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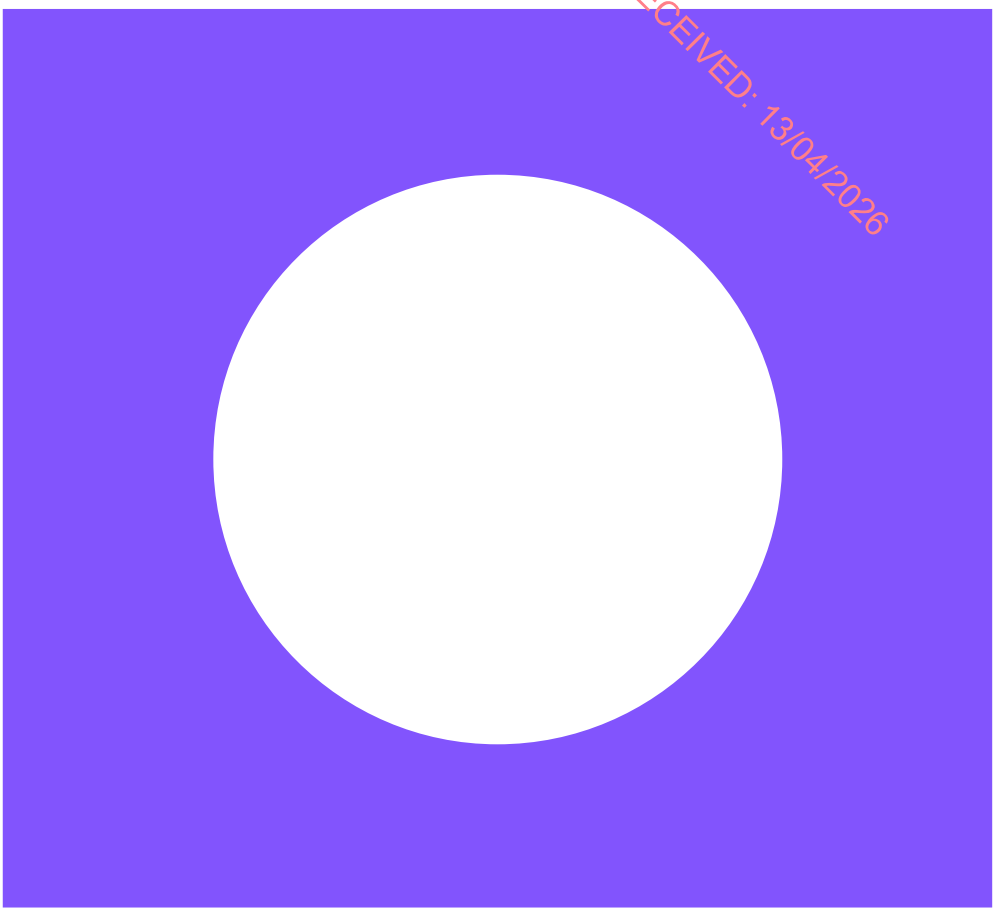

Shelburne Energy Farm Environmental Impact Assessment Report

Chapter 8 Land, Soils and Hydrogeology

April 2026

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Mott MacDonald
South Block
Rockfield
Dundrum
Dublin 16
D16 R6V0
Ireland

T +353 (0)1 2916 700
mottmac.com

Shelburne Energy Farm Environmental Impact Assessment Report

Chapter 8 Land, Soils and Hydrogeology

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8.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of the likely significant environmental effects posed by the Proposed Project. This assessment is based on the full outline design as described in Chapter 5 –*Description of Development.*

This assessment evaluates the pre- and post-mitigation (i.e. residual) effects arising during construction and operational phases on a series of sensitive receptors identified for land and land use, soils and geology and hydrogeology. This chapter should be read in conjunction with the following chapters and their appendices, which present related impacts arising from the Proposed Project and proposed mitigation measures:

- Chapter 7 – Biodiversity; and
- Chapter 9 – Surface water resources and flooding.

A specific Water Framework Directive (WFD) screening has been conducted (Section 8.5.4) for the WFD groundwater bodies intersected by the scheme working areas, to assess the impact of the proposed construction activities on their status and to WFD objectives.

8.2 Policy and Guidance

8.2.1 Policies

This chapter has been prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU (European Commission, 2014).

The requirements of the following legislation have also been complied with:

- The Water Framework Directive (WFD) 2000/60/EC (as amended) (European Commission, 2000) provides a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. The WFD requires Member States to establish river basin districts and, for each district, a river basin management plan (RBMP) which is revised, implemented and reviewed every six years;
- The Groundwater Daughter Directive 2006/118/EC (European Commission, 2006) establishes a regime which sets groundwater quality standards and introduces measures to prevent or limit the input of pollutants into groundwater, and was amended by Directive 2014/80/EU (European Commission, 2014);
- The WFD was implemented in Ireland by Statutory Instrument (S.I.) 722/2003 (Office of the Attorney General, 2003). Objectives for protection of groundwater against pollution and deterioration were implemented in S.I. 9/2010 (Office of the Attorney General, 2010);
- EU Directive 80/68/EEC (European Commission, 1979), amended by the Priority Substances Directive 2013/39/EU (European Commission, 2013), concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. The objective of the Directive 2013/39/EU is to protect the environment from the adverse effects of these waste water discharges, and is implemented in Ireland as S.I. No. 684/2007 (Office of the Attorney General, 2007);
- The Drinking Water Directive 98/83/EC (European Commission, 1998), amended by Directive 2020/2184 (European Commission, 2020) concerns water quality for human

consumption, and is implemented in Ireland as S.I. No. 122/2014 (as amended) (Office of the Attorney General, 2014). Thresholds for potable groundwater quality indicators are specified in S.I. No. 366/2016 (as amended) (Office of the Attorney General, 2016);

- The Waste Framework Directive 2008/98/EC (European Commission, 2008) provides waste management principles for the protection of water, soils and places of special interest, and establishes an order of preference for managing and disposing of waste.

