**.	• Heavy metals • Inorganics, such as cyanides, sulphates and nitrates • Acids & Alkalis • Polycyclic Aromatic Hydrocarbons (PAH) • Petroleum hydrocarbons • Asbestos • Methane, carbon dioxide
	Waste materials within former **Landfill site**.	• Heavy metals • Inorganics, such as cyanides, sulphates and nitrates • Acids & Alkalis • PAH • Volatile and Semi-Volatile Organic Compounds (VOCs and SVOCs) • Petroleum hydrocarbons • Asbestos • Methane, carbon dioxide
Off-site	**Made Ground** and potential contamination associated with neighbouring **farm activities**, and **infilled small ponds/quarries**.	• Heavy metals • Inorganics, such as cyanides, sulphates and nitrates • PAH • Petroleum hydrocarbons • Methane, carbon dioxide

Table 7:2: Relevant Potential Pathways and Receptors

Receptors	Pathways
Human Health: • Future site users • Intrusive maintenance workers	• Dermal contact with soil or dust • Incidental ingestion of soil and/or dust • Inhalation of vapours • Inhalation of dust and/or fibres • Migration and accumulation of ground gas in enclosed spaces leading to inhalation or explosion
Controlled Waters: • Groundwater (Secondary Aquifers) • Surface water features across site.	• Leaching of soil contaminants • Vertical and lateral migration • Surface run-off
Property: • Underground utilities • Building structures	• Direct Contact • Accumulation and explosion of gas

Table 7:3: Preliminary Conceptual Site Model

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
On Site Sources - Former Landfill Site	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users	Mi	Lw	L	Made Ground is expected in the former landfill area. Following development, it is anticipated that limited human interaction with the soils is likely to happen, based on the proposed end use. Where a viable pollutant pathway exists, the provision of a clean capping layer would restrict direct access to potentially contaminated soils. It is recommended that an intrusive ground investigation be completed to assess the extent of any potential contamination associated with the landfill.
		Intrusive maintenance workers	Md	Lw	M/L	The exposure of intrusive maintenance workers can be mitigated by the adoption of suitable working methods, utilising appropriate personal protective equipment (PPE) and maintaining good hygiene. If significant asbestos is recorded, the requirements of the Control of Asbestos Regulations (CAR) 2012 should be complied with.
	Inhalation of vapours	Future site users	Mi	Lw	L	There is a potential for VOC/SVOC impact within the former landfill site. If there are no enclosed spaces around the former landfill, The risk to future site users would be minimal. If enclosed spaces are proposed in the area of the former landfill, potential sources of vapours such as Made Ground and contaminated soils/groundwater could potentially be mitigated through removal or treatment prior to construction or the installation of protection measures may be required during construction to mitigate the potential risk to future site users from vapours.
		Intrusive maintenance workers	Md	Lw	M/L	In the event that elevated concentrations of volatile contaminants are identified during ground investigation works and where entry into confined spaces/excavations is required by intrusive maintenance workers, it is recommended that a combination of the following may be required to mitigate the potential risk of exposure to vapours: • appropriate PPE and/or Respiratory Protective Equipment (RPE); • monitoring equipment (such as explosive level meters); and • safe entry procedures.
	Migration and accumulation of ground gases in enclosed	Future site users	Md	Ul	L	Landfill material could represent a source of ground gas.

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
	spaces leading to asphyxiation (carbon dioxide) or explosion (methane).					The proposed development is likely to have limited enclosed spaces that would warrant ground gas protection measures. However, if enclosed spaces are proposed in the vicinity of the former landfill, ground gas monitoring is recommended to inform the level of mitigation required.
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifers	Md	Lw	M/L	The landfill represents a potential source of contamination that could impact upon underlying aquifers and surface water receptors. Ground investigation should be undertaken to assess the risk to controlled waters.
	Vertical and lateral migration of contaminants.		Md	Lw	M/L	
	Lateral migration of contaminated groundwater.	On site water courses	Md	Lw	M/L	
	Surface run-off.		Md	Lw	M/L	
	Direct contact.	Water utility pipes	Md	Lw	M/L	Should water utility pipes be proposed through the former landfill area, an investigation and risk assessment should be undertaken to assess the level of protection required to pipework.
		Buried structures/ foundations.	Md	Ul	L	Sulphates and low pH in the ground could accelerate the degradation of buried concrete structures (e.g. foundations). Ground investigation is recommended to inform concrete design.
On Site Sources – Localised Made Ground	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users	Mi	Ul	VL	The potential for encountering localised Made Ground or contaminated soils is restricted to the former brickworks, around old buildings and old quarries. As part of the proposed development, it is anticipated that limited human interaction with the soils is likely to happen, based on the end use. Where a viable pollutant pathway exists, the provision of a clean capping layer would restrict direct access to potentially contaminated soils. It is recommended that an intrusive ground investigation be completed in order to assess the extent of any potential contamination at the site.
		Intrusive maintenance workers	Mi	Lw	L	The exposure of intrusive maintenance workers can be mitigated by the adoption of suitable working methods, utilising appropriate personal protective equipment (PPE) and maintaining good hygiene. If significant asbestos is recorded, the requirements of the Control of Asbestos Regulations (CAR) 2012 should be complied with.

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Ul	L	Localised Made Ground is expected adjacent to the former brickworks, buildings and old quarries, which could represent a source of ground gas. The proposed development is likely to have limited enclosed spaces that would warrant ground gas protection measures. However, where enclosed spaces are located in the vicinity of Made Ground, ground gas monitoring is recommended to inform the level of mitigation required.
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifers	Mi	Ul	VL	No significant source of contamination has been identified at the site that would represent a risk to controlled water receptors. Ground investigation into areas of Made Ground should be undertaken to assess the risk to controlled waters.
	Vertical and lateral migration of contaminants.		Mi	Ul	VL	
	Lateral migration of contaminated groundwater.	On site water courses	Mi	Ul	VL	
	Surface run-off.		Mi	Ul	VL	
	Direct contact.	Water utility pipes	Mi	Ul	VL	No significant source of contamination has been identified at the site that would represent a risk to potable water supply pipes. An investigation and risk assessment should be undertaken to assess the level of protection required to pipework.
		Buried structures/ foundations.	Md	Ul	L	Sulphates and low pH in the ground could accelerate the degradation of buried concrete structures (e.g. foundations). Ground investigation is recommended to inform concrete design.
Off-site sources as detailed in **Table 7:1**.	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Ul	L	No significant source of off site ground gas has been identified, and limited enclosed spaces are anticipated to form part of the proposed development. Where enclosed spaces are located near to off site sources of Made Ground, ground gas monitoring should be undertaken to inform the risk
	Lateral migration of contaminated groundwater.	Groundwater: Underlying Secondary Aquifers	Mi	Ul	VL	No significant off site source of contamination has been identified which is likely to result in a risk to the aquifer quality under the site. Ground investigation is recommended in areas adjacent to possible contamination sources to quantify this.
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low						

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor, Hi = High, Li = Likely, Lw = Low Likelihood, Ul = Unlikely						

Contaminant Linkage Assessment Summary

When considered in the context of the conceptual site model and the historical activities that have taken place across the majority of the site (excluding the landfill) the proposed development is considered to pose a LOW risk to human health due to the lack of significant contamination sources identified across the site. The risk to human health is increased to MODERATE/LOW in the area of the former landfill site.

The risk posed to controlled waters is predominantly considered to be VERY LOW due to the absence of a significant contamination across most of the site. The risk is increased to MODERATE/LOW in the area of the former landfill, where there is a potential for elevated contaminant concentrations to be present.

It is recommended that localised ground investigation be undertaken to quantify the identified contaminant linkages and assess likely mitigation measures.

8. CONCLUSION AND RECOMMENDATIONS

Conclusions

8.1 The site predominantly comprises agricultural land utilised for grazing animals. Several ponds are present across the site, with occasional derelict buildings in the south and central areas. Several small water courses are present along field boundaries.

8.2 The site has remained largely undeveloped over the historical mapping period, predominantly utilised for agricultural purposes, with limited farm buildings present. Several small old quarries have been identified across the site which have either been infilled of become ponds. A former quarry in the south west was subsequently utilised as a landfill (inert, commercial, household waste and liquid sludge). A brickworks and clay pit were also present in the south west of site. The surrounding land uses are broadly similar, comprising agricultural land with associated farm buildings. Small quarries and ponds are mapped in the surrounding area, with some possibly now infilled. Tanks are identified near to the site associated with agricultural premises.

8.3 Ground conditions are anticipated to predominantly comprise Devensian Till overlying bedrock of the Ordovician Rocks. Igneous intrusions are mapped in the north east and the Central Anglesey Shear Zone and Berw Shear Zone in the south west. Localised Made Ground is expected in the vicinity of the former brickworks, landfill site, and old quarries.

8.4 The Till is categorised as an undifferentiated Secondary Aquifer whilst all bedrock geologies mapped underlying the site are categorised as Secondary B Aquifers.

8.5 Limited sources of contamination have been identified across most of the site given the lack of historic development, although the landfill does represent a potential source of contamination. The risk to human health receptors is considered to be low across most of the site, increased to moderate/low within the former landfill area.

8.6 The risk to controlled water receptors is considered to be very low based on the lack of a significant contamination source across most of the site, increased to moderate/low in areas associated with the former landfill.

8.7 Shallow spread foundations are likely to be viable across most of the site except possibly in the areas of the landfill, brickworks and other areas of infilled ground, but shallow bedrock may need breaking out to facilitate this locally. Earthworks are likely to be required where steep gradients are present.

Recommendations

8.8 Once the development masterplan is defined, it is recommended that ground investigation is undertaken to quantify the contaminant linkages identified within conceptual site model.

8.9 It is recommended that intrusive ground investigation is undertaken in areas where bedrock outcrops are known/suspected to be present and in areas of possibly infilled ground to inform foundation design.

9. REFERENCES

1. BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of practice. British Standards Institute, 2017.

2. CIRIA C552 *Contaminated land risk assessment. A guide to good practice*. Rudland, D J, Lancefield, R M, Mayell, P N, 2001.

3. Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance. Department for Environment Food and Rural Affairs (DEFRA), 2012.

4. Land Contamination Risk Management. Environment Agency, 2020.

5. https://www.gov.uk/government/collections/land-contamination-technical-guidance.

6. The Control of Asbestos Regulations. Health and Safety Executive, 2012.

DRAWINGS

Drawing 1: Site Layout Plan

APPENDICES

Appendix 1: Site Photographs

Appendix 2: Groundsure Report (Available on Request)

Appendix 3: Historical Mapping (Available on Request)

Appendix 4: Classification of Risk

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