Prosiect Maen Hir

Solar a Storio Ynni

Preliminary Environmental Information Report
Volume I, Chapter 11: Ground Conditions

Prosiect Maen Hir - September 2024

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11 Ground Conditions

11.1 Introduction

11.1.1 This PEIR chapter presents the preliminary likely significant environmental effects of the Project upon ground conditions. Given that the PEIR Boundary is principally greenfield in nature, the key areas for assessment are around the Former Oil Depot in Maen Hir North, and the areas of geological importance as part of the GeoMôn GeoPark.

11.1.2 For the purposes of this chapter, the Study Area is set at 250m from the PEIR boundary, as defined within the Prosiect Maen Hir Scoping Request (Appendix 2-2, para 7.8.26).

11.2 Baseline Conditions

11.2.1 The Baseline Conditions summarise the information presented in four Phase 1 Geo-Environmental Assessments undertaken across the PEIR boundary area (Appendix 11-1). The Baseline Conditions have also been informed by a historic report on an intrusive ground investigation within the Former Oil Depot site in Rhosgoch. Although the topic author has had sight of this report on the intrusive ground investigation, at the time of writing the PEIR the Applicant does not currently have permission to publish the report as part of the PEIR. Further intrusive investigations may be required at the Former Oil Depot which will be reported on in the ES.

11.2.2 In accordance with good practice, the published guidance documents referenced along with details of the Ground Conditions Policy and Legislative Context in Appendix 11-2 will also be used in the assessment.

11.2.3 The PEIR Boundary (see Figure 2-1) predominantly comprises agricultural land largely used for grazing livestock with some areas of crop cultivation. The Former Oil Depot site in Maen Hir North and a small former landfill in Maen Hir South A represent the only significant brownfield land uses within the PEIR boundary. Several watercourses are present across the PEIR Boundary and Llyn Alaw, a reservoir, is to the southwest of Maen Hir Central.

11.2.4 Historically, the land within the PEIR Boundary has remained largely undeveloped throughout the mapping period reviewed and utilised for agricultural purposes. The only exception to this is the Former Oil Depot in Rhosgoch constructed in the 1970s. Several, very small, localised historical quarries are present across the PEIR Boundary.

11.2.5 The British Geological Survey (BGS) (Ref 11-1) indicates that the PEIR Boundary is predominantly underlain by superficial deposits of Devensian Till with Alluvium locally adjacent to watercourses. Peat is mapped locally in the areas where Alluvium is indicated to be present to the east of Llyn Alaw. Superficial deposits are locally absent at sporadic locations across the PEIR Boundary, which often corresponds with rocky outcrops at ground level.

11.2.6 Bedrock is indicated to predominantly comprise the New Harbour Group, South Stack Formation and Ordovician Rocks, with localised igneous intrusions sporadically mapped across the PEIR Boundary.

11.2.7 The Till is categorised as an undifferentiated Secondary Aquifer (assigned where it is not possible to attribute either category A or B to the strata), whilst the Alluvium is categorised as a Secondary A Aquifer (permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers). All bedrock geologies mapped underlying the PEIR Boundary are categorised as Secondary B Aquifers (predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering).

11.2.8 The PEIR Boundary is not located within any areas associated with coal mining.

11.2.9 The whole island of Anglesey falls within a UNESCO designated Geopark (GeoMôn) due to its international geological significance, with more than 100 rock types, many types of surface sediments, and some of the oldest fossils in England or Wales.

11.2.10 The PEIR Boundary is in an area of low risk from unexploded ordnance.

11.2.11 The PEIR Boundary is not located within a Mineral Safeguarding Area (MSA), with the dormant Mynydd Parys mine located 1km east, the only mineral safeguarded area nearby (Ref 11-2).

11.2.12 The future baseline conditions of the Project, considering the uses are predominantly agricultural, are unlikely to significantly alter. Any changes would be minimal associated with localised uses of the site, for instance, a localised fuel spill.

11.2.13 Other than the potential ground investigation at the Former Oil Depot, in respect of the remainder of the site, ground investigation is not considered to be required to inform the EIA. The rest of the site is in predominantly agricultural use comprising pasture, crops and animal grazing. Additionally, the type of Project has limited human exposure and even more limited human occupation during the operational phase. Ground investigation across the rest of the Project would, therefore, only be undertaken where a potentially significant effect is identified by the Phase 1 Geo-Environmental Assessments.

11.3 Assessment Methodology

Assessment Scope

Scoped In

11.3.1 As per the Prosiect Maen Hir Scoping Request Document (para 7.8.38), the preliminary ground conditions assessment covers geology, soils and groundwater within the PEIR Boundary and in the surrounding area across construction, operation and decommissioning.

11.3.2 The preliminary assessment involves consideration of the naturally occurring geological conditions and any man-made deposits, known as ‘Made Ground’. Consideration is given to the physical nature of the rocks, soils and Made Ground, together with information on existing chemical or anthropogenic contamination, ground gas and geotechnical features arising from the former and existing uses of land within the PEIR Boundary.

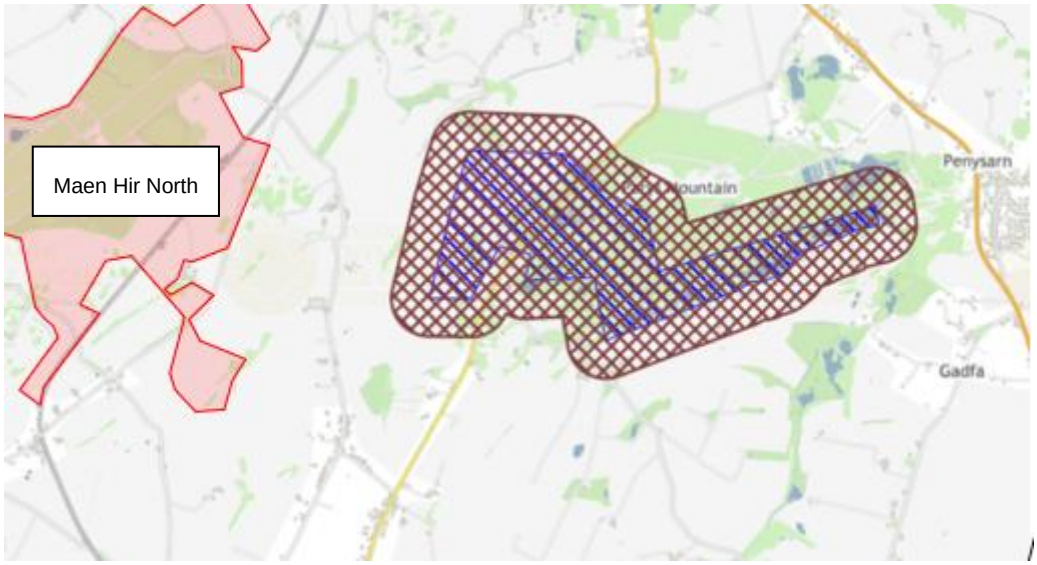
11.3.3 The hydrogeological regime, comprising the groundwater in any permeable deposits (rock, soil or Made Ground) beneath the PEIR Boundary, and the

hydrological regime (surface water), are described in so much as they interact with land contamination and geotechnical / construction risk.

Scoped Out

11.3.4 As per the Prosiect Maen Hir Scoping Request Document (para 7.8.42), and considering that the PEIR Boundary is not in a Minerals Safeguarding Area (MSA), and considering the UNESCO geopark status, mineral extraction is unlikely to be permitted within the PEIR Boundary, and the Project is not anticipated to have any likely significant effects on mineral extraction and therefore mineral extraction was scoped out. The only local MSA is at Parys Mountain c. 850m to the east of the PEIR Boundary, the extents of which are indicated on Figure 11-1.

Figure 11-1 Parys Mountain Metalliferous Safeguarding Area and Buffer Zone



Overview

11.3.5 The likely significant environmental effects of the Project during the construction, operation and decommissioning phases have been preliminarily assessed against the baseline conditions. If required and appropriate, measures are proposed to avoid, prevent, reduce or offset any significant negative effects and any residual effect has been identified.

11.3.6 The potential impacts for any given development project can be separated into three groups, all of which need to be considered in a risk assessment. These are:

- The Project impacting upon itself
- The Project impacting on its surroundings; and
- The surroundings, impacting the Project

11.3.7 The existing soil and groundwater conditions have been established through the Phase 1 Geo-Environmental Desk Studies and been informed by a Ground Investigation Report for the Former Oil Depot, which this topic author has had sight of. At the time of writing the PEIR, the Applicant does not currently have permission to publish that report and therefore further intrusive investigations may be required at the Former Oil Depot which will be reported on in the ES.

11.3.8 The Phase 1 Geo-Environmental Desk Studies uses the potential 'source-pathway-receptor contaminant linkage' (S-P-R) concept to assess contaminated land risk as introduced in the Environmental Protection Act 1990 and to inform the assessment of likely significant effects on the environment in EIA terms. Any risk considered to be greater than 'low', are carried through for assessment in this chapter. Potential geotechnical risks, including slope stability, mining, ground instability risks, or possible shallow bedrock, have also been assessed.

11.3.9 The information from the Phase 1 Geo-Environmental Desk Studies and subsequent Ground Investigation (where recommended by the desk studies) will be used to develop the ground model (GM) and a Conceptual Site Model (CSM). This CSM will be based on a ground model of the on-site physical conditions and an exposure model of the possible contaminant linkages. The CSM forms the basis for Generic Quantitative Risk Assessment (GQRA), undertaken in accordance with Environment Agency (EA) guidance, set out within the Land Contamination Risk Management (LCRM) guidance. Depending on the outputs of the GQRA, a Detailed Quantitative Risk Assessment (DQRA) may be required. Both the GQRA and DQRA would be undertaken in support of detailed design secured by DCO Requirement post-consenting of the Project.

11.3.10 Environmental effects related to ground contamination are assessed by first identifying contaminant linkages. A contaminant linkage is said to exist where three conditions are satisfied:

- There is a source contaminant with the potential to cause harm to human health, property (including buildings) or the wider environment
- There is a receptor (e.g. people, property, the environment) which might be harmed by the source of contamination; and
- There is a pathway by which the source can reach the receptor, so that harm can be caused

11.3.11 On any particular site, there may be multiple sources, pathways and receptors and each source-pathway-receptor contaminant linkage must be examined and risk assessed. This is usually done in a series of stages, starting with a general, more conservative approach, but becoming more in-depth and site-specific if a more detailed approach is warranted (usually where the ground contamination issues (e.g. a contamination plume at depths, or with multiple sources) are very complex to resolve).

11.3.12 The stages of assessment are summarised as:

- Hazard identification
- Generic risk assessment
- Detailed risk assessment
- Risk evaluation

11.3.13 The stages of assessment from LCRM are detailed in Table 11-1.

Table 11-1 Risk Assessment Stages

Hazard Identification
• The potential contaminant linkages are identified (based on available data), and professional judgement is applied to determine which of these can be considered plausible, i.e. there is a realistic probability that environmental damage may take place. • Only the plausible linkages need be considered further in the generic risk assessment.
Generic Risk Assessment
• All the plausible linkages are considered in the light of ground investigation test results.

• The concentrations of chemicals in the ground are compared, using specified statistical techniques, with published values (Generic Assessment Criteria), which are deemed indicative of minimal risk, for example to human health, plant life or the water environment.
Detailed Risk Assessment
• Where concentrations exceed the assessment criteria there is a need to identify potential mitigation measures. • Mitigation can include more detailed risk assessment using site-specific conditions rather than generic ones. • Mitigation measures can also include engineering work (also known as remediation), such as removal or treatment of the contaminant or severing of the pathway between the contaminant and the potential receptor, thereby breaking the linkage. • It is not always possible to completely remove an environmental effect, and a residual impact may remain, or some secondary impacts may be generated. Accepting a secondary or residual impact may often involve a trade-off, which must be judged to be reasonable. An example of a trade-off might be the removal of contaminated soil from a development site, but the secondary impact would be increased lorry traffic and risk of road traffic accidents during the removal.
Risk Evaluation
• Risk Evaluation is used frequently in the decision-making process. • This may involve more in-depth scientific analysis or professional judgement and local experience and can take place at any stage in the assessment process. • The LQM CIEH Suitable for Use Levels (S4UL) and Water Framework Directive (WFD) generic criteria are by design very conservative in terms of providing protection to health and the environment. Consequently, a moderate exceedance of a criterion does not mean a sudden change from acceptable risk to unacceptable risk. Risk Evaluation allows for other factors to be considered as part of the risk assessment (where applicable), and a proportionate, considered approach to mitigation recommendations provided.

Study Area

11.3.14 The extent of the Ground Conditions study area is the PEIR Boundary and the immediate surrounding area (see Figure 2-1).

11.3.15 The 'immediate surrounding area' is defined for the purposes of the PEIR assessment as land within close proximity to, or bordering, the PEIR Boundary

(i.e. less than 250m from the PEIR Boundary) which has the potential to be a contaminant source and where there is a potential pathway for contaminant migration that may affect the receptors within the PEIR Boundary or alternatively be affected by the Project.

11.3.16 As set out in the Prosiect Maen Hir Scoping Request document (para 7.8.26), the inclusion of a 250m buffer is based on the 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (Ref 11-3). This buffer is a conservative approach due to the lower sensitivity of the Project relative to the low density of housing in the surrounding area, but is reasonable in the context of the Project taking into account the distance over which contamination can migrate.

Determining Significance of Effect

11.3.17 The approach to assessing and assigning significance to an environmental effect is derived from a variety of sources including, legislative requirements, topic-specific guidance, standards and codes of practice, advice from statutory consultees and other stakeholders and the expert judgement of the team undertaking the assessment.

Receptor Sensitivity

11.3.18 The criteria used to determine receptor sensitivity are set out in Table 11-2, are as set out in the Prosiect Maen Hir Scoping Request document (para 7.8.32).

Table 11-2 Framework for Determining Sensitivity of Water Resources and Ground Conditions Receptors

Receptor Sensitivity	Sensitivity Description
High	• A large, medium or small water body with a National Resources Wales (NRW) Quality classification of "High" or "Good" and / or a Current Chemical Quality classification of "Good" • The hydrological receptor and downstream environment has limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes • The hydrological receptor is of high environmental importance or is designated as having national or international importance, such as

Receptor Sensitivity	Sensitivity Description
	Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSIs) • The hydrological receptor is designated for supporting ecological interest • The hydrological receptor acts as an active floodplain or other flood defence • The hydrological receptor will support abstractions for public water supply or private water abstractions for more than 25 people • Abstractions used for the production of mass-produced food and drinks • Areas containing geological or geomorphological features considered to be of national importance (e.g. SSSIs) • Human health of people • Local groundwater constitutes a valuable resource because of its high quality and yield, e.g., aquifer(s) of local or regional value, statutorily designated nature conservation sites (e.g., SACs and SSSIs) dependent on groundwater
Moderate	• A large, medium or small water body with an NRW Quality classification of “Moderate” • The hydrological receptor and downstream environment will have some capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics / natural processes • The hydrological receptor is of regional environmental importance (such as Local Nature Reserves), as defined by the NRW • The hydrological receptor does not act as an active floodplain or other flood defence • The hydrological receptor supports abstractions for public water supply or private water abstractions for up to 25 people • Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS), considered worthy of protection for their historic or aesthetic importance • Aquifer of limited value (less than local) as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching (e.g. Secondary Aquifer). • Local areas of nature conservation known to be sensitive to groundwater effects

Receptor Sensitivity	Sensitivity Description
Low	• A large, medium or small water body with an NRW Quality classification of “Poor” or “Bad” and / or a Current Chemical Quality classification of “Fail” • The hydrological receptor and downstream environment will have capacity to attenuate natural fluctuations in hydrochemistry but can absorb any changes without fundamentally altering its baseline characteristics / natural processes • The hydrological receptor is not of regional, national or international environmental importance • The hydrological receptor is not designated for supporting freshwater ecological interest • The hydrological receptor does not act as an active floodplain or other flood defence • The hydrological receptor is not used for recreational use • The hydrological receptor does not support abstractions for public water supply or private water abstractions • Geological features or geology not protected and not considered worthy of specific protection • Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible. Changes to groundwater not expected to affect local ecology

Magnitude of Impact

11.3.19 The criteria used to determine magnitude of impact are set out in Table 11-3, as set out in the Prosiect Maen Hir Scoping Request document (para 7.8.33).

Table 11-3 Framework for Determining Magnitude of Change

Magnitude of Effect	Magnitude Description
High	• A short or long term major shift in hydrochemistry or hydrological conditions sufficient to change the ecology of the receptor. This change would equate to a change of an NRW Quality classification by two classes, e.g., from “High” to “Moderate” • A sufficient material increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water

Magnitude of Effect	Magnitude Description
	• A major (greater than 50%) or total loss of a geological receptor or peat habitat site, or where there would be complete severance of a site such as to fundamentally affect the integrity of the site (e.g., blocking hydrological connectivity) • Major permanent or long-term change (i.e., degradation of quality) to groundwater quality or a reduction in the available yield • Major permanent or long-term negative change to geological receptor • Changes to groundwater quality or water table level will cause harm or negatively alter local ecology or will lead to groundwater flooding issue • A major permanent or long-term change to geological receptor, such as the alteration of pH or drying out of peat
Moderate	• A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This would equate to a change of an NRW water quality classification by one class, e.g., from "Good" to "Moderate" • A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water • A loss of part (approximately 15 % to 50 %) of a geological receptor or peat habitat site, major severance, major effects to its integrity as a feature, or disturbance such that the value of the site would be affected, but could still function • Changes to the local groundwater regime may slightly affect the use of the receptor • The yield of existing supplies may be reduced or quality slightly deteriorated • Fundamental changes to local habitats may occur, resulting in impaired functionality
Low	• A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change would not reduce the NRW Current Ecological Quality classification • A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water

Magnitude of Effect	Magnitude Description
	• A detectable but non-material effect on the receptor or a moderate effect on its integrity as a feature or where there would be a minor severance or disturbance such that the functionality of the receptor would not be affected • Changes to groundwater quality, levels or yields that do not represent a risk to existing baseline conditions or ecology
Negligible	• No perceptible changes to the baseline hydrochemistry or hydrological environment • No change to the NRW water quality classification • No increase in the probability of flooding onsite and offsite • A slight or negligible change from baseline condition of geological resources • Change hardly discernible, approximating to a 'no change' in geological condition

Significance of Effect

11.3.20 The predicted significance of the effect is determined through a standard method of assessment and based on professional judgement, considering both the sensitivity of the receptor and the magnitude of the potential impact as defined in Table 11-4. Effects of moderate significance or greater are typically considered to be significant within the EIA process, but this is tested with professional judgement.

Table 11-4 Framework for Assessment of the Significance of Effect

Magnitude of Effect	Sensitivity of Resource or Receptor		
	High	**Moderate**	**Low**
High	Major	Major	Minor
Moderate	Major	Moderate	Minor
Low	Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible

11.3.21 The Duration of the effect is also considered.

- Short-term: Temporary effects related to a specific construction event of no more than a year's duration – such as the construction of an individual building or a specific element of infrastructure such as a section of road
- Medium-term: Temporary effects of longer duration, such as those arising over an extended period of construction ranging from one year to the full construction period
- Long-term: Permanent effects arising from the operation of the facility or from the permanent presence or removal of physical features

Baseline Surveys

11.3.22 Four Phase 1 Geo-Environmental Desk Studies (Appendix 11-1) have been undertaken which provide supporting baseline data to the assessment. A field reconnaissance (walkover) to determine the nature of the PEIR Boundary and its surroundings including current and former land uses, topography and hydrology was also carried out to inform the desk study assessments.

11.3.23 The desk studies included the review of the following:

- Historical Ordnance Survey maps, to identify former potentially contaminative uses at the PEIR Boundary and surrounding area, and an assessment of the associated contamination risks
- A third-party environmental database search to identify flood warning areas, local landfills, pollution incidents, abstractions, environmental permits etc. which may have had the potential to have environmental impact on the PEIR Boundary
- Historical aerial photographs (Google Earth) and other imagery (third-party environmental database search)
- Topographical, geological and hydrogeological maps
- Natural Resources Wales Interactive Viewer (Ref 11-2)
- British Geological Survey (BGS) archive records and mapping

11.3.24 A ground investigation was undertaken on the Former Oil Depot in 2016. The Report has been reviewed as part of the Phase 1 Desk Study and has informed the assessment outlined in this chapter. At the time of writing the PEIR, the Applicant did not have permission to publish this report. Further intrusive

investigation may be required at the Former Oil Depot to inform the ES which will be submitted with the DCO Application. The ES will also review and update the conclusions of this chapter in accordance with the further investigations. A high level summary of the information contained in this report is set out below.

11.3.25 The ground investigation recorded ground conditions in the west of the Former Oil Depot comprised Made Ground over bedrock of the New Harbour Group (schist), with localised pockets of Glacial Till. In the east, ground conditions comprised topsoil over Glacial Till, over localised Head Deposits, over the New Harbour Group bedrock, with localised pockets of Made Ground.

11.3.26 Groundwater was identified in the west of the site at an elevation of between 51m and 32m AOD, broadly between 2m and 6m below ground level, indicated to flow to the north west. A separate groundwater body was also identified in the east of the site within the Glacial Til and Head deposits. Groundwater was considered to be in continuity with the adjacent water course.

11.3.27 Visual/olfactory evidence of hydrocarbon contamination was identified within the area of the former oil storage tanks in the south west of the Former Oil Depot. The laboratory analysis and risk assessment identified a risk to human health in south west of the site associated with the hydrocarbon impact, and a hotspot of arsenic within the south eastern undeveloped area of site.

11.3.28 Within the groundwater, dissolved concentrations of benzo(a)pyrene, benzo(ghi)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, cadmium, chromium, copper, mercury, nickel, selenium and zinc were recorded at concentrations, which represent a potential risk to controlled waters.

11.3.29 The above data has been used to prepare a CSM to determine the likely contaminant linkages which could give rise to unmitigated environmental effects and the features that could give rise to unmitigated geotechnical effects, within the Phase 1 Desk Studies. The CSMs produced within the desk studies have been combined into a single CSM, presented below in Table 11-5.

Table 11-5 Conceptual Site Model

Source	Pathway	Receptor	Con	Prob	Risk
On Site – Former Oil Depot					
Made Ground associated with form oil storage depot.	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users	Md	Ul	L
		Intrusive maintenance workers	Md	Lw	M/L
	Inhalation of vapours.	Future site users	Md	Lw	M/L
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Lw	M/L
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifer	Md	Lw	M/L
	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
		Buried structures/ foundations.	Md	Ul	L
Elevated Radon levels	Inhalation of radioactive particles	Future site users	Md	Lw	M/L
Possible elevated ground gasses associated with potentially organic rich Alluvium.	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Lw	M/L

Source	Pathway	Receptor	Con	Prob	Risk
On Site – Former Landfill					
Contaminants associated with Made Ground landfill material	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users	Mi	Lw	L
		Intrusive maintenance workers	Md	Lw	M/L
	Inhalation of vapours	Future site users	Mi	Lw	L
		Intrusive maintenance workers	Md	Lw	M/L
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Ul	L
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifers	Md	Lw	M/L
	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
		Buried structures/ foundations.	Md	Ul	L
On Site – Rest of Site					
Possible localised Made Ground associated with farming activities, infilled ponds or quarries.	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users	Mi	Ul	VL
		Intrusive maintenance workers	Mi	Lw	L

Source	Pathway	Receptor	Con	Prob	Risk
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Ul	L
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifer	Mi	Ul	VL
	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
		Buried structures/ foundations.	Md	Ul	L
Elevated Radon levels	Inhalation of radioactive particles	Future site users	Md	Lw	M/L
Possible elevated ground gasses associated with potentially organic rich Alluvium.	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Lw	M/L
Off Site					
Made Ground and potential contamination associated with neighbouring farm activities, railway line and infilled small ponds/quarries.	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users	Md	Ul	L

Source	Pathway	Receptor	Con	Prob	Risk
Possible elevated ground gasses associated with potentially organic rich Alluvium.	Lateral migration of contaminated groundwater.	Groundwater: Underlying Secondary Aquifers	Mi	Ul	VL
Small Graveyards near to site boundaries.	Lateral migration of contaminated groundwater.	Groundwater: Underlying Secondary Aquifers	Mi	Ul	VL
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor, Hi = High, Li = Likely, Lw = Low Likelihood, Ul = Unlikely					

11.3.30 The CSM identified a very low to low risk across most of the Solar PV Site, increased to low - moderate/low within the Former Oil Depot and the former landfill.

Assumptions and Limitations

11.3.31 Intrusive ground investigation has previously been completed within the Former Oil Depot in 2016. Further intrusive investigation may be required at the Former Oil Depot to inform the ES which will be submitted with the DCO Application. The ES will also review and update the conclusions of this chapter in accordance with the further investigations. Investigation across the rest of the PEIR Boundary will be completed as part of detailed design following consenting of the DCO Application and will be secured as part of the management plans. Nevertheless, the investigations completed to date are sufficient in scope to inform the preliminary assessment for the purposes of the EIA Regulations.

Consultation

11.3.32 Engagement with Isle of Anglesey County Council has been undertaken regarding the assessment methodology that informs this chapter.

11.4 Embedded Mitigation

Design

11.4.1 The following mitigation measures relating to the hydrological environment are embedded into the design and construction of the Project, and will be secured under the DCO:

- There will be a 10m buffer from watercourses except for watercourse crossings along access tracks
- The Project will utilise existing access road and tracks already in place at this location, this will help to minimise ground disturbance and requirement for further watercourse crossings
- Onsite access tracks will follow the alignment of the existing agricultural tracks, where possible, limiting the requirement for new drainage ditch crossings, disturbance to soils and habitat removal. The internal access tracks will be constructed of compacted stone with excavation kept to a minimum
- Where drainage is required, a ditch or a swale, with check dams, may be located downhill of the internal access track to control any potential for surface water run-off. An outline Surface Water Management Plan which will be secured by DCO Requirement, will provide further details on the measures to control surface water within the PEIR Boundary

Construction and Decommissioning

11.4.2 The outline Construction Environmental Management Plan (oCEMP), outline Surface Water Management Plan (oSWMP), and outline Decommissioning Environmental Management Plan (oDEMP) will secure mitigation measures to control the risk to the health of construction workers. Construction workers and services personnel will follow guidance stated in, but not limited to CIRIA C811 Environmental Good Practice on Site Guide and CIRIA C670 Site Health Handbook during construction works. Adequate standard personal protective equipment and the development of basic hygiene measures will be implemented.

11.4.3 The oSWMP will secure water management measures to control surface water runoff and drain hardstanding and other structures during the construction, operation and decommissioning of the Project and will form part of a Pollution Prevention Plan (PPP) which will be incorporated into the detailed CEMP (based on the oCEMP), which is secured through the DCO requirements and will have to be approved by the local planning authority in consultation with NRW prior to commencement of the construction phase.

11.4.4 The PPP will set out measures to be employed to avoid or mitigate potential contamination for all phases of the Project and will also include an Incident Plan to be followed should a contamination event occur. All appropriate personnel working on the construction site will be trained in its use. Method statements will also be applied, which will follow the principles laid out in relevant CIRIA guidance and the principles of the archived EA Pollution Prevention Guidelines [Ref 11-5].

11.4.5 Spillages (such as oil, fuel, cement, chemicals etc.) and soil erosion or the generation of suspended solids during construction activities (including excavations and plant/wheel washing) will be controlled through the implementation of the CEMP. This could include prevention measures such as: bunded storage tanks; designated wheel washing areas; settling basins; screening stockpiles of materials; dampening exposed soils as appropriate; and set out requirements for ongoing monitoring and liaison (with the local community, the NRW and the local authorities, as appropriate). Further details will be provided at the ES stage.

11.4.6 Measures will be undertaken as appropriate, in line with CIRIA C811 Good Practice on Site and with a CEMP, to minimise the potential for the movement of sediments into surface watercourses.

11.4.7 To avoid infiltration of polluted water from vehicles or accidental spillage, vehicles will be inspected regularly and maintained to reduce the risk of leakages.

11.4.8 The CEMP will set out the various measures to manage the effects from earthworks, which may include seeding of stockpiles, silt traps and temporary drainage grips.

11.4.9 An outline Soil Management Plan (oSMP) will be prepared at the ES stage, and will set out how soil will be managed to ensure its quality is maintained.

11.5 Preliminary Assessment of Likely Significant Effects

Construction/Decommissioning

11.5.1 Construction phasing for the Project is currently being developed in response to evolving technical requirements including but not limited to Grid Connection timescales. The Project could be delivered in up to two phases.

11.5.2 Under a single-phase construction programme, enabling works could start in Q4 2026, with the Project being energised in Q4 2028. It is anticipated the construction phase for this scenario would be approximately 24 months long.

11.5.3 Under a two-phase construction programme, enabling works for the first phase could start in Q4 2026, with the first phase being energised in Q4 2028. The second phase would be constructed at a later date and energised at a date to be agreed with NGET and not later than 2037. In this scenario, part of the Project would be constructed and operational before the remaining part. It is anticipated that each of the construction phases under this scenario would be approximately 24 months long.

11.5.4 This assessment considers that the worst-case for likely significant effects to arise would be under the single-phase scenario, with all works taking place at the same time for both construction and decommissioning. This assessment also assumes embedded mitigation measures have been applied.

Risks to Human Health

11.5.5 Due to the predominantly greenfield and agricultural nature of the PEIR Boundary, currently and historically, it is unlikely that there will be widespread soil and/or groundwater contamination present that could present a risk to human health or controlled waters receptors. If unforeseen contamination is identified ground workers may be exposed through direct exposure, dermal contact and inhalation of dusts and particulates, although this is unlikely. There is a low likelihood that localised spillages of hydrocarbons could contaminate soils and generate vapours with the potential to migrate into confined spaces within buildings. The sensitivity is high and magnitude would be negligible so overall significance of effect would be negligible adverse and not significant.

11.5.6 In relation to the Former Oil Depot, and potentially the former landfill site, there will be an increased potential for direct human exposure to potential contamination identified in shallow soils through ingestion, direct contact or inhalation of contaminated soil or dust by construction workers in the short-term during construction works. Localised hydrocarbon and arsenic impact have been recorded in the Made Ground soils which could represent a risk to human health.

The potential effect of contaminated soils on construction workers in this area is considered to be of moderate significance and significant based on a high sensitivity and low magnitude.

Risks to Controlled Waters

11.5.7 There is a low likelihood that localised contamination may be mobilised during construction/decommissioning, where soils are excavated, and rainfall leaches soluble contaminants across most of the PEIR Boundary. However, the risk is increased where groundworks are required within the Former Oil Depot and landfill. It is possible that the Made Ground will contain leachable contaminants. The sensitivity of the underlying Secondary Aquifer is moderate and the magnitude of impact associated with leachate infiltrating the groundwater is moderate. Therefore, the significance of effect is considered to be moderate adverse and significant.

11.5.8 The potential impact on the local surface water (moderate sensitivity) surrounding the Former Oil Depot is considered to have a moderate magnitude, therefore representing a moderate adverse effect, which is significant. A detailed quantitative risk assessment will be undertaken to assess the level of risk to controlled waters to inform whether specific remediation/mitigation measures will be required.

11.5.9 Where earthworks are required, including stockpiling and dewatering activities, there is a medium likelihood for an increase in erosion and migration of particulate matter and suspended solids into watercourses across the PEIR Boundary. The effect on surface water receptors, including flora and fauna, during construction are considered to be of minor adverse significance, confined to a localised area and of short / medium duration.

11.5.10 Spillages such as oil, fuel, or chemicals could impact upon controlled water receptors. Based on the small volumes that will be stored onsite, the effect on controlled waters during construction is considered to be of minor adverse significance, confined to a localised areas and of short / medium duration.

Risks to Geology, Buildings and Structures

11.5.11 Subject to detailed design there may be a need to cut and fill in the locations for the Project Substation and BESS, depending on the final areas for these elements of the Project. Further information and design evolution will be provided in the ES. Assuming that excavated materials will be conserved and reused onsite, avoiding additional demand on the existing materials supply, there is a minor adverse effect as a result of the low likelihood of loss of mineral resource having low magnitude of impact.

11.5.12 Where earthworks are required, a cut and fill balance will be sought to avoid importation or export of materials. The outline Soil Management Plan (oSMP) will set out the methods by which materials will be handled and managed to maintain quality.

Operation

Risks to Human Health

11.5.13 The Project will involve a number of personnel undertaking maintenance activities on solar infrastructure and mechanical cutting of vegetation where this is not grazed. Therefore, there is a low likelihood of future site users being exposed to any soil or groundwater contamination. Contact with potentially contaminated materials is likely to be limited to areas of landscaping within the Former Oil Depot, and other localised areas in relation to small, potentially infilled ponds and quarries, as well as the former landfill area. Replacement activities as set out within Chapter 5: Project Description, would likely be negligibly affected. As such, the impact magnitude would be low on the high sensitivity receptor which results in a moderate adverse effect, which is not significant.

11.5.14 Low levels of ground gas have been recorded in the Former Oil Depot commensurate with a Characteristic Situation 2 site. Areas of Alluvium represent a potential source of ground gas, whilst naturally elevated radon levels are present across certain areas of the PEIR Boundary. Given the lack of enclosed spaces proposed as part of the Project, elevated ground gasses/radon are considered to represent a low magnitude effect to a moderate sensitivity receptor, resulting in a minor adverse effect, which is not significant.

Risks to Controlled Waters

11.5.15 The presence of increased hardstanding at the BESS, Project Substation, and any concrete footings required to support Ancillary Infrastructure, will reduce the infiltration of rainfall and subsequent leaching of any localised soluble contamination in shallow soils into underlying groundwater (Secondary Aquifers) and surface waters.

11.5.16 Limited risks to controlled water are anticipated during the operation phase, likely limited to low quantities of heavy metals and hydrocarbons associated with runoff from vehicle parking areas. The effect on Controlled Waters from these sources during operation across the PEIR Boundary are considered to be of negligible adverse effect (not significant) based on a Moderate sensitivity and low magnitude and would be confined to a localised area and of short to medium duration.

Risks to Geology, Buildings and Structures

11.5.17 The entirety of Anglesey forms part of GeoMôn Geopark, due to the unique bedrock geology. The Project will involve minimal excavations into the underlying bedrock, thereby having a negligible impact upon a high sensitivity receptor, resulting in a negligible adverse effect, which is not significant. Additionally, the lifespan of the Project in geological terms means that the effect is short term.

11.6 Additional Mitigation

11.6.1 If unforeseen contamination is encountered across the PEIR Boundary (excluding the Former Oil Depot, for which a site specific remediation strategy will be prepared), mitigation measures will comprise small scale excavation, reuse of Made Ground / impacted soils at depth and/or possibly small-scale treatment or disposal dependent upon the most sustainable method.

11.6.2 The completion of ground investigation, and implementation of any required eventual remediation strategy will remove any unacceptable risk to future site users.

11.6.3 Where contaminants are identified in soils which represent a risk to future site users, the pathway will need to be either removed by the presence of hardstanding or mitigated by the installation of a clean capping layer. The specific

locations will be determined through ground investigation, and the requirements of the capping layer will be stipulated in a Remediation Strategy, if required.

11.6.4 Where ground gasses are identified in areas where enclosed spaces are proposed, gas protection measures will be required to mitigate the risk. The gas protection will be installed in accordance with BS8485:2015+A1:2019 to meet the level of protection required.

11.7 Residual Effects

Human Health

11.7.1 The completion of a ground investigation and implementation of a Remediation Strategy, if required, will remove any unacceptable risk to future site users. As such, taking into account this additional mitigation, the residual effect will be negligible adverse and not significant due to a negligible magnitude impact occurring on high sensitivity receptor.

Controlled Waters

11.7.2 Following completion of a DQRA within the Former Oil Depot, any subsequent remediation (if required) will reduce the effects upon controlled water receptors.

11.7.3 Taking this additional mitigation into account, the magnitude of impact associated with leachate infiltrating the groundwater would be reduced to negligible. Therefore, the significance of effect on this moderate sensitivity Secondary Aquifer is considered to be negligible adverse and not significant.

11.7.4 Likewise for surface water surrounding the Former Oil Depot (moderate sensitivity), the magnitude would be reduced to negligible, therefore representing a negligible adverse effect, which is not significant.

11.8 Effect Interactions

11.8.1 The potential for human health effects as a result of contamination is considered inherently in this chapter and also considered further in Chapter 17: Human Health.

11.8.2 Potential effects on ecological receptors as a result of adverse effects on controlled waters are considered further in Chapter 7: Ecology and Biodiversity.

11.9 References

Ref 11-1 British Geological Survey (BGS) Geology Viewer

Ref 11-2 Natural Resources Wales Interactive Viewer

Ref 11-3 Guidance for the Safe Development of Housing on Land Affected by Contamination'

Ref 11-4 A ground investigation has been completed on the former Rhosgoch Oil Storage Depot site

Ref 11-5 EA Pollution Prevention Guidelines for business

Ref 11-6 Ynys Mon Isle of Anglesey County Council Map