Geology is recognised as an important component of natural heritage in three separate pieces of national legislation which include the following:

- Planning and Development Act 2000 (as amended) (Law Reform Commission, 2000);
- Planning and Development Regulations 2001(as amended) (Minister for the Environment and Local Government, 2001);
- Wildlife Act 1976 (as amended) (Irish Government, 1976).

This legislation requires various branches of Government and statutory agencies to consult and take due regard for potential conservation of geological heritage features. Any geological features within the red line boundary (RLB) that are considered valuable and worthy of protection, these features would be classified as Geological Heritage Sites and County Geological Sites, which may be viewed online (Geological Survey Ireland, 2025).

8.2.2 Guidance

The assessment was carried out with reference to the following guidance and adapted to reflect the nature of the Proposed Project and attributes of the receiving environment based on professional judgement and experience:

- Guideline for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (Institute of Geologists of Ireland, 2013);
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency (Environmental Protection Agency, 2022);
- Guidelines on the Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Road Authority, 2009) (now Transport Infrastructure Ireland (TII));
- Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Inland Fisheries Ireland);
- Control of Water Pollution from Construction Sites - Guide to Good Practice (C532) (CIRIA, 2001).
- Methodology for establishing groundwater threshold values and the assessment of chemical and quantitative status of groundwater, including an assessment of pollution trends and trend reversal. Wexford: Environmental Protection Agency (O'Connell & Craig, 2024).

8.3 Methodology

The main scope of this assessment consists of the analysis of the likely significant effects posed by the Proposed Project works (considering both construction and operational phases) on land use, soils, geological and hydrogeological elements, and to provide indications for appropriate mitigation measures where required. A detailed description of the overarching methodology of the EIAR is presented in Chapter 3.

The assessment method follows a staged approach involving:

- Acquisition of construction works details for the study area under investigation, based on information summarised in Chapter 5, to establish the location, type and scale of required works and activities. This includes (but is not limited to) consideration of elements such as earthworks, storage/transport of leachable and hazardous materials, lowering of groundwater levels by pumping or drainage, discharges to ground, and penetrative works above or below water table;
- Establish the baseline conditions and sensitivity of potential receiving environments in respect to the land use, soils, geological and hydrogeological elements in the study area;
- Quantify the magnitude of impacts and the significance of associated effects on identified receptors;
- Identify relevant mitigation measures to apply where required, and determine residual effects;

The impact assessment methodology is based on the guidance listed in Section 8.2 and tailored accordingly based on professional judgement and experience. Details of the author and experience is provided in Appendix 1.1. The Approach used for each stage of this assessment is discussed in detail below.

8.3.1 Approach to Data Collection

A desktop study was undertaken to review the existing accessible data, in addition to assessments carried out to date. From this data, outlined in Table 8.1, constraints and likely sensitive receptors have been identified.

Table 8.1: Summary of available sources used to inform Land, Soils and Hydrogeology Chapter

Data Source	Date	Data Content
Land and Land Use		
CORINE Land Cover (CORINE, 2018)	2018	• CORINE Land Cover.
EPA Maps	2025	• Waste facilities (licenced and historical). • Integrated pollution control (licenced and historical).
National Library of Scotland (National Library of Scotland, 2025)	2025	• Historical maps.
Ordnance Survey Ireland (Ordnance Survey Ireland, 2025)	2025	• Historical maps.
EPA Maps (National Monument Service, 2025)	2025	• Special Area of Conservation. • Special Protection Area. • Proposed Natural Heritage Area. • WFD groundwater body and groundwater body status.
Soils and Geology		
Irish Soil Information System (Environmental Protection Agency, Teagasc, Cranfield University, 2025)	2025	• Soil type.
Geological Survey of Ireland (GSI) Web Map Viewer (Geological Survey Ireland, 2025)	2025	• Superficial Deposits (scale 1:50,000). • Bedrock Geology (scale 1:100,000). • Geohazards include landslide susceptibility. • Geological Heritage sites. • Active Quarries
EPA Maps	2025	• Radon risk.

Data Source	Date	Data Content
		• SIS national soils. • Special Areas of Conservation. • Special Protection Areas. • National Heritage Areas (NHA).
Hydrogeology		
Geological Survey of Ireland (GSI) Web Map Viewer (Geological Survey Ireland, 2025)	2025	• Groundwater Bodies. • Karst features including caves, dry valleys, enclosed depressions, estavelles, springs, superficial solution features, swallow holes and turloughs. • Karst traced underground connections. • Groundwater Resource Potential. • Groundwater Vulnerability. • Wells and Springs. • Group Scheme and Public Supply Source, Protection Areas. • Superficial Deposit Permeability.
EPA Maps (National Monument Service, 2025)	2025	• WFD groundwater body and groundwater body status.

No existing ground investigation data is available for the site, as such this review will be solely summarised on desk-based information.

8.3.2 Approach to Impact Assessment

8.3.2.1 Identification of Receptors

A part of the current scope consists of identifying the environments and associated sensitive receptors potentially impacted by the Proposed Project. The criteria used to define receptors for the study area (based on a 250m buffer zone extended from each proposed working area) are summarised below in Table 8.2.

Table 8.2: Summary of Key Receptors to be Considered

Environmental Elements	Key Receptor
Land and Land Use	• Land use types and potential contaminants
Human Health	• Site end users
Soils and Geology	• Soils, superficial deposits, bedrock geology and other geological features, further to a review of GSI data and site specific ground investigation. • Mapped karst landforms including caves, dry valleys, enclosed depressions, estavelles, springs, superficial solution features, swallow holes and turloughs. • Geological heritage sites. • Geohazards: recorded events, primarily landslides, karst features. • Economic geological sites.
Hydrogeology	• Groundwater body and both quantitative and qualitative status classification as assigned under the WFD. • Groundwater: Groundwater abstractions from Public Supply Schemes, Group Water Schemes and local domestic/agricultural wells (with varying degrees of location accuracy) mapped by the GSI including Source Protection Zones (SPZs). • Traced underground connections of known water dye trace studies. • Groundwater Drinking Water Protection Areas.

Environmental Elements	Key Receptor
	• Aquifer Type, as assigned by the GSI; relates to the aquifers productivity in terms of well yields as detailed below: – Ll – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones; – Lm – Bedrock which is Generally Moderately Productive; – Lk – Locally Important Aquifer – Karstified to a limited degree or area; – Rkd – Regionally Important Aquifer–Karstified (diffuse); – Lg – Locally Important Aquifer– Sand and gravel. • Designated sites that are hydrologically or hydrogeologically connected to the Proposed Project (e.g. by way of karst connections, or by linear features such as water courses). • Boreholes.
Water Quality	All of the above under hydrogeology.

Source: (National Road Authority, 2009)

8.3.2.2 Assessment of Receptor Sensitivity

A receptor is defined as an element potentially subjected to an impact by the proposed construction activities. The sensitivity (also referred to as "importance" in the 2009 National Road Authority (NRA) guidelines) of soil, geological or hydrogeological receptors should be assessed on the basis of their quality, extent (scale) and rarity. Typical criteria to be applied in assessing the importance of these elements are provided by NRA - Guidelines on the Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Road Authority, 2009) hereafter referred to as the NRA Guidelines, and EPA - Guidance on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022), hereafter referred to as the EPA EIAR Guidelines, as set out in Table 8.3 and Table 8.4. These guidelines are an industry standard, which are typically used for projects akin to the Proposed Project.

Quantitative guidance regarding the importance/sensitivity for land use receptors or human health receptors is not addressed in the NRA methodology in the NRA Guidelines. As such, professional judgement has been used to assign receptor values based on the perceived ecological, economic and societal value of land use types.

Table 8.3: Estimation of Sensitivity/Importance of Soil and Geology Receptors

Sensitivity/ Importance	Criteria	Example
Very High	• Attribute has a high quality, significance, or value on a regional or national scale • Degree or extent of soil contamination is significant on a national or regional scale. • Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale	• Geological feature rare on a regional or national scale such as National Heritage Areas (NHA). • Large existing quarry or pit. • Proven economically extractable mineral resource.
High	• Attribute has a high quality, significance, or value on a local scale. • Degree or extent of soil contamination is significant on a local scale. • Volume of peat and/or soft organic soil underlying site is significant on a local scale.	• Contaminated soil on site with previous heavy industrial usage. • Large recent landfill site for mixed wastes. • Geological feature of high value on a local scale (County Geological Site). • Well drained and/or high fertility soils. • Moderately sized existing quarry or pit. • Marginally economic extractable mineral resource. • Land

Sensitivity/ Importance	Criteria	Example
Medium	• Attribute has a medium quality, significance, or value on a local scale. • Degree or extent of soil contamination is moderate on a local scale. • Volume of peat and / or soft organic soil underlying site is moderate on a local scale.	• Contaminated soil on site with previous light industrial usage. • Small recent landfill site for mixed wastes. • Moderately drained and / or moderate fertility soils. • Small existing quarry or pit. • Sub-economic extractable mineral resource.
Low	• Attribute has a low quality, significance, or value on a local scale. • Degree or extent of soil contamination is minor on a local scale. • Volume of peat and / or soft organic soil underlying site is small on a local scale.	• Large historical and / or recent site for construction and demolition wastes. • Small historical and / or recent site for construction and demolition wastes. • Poorly drained and / or low fertility soils. • Uneconomically extractable mineral resource.

Table 8.4: Estimation of Sensitivity/Importance of Hydrogeology Attributes

Sensitivity/ Importance	Criteria	Example
Extremely High	• Attribute has a high quality or value on an international scale.	• Groundwater supports river, wetland or surface water body. • Ecosystem protected by EU legislation, e.g., Special Areas of Conservation (SAC) or Special Protection Areas (SPA) status.
Very High	• Attribute has a high quality or value on a regional or national scale	• Regionally Important Aquifer with multiple wellfields. • Groundwater supports river, wetland or surface water body ecosystem protected by national legislation - NHA status. • Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	• Attribute has a high quality or value on a local scale.	• Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers. • Locally important potable water source supplying >1000 homes. • Outer source protection area for regionally important water source. • Inner source protection area for locally important water source.
Medium	• Attribute has a medium quality or value on a local scale.	• Locally Important Aquifer. • Potable water source supplying >50 homes. • Outer source protection area for locally important water source.
Low	• Attribute has a low quality or value on a local scale.	• Poor Bedrock Aquifer Potable water source supplying <50 homes.

8.3.2.3 Assessment of Magnitude of Impact

The significance of any potential effect has been determined based on the sensitivity of the feature to be protected and the magnitude of the impact on the receiving soil, geological and

hydrogeological environments. The terms used to define magnitude of impact are in accordance with NRA Guidelines and in line with the concepts provided by the EPA EIAR Guidelines (2022). A classification of attributes is provided in Table 8.5.

The NRA Guidelines state that impacts associated with construction of new developments are not necessarily always negative and that positive impacts are sometimes possible (e.g. enhancement of geological exposures, reduction in serious pollution risks to surface waters). Impacts should, therefore, be identified as positive, neutral or negative. Impacts may further be categorised according to type; they may be “direct” or “indirect” or in the case of negligible or neutral impact have “no predicted impact”.

The assessment of the impact of the Proposed Project on identified receptors will also include the duration of relative effect: temporary or permanent.

Table 8.5: Criteria for Rating Impact Significance

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Large Adverse (Negative) – Direct. – Indirect.	• Results in loss of attribute and / or quality and integrity of attribute.	• Removal of large proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. • Potential high risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >2% annually.	• Loss of high proportion of future quarry or pit reserves. • Irreversible loss of high proportion of local high fertility soils. • Removal of entirety of geological heritage feature. • Requirement to excavate / remediate entire waste site. • Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse (Negative) – Direct. – Indirect.	• Results in impact on integrity of attribute or loss of part of attribute.	• Removal of moderate proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. • Potential medium risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >1% annually.	• Loss of moderate proportion of future quarry or pit reserves. • Removal of part of geological heritage feature. • Irreversible loss of moderate proportion of local high fertility soils. • Requirement to excavate / remediate significant proportion of waste site. • Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse (Negative) – Direct. – Indirect.	• Results in minor impact on integrity of attribute or loss of small part of attribute.	• Removal of small proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. • Potential low risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >0.5% annually.	• Loss of small proportion of future quarry or pit reserves. • Removal of small part of geological heritage feature. • Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. • Requirement to excavate / remediate small proportion of waste site. • Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible (Neutral) – No predicted impact.	• Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	• Calculated risk of serious pollution incident <0.5% annually.	• No measurable changes in attributes.

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Minor Beneficial (Positive) – Direct. – Indirect.	• Results in minor improvement of attribute quality.	• Not specified.	• Minor enhancement of geological heritage feature. • Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial (Positive) – Direct. – Indirect.	• Results in moderate improvement of attribute quality.	• Not specified.	• Moderate enhancement of geological heritage feature. • Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial (Positive) – Direct. – Indirect.	• Results in major improvement of attribute quality.	• Not specified.	• Major enhancement of geological heritage feature. • Calculated reduction in pollution risk of 75% or more where existing risk is >1% annually.

8.3.2.4 Assessment of Significant Effect

The significance of an impact and its effect are determined based on the sensitivity of the potential receptor (Table 8.3 and Table 8.4) and the magnitude of the impact considered (Table 8.5). The matrix to determine the significance of an effect is provided in the following table (Table 8.6).

Table 8.6: Significance of an Effect Matrix

		Magnitude of Impact			
		Negligible	**Small**	**Moderate**	**Large**
Sensitivity of Receptor	**Extremely High**	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Moderate/ Significant	Significant/ Profound	Profound
	High	Imperceptible	Slight/Moderate	Moderate/ Significant	Significant/ Profound
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

8.3.2.5 WFD Methodology

The European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. 9 of 2010) establish a new strengthened regime for the protection of groundwater in line with the requirements of the Water Framework Directive (2000/60/EC) and the Groundwater Directive (2006/118/EC). Parts (IV) – (VI) of the Regulations identify the Environmental Protection Agency as the responsible body for establishing and maintaining a list of Threshold Values (TVs) for pollutants in groundwater, assessing the chemical and quantitative status of groundwater bodies and undertaking pollutant trend and trend reversal assessments.

The achievement of good groundwater status involves meeting a series of conditions, which are designed to satisfy the criteria defined in the WFD and the Groundwater Directive. In order to assess whether these conditions are being met, a sequence of tests has been prescribed for each of the quality elements defining good (chemical and quantitative) groundwater status. There are five chemical and four quantitative tests to satisfy for compliance. Each test is applied independently, and the results are combined to give an overall assessment of groundwater body chemical and quantitative status. The worst-case classification from the relevant chemical status tests is reported as the overall chemical status for the groundwater body, and the worst-case classification of the quantitative tests is reported as the overall quantitative status for the groundwater body. The worst result of the chemical and quantitative assessments is reported as the overall groundwater body status.

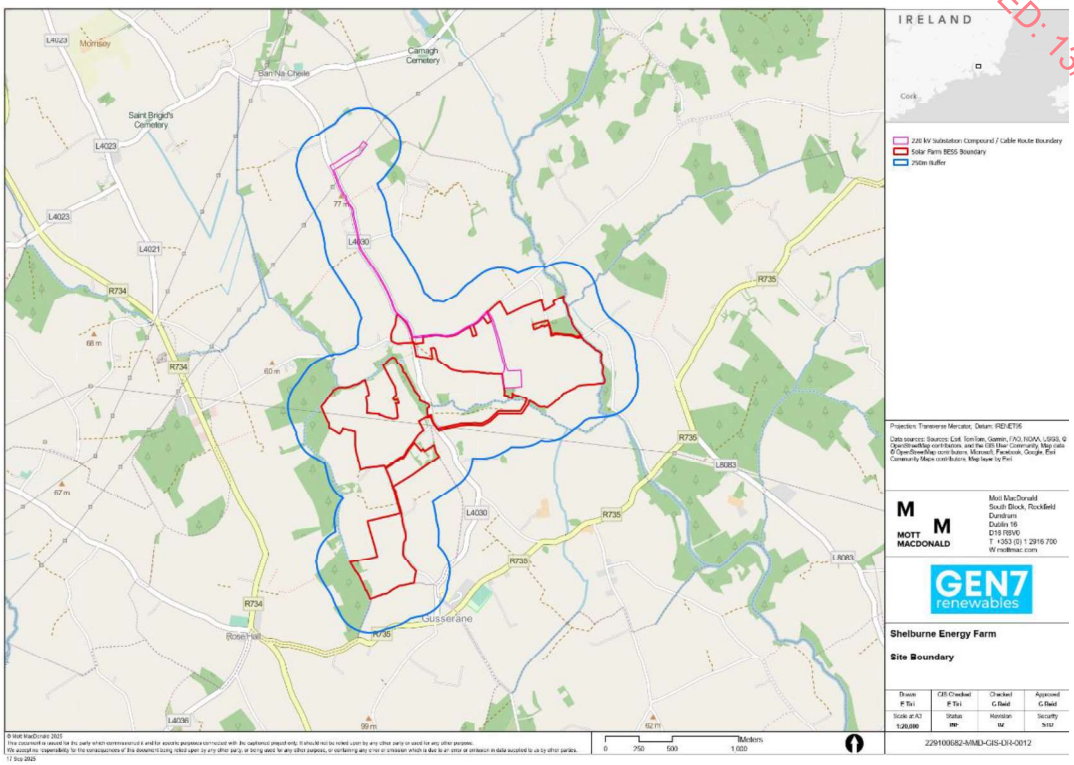
Status assessments are undertaken at the end of every six-year River Basin Management Planning (RBMP) cycle (currently in its third cycle from 2022 – 2027) and are used to generate a snapshot that shows the impacts of abstraction and pollution on groundwater. The baseline WFD screening assessment will be conducted using the latest available data for WFD status (2016 – 2021 RBMP cycle).

A baseline WFD screening assessment (Section 8.5.4) has been conducted against WFD status for the one groundwater body intersected by the Proposed Project, following the EPA WFD groundwater quantitative status guidelines (O'Connell & Craig, 2024).

8.3.3 Study Area

The study area is defined by the site boundary and a 250m buffer as shown in Figure 8.1.

Figure 8.1: Study Area and 250m Buffer



Source: Mott MacDonald 2025 from ArcGIS

The 250m buffer zone has been informed by the design of the Proposed Project, noting that the potential effects on ground conditions will be limited to the project footprint, and not the wider area. However, the immediately surrounding land is also considered in terms of any potential contamination to migrate onto or off site via groundwater.

8.3.4 Limitations of this EIAR

- This EIAR is predominantly based on desk-based information.

8.4 Receiving Environment

The following sections present an overview of the baseline conditions for the receiving environments and associated receptors (following methodology provided in Section 8.3 within the working areas defined in Chapter 5).

8.4.1 Land and Land Use

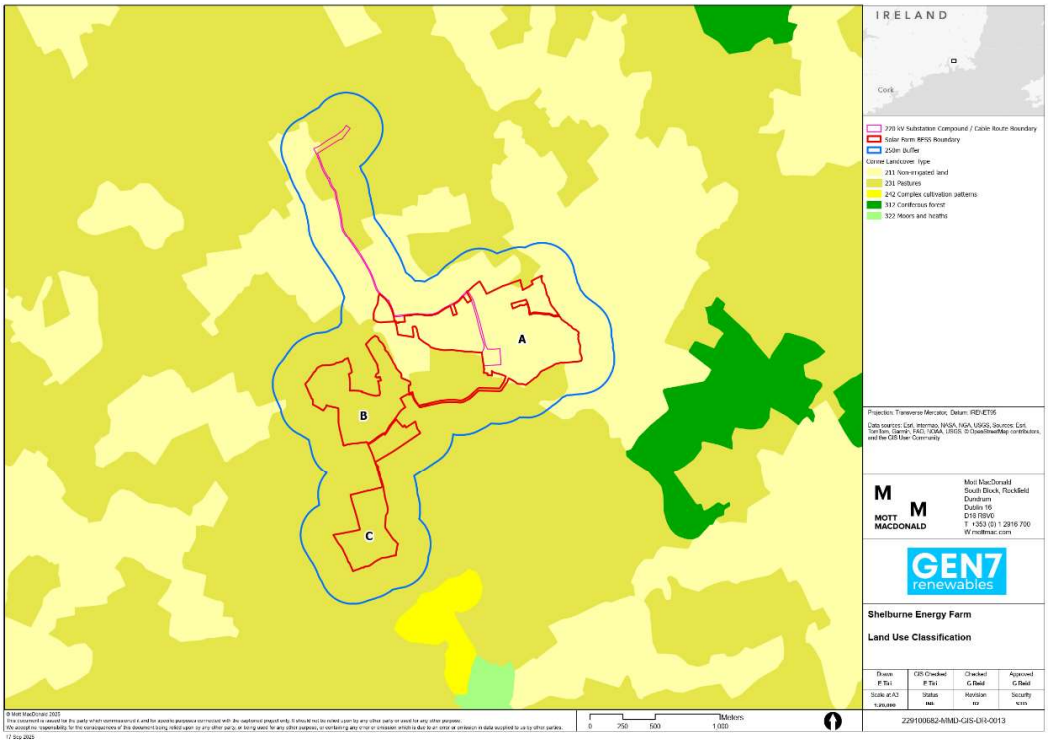
The land use designations in the study area have been obtained using CORINE Land Cover Dataset (CORINE, 2018). The land use within the study area is summarised below:

- The land use identified within the areas B and C to the south and west is pastures, localised areas within the boundary to the north and east are pastures. Land use of this nature is abundant within the local area and is therefore considered to have a low sensitivity;
- Non-irrigated arable land is dominant in area A to the north and east of the Proposed Project, land use of this nature is abundant within the within the local area and is therefore considered to have a low sensitivity;

- No other land use is identified by CORINE within 250m of the site, although it should be noted that mixed woodland is noted on satellite imagery to the border areas B and C, mostly to the northeast and west of these areas.

The relationship between the land use and the site boundary is shown in Figure 8.2.

Figure 8.2: CORINE Land Use 2018



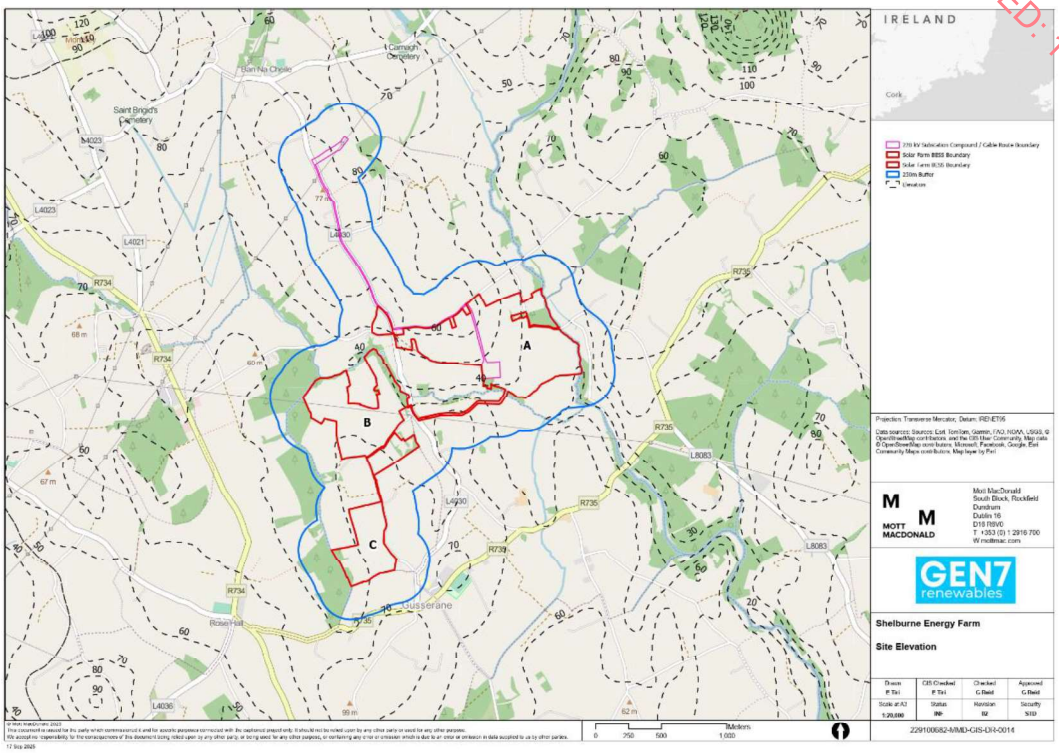
Source: Mott MacDonald 2025 from ArcGIS including data from CORINE (CORINE, 2018)

A review of historical mapping and historical aerial imagery (National Library of Scotland, 2025; Ordnance Survey Ireland, 2025) indicates there have been no major changes to the land use in the study area between 1830s and 2023. However, the following noteworthy changes have been identified on the available records:

- On-site potential sand pit within the northwest of area A;
- Off-site features include:
  - Gravel pit – to the north of Area A;
  - Corn Mill 260m to the south of Area A;
  - Two ringforts located 130m and 160m to the south of Area A;
  - Springs located adjacent to the west of Area C.

Topography (Tailte Eireann , 2023) varies across the site. The minimum elevation across the site is 29.5m OD and the maximum elevation is 77m OD. The highest elevation within the solar array is 66.5m OD located within Area A. In area A the topography typically slopes to the south, with localised variations sloping towards watercourses to the east (Owenduff River) and south (Tellarought River). In area B, the topography slopes to the southeast. In areas C the topography slopes towards the west. Elevation rises along the underground cable route towards the north, the elevation rises to a maximum topography of 77m OD. A topographic contour plot is included in Figure 8.3.

Figure 8.3: Topographic Contour Plot



Source: Mott MacDonald 2025 from ArcGIS including data from Tailte Eireann (Tailte Eireann , 2023)

No licenced or historic waste facilities have been identified within the study area (Environmental Protection Agency, 2025).

No licensed or surrendered Integrated Pollution Control (IPC) sites have been identified within the study area (Environmental Protection Agency, 2025).

A summary of the identified land and land use receptors, and associated sensitivity classifications is provided in Table 8.7.

8.4.1.1 Protected Areas

There are no protected areas within the site such as Special Area of Conservation (SAC) or Special Protection Area (SPA) or proposed Natural Heritage Area (pNHA), the closest mapped protected area is a pNHA, Boley Fen is 1km to the southeast of the Proposed Project (Environmental Protection Agency, 2025).

Table 8.7: Summary of Land Uses and Land Uses Receptors

Design Element	Land Use Type	Distance from Red Line boundary (m)	Potential Contaminants	Sensitivity
Solar array and underground cable	Pastures	0	Pesticides, fertilisers, ammonium	Medium
Solar Array, BESS substation and underground cable	Non-irrigated arable land	0	Pesticides, fertilisers, ammonium	Medium

Design Element	Land Use Type	Distance from Red Line boundary (m)	Potential Contaminants	Sensitivity
Protected areas				
No protected areas are located within the study area. The closest protected area is 1km to the southeast this is not considered to be sensitive to activities within the study area.				

8.4.2 Soils and Geology

Soil types were identified using the Teagasc database (Environmental Protection Agency, Teagasc, Cranfield University, 2025). Superficial deposits and bedrock were identified using the Geological Survey of Ireland (GSI) database (Geological Survey Ireland, 2025).

8.4.2.1 Soils

The soil associations mapped within the area are as follows:

- Clonroche association: Characterised as well-drained *Brown Earths.* Developed on drift, typically fine loamy with siliceous stones, and with good nutrient retention;
- Kilpierce association: Characterised as *Groundwater Gleys*. Developed on drift, typically fine loamy with siliceous stones. These soils are poorer draining, particularly where not drained, leading to periodic waterlogging and anaerobic conditions; and
- River association: Characterised as *Alluvial Gleys, Drained Alluvial Soils* and *Humic Alluvial Gleys.* A large soil association with 12 component series of all texture characteristics (sandy, silty, clayey or loamy). Alluvial soils are typically very fertile due to their formation in fluvial sediments rich in minerals, but are also subject to regular periods of waterlogging where undrained.

Soil sensitivity values have been assigned based on the classifications in Table 8.3. Soils considered well drained and/or highly fertile and are classified as having High sensitivity. As such, Clonaroche and River associations are considered as having high sensitivity and Kilpierce association as having Medium sensitivity.

8.4.2.2 Human Health

The Proposed Project is to include areas of industrial end use (BESS and substation areas) and retain current land use which is typically agricultural (cable route and solar array).

In areas that retain the current land use of agricultural land use the human health sensitivity is assessed as high sensitivity. Where the proposed land use is industrial the human health sensitivity is assessed as medium sensitivity.

8.4.2.3 Superficial Deposits

GSI mapping of superficial deposits show the majority of the site has mapped superficial deposits, with areas of no mapped superficial deposits corresponding with areas of subcrop and bedrock outcrop.

The superficial deposits to the north of the site underlying Area A including solar array, BESS, substation and cable route, area are mapped as Glacial Till derived from Lower Palaeozoic shales, to the east and south of the Proposed Project are alluvium deposits which correspond to the watercourses within the site.

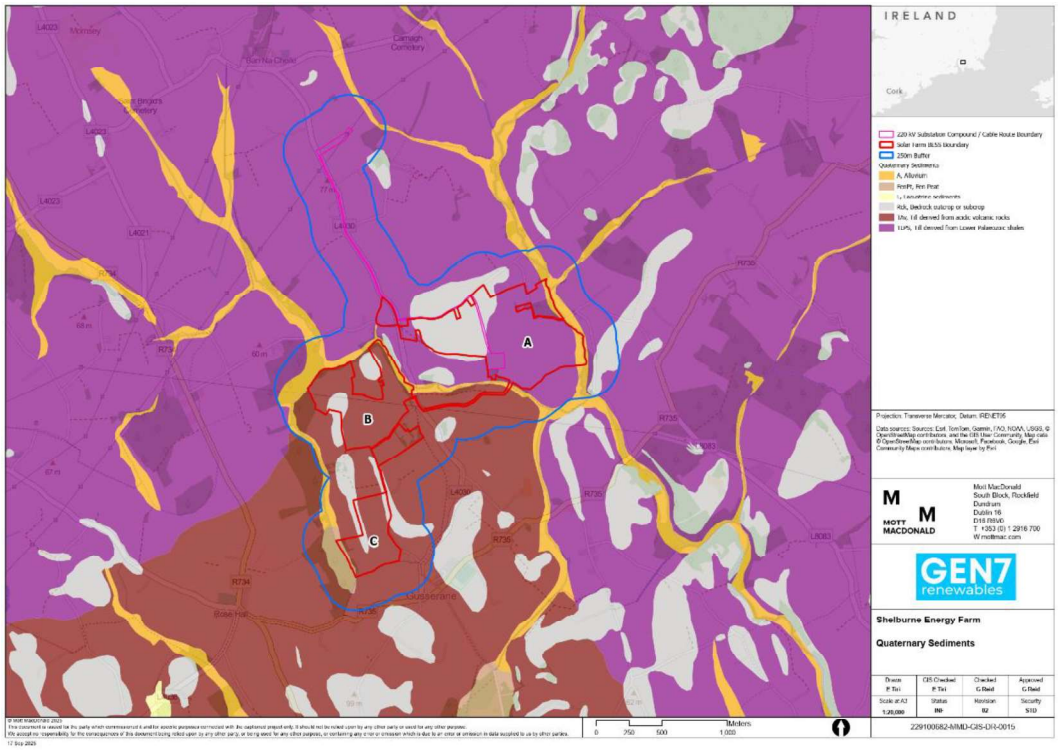
The superficial deposits underlying Solar Farm A and B are Till derived from acidic volcanic rocks, alluvium is present to the north and west corresponding to the watercourses bounding the

Project site. There is a mapped area of Fen Peat adjacent to the site, to the southwest of solar array Area C

Mapped Quaternary geomorphology includes meltwater channels and streamlined bedrock features the are typically orientated NNW-SSE.

The superficial geological deposits related to the site are shown in Figure 8.4.

Figure 8.4: Superficial Geology



Source: Mott MacDonald 2025 from ArcGIS including data from the Geological Survey Ireland (Geological Survey Ireland, 2025)

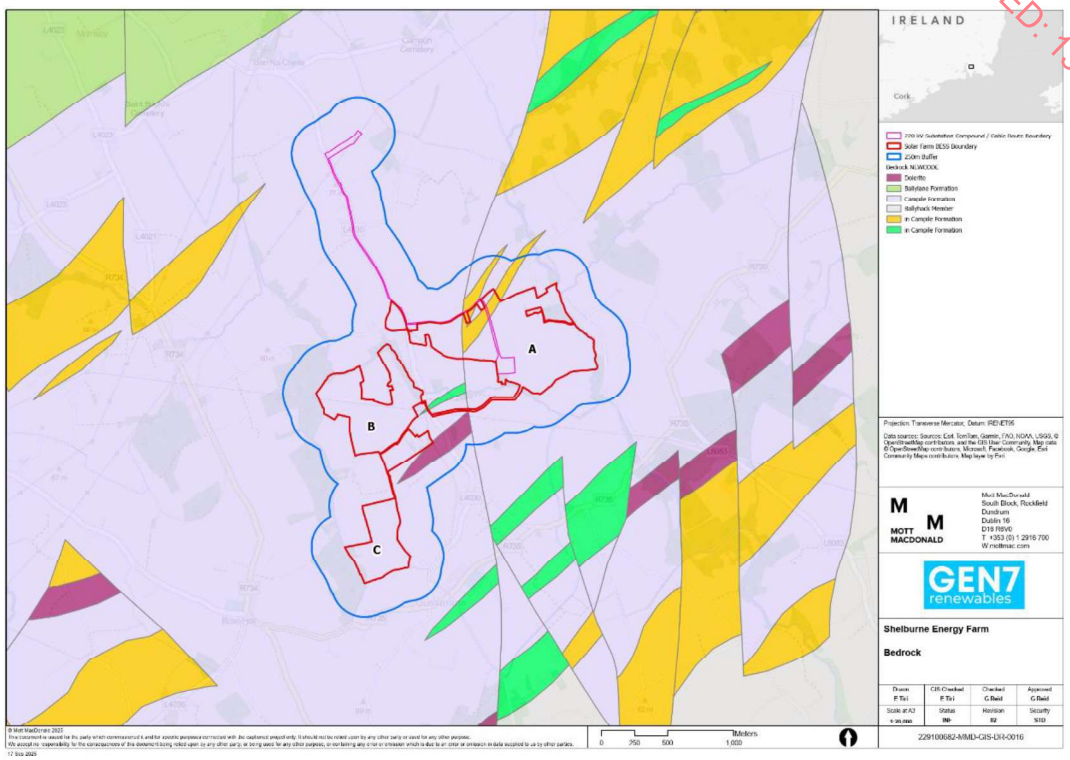
8.4.2.4 Bedrock Geology

GSI mapping of the bedrock beneath the site shows that the bedrock geology beneath the study area comprises Campile Formation and Slieve Gullion Complex.

The units of the Campile Formation present beneath the site are Rhyolitic volcanics, grey and brown slates, Felsic volcanics and intermediate volcanics of Ordovician age The Campile Formation has been intruded by Dolerited dykes from the Slieve Gullion Complex of Tertiary age. General mapped dip of the geology in the area is to the northwest dipping between 55 and 70º. Structural features in the area include faulting orientated generally north-south.

The bedrock mapping and linear features related to the site are shown in Figure 8.5.

Figure 8.5: Bedrock Geology



Source: Mott MacDonald 2025 from ArcGIS including data from the Geological Survey (Geological Survey Ireland, 2025)

8.4.2.5 Geological Heritage

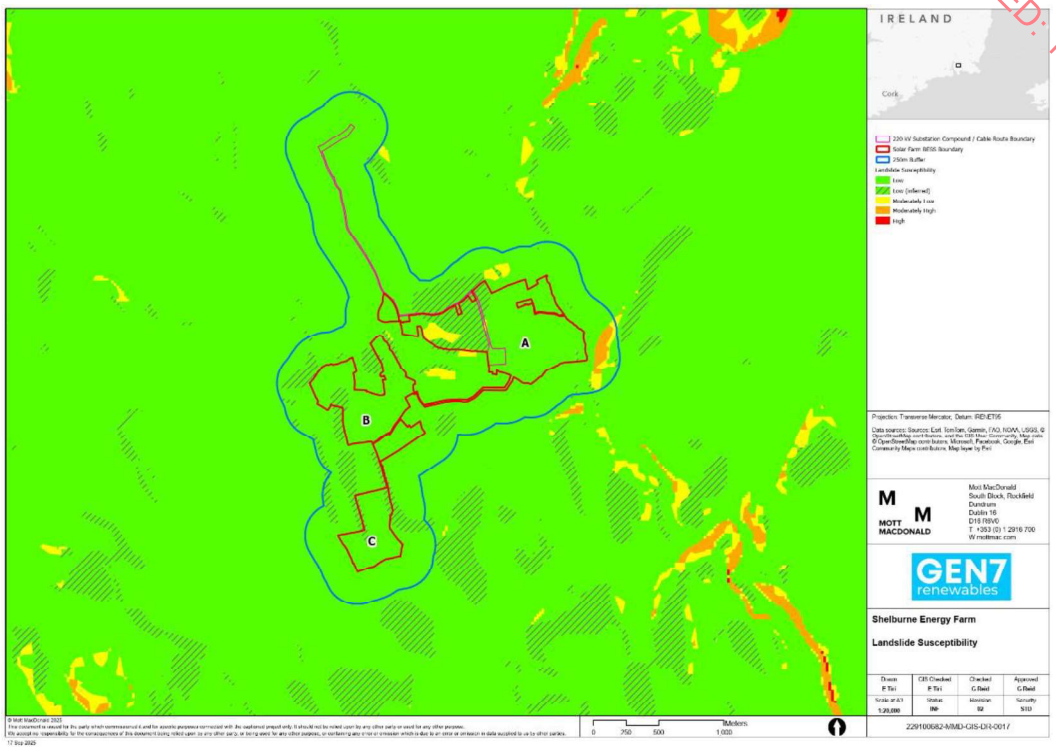
The GSI Geological Heritage mapping portal does not identify any geological heritage sites within the study area (Geological Survey of Ireland , 2025). The closest heritage site is Carrigadaggan (a country Geological site), located 4.5km northeast of the study area (Geological Survey Ireland, 2019)). The geological significance of the site is therefore considered to be low, with the bedrock geology considered to have a Low sensitivity. The sensitivity of the bedrock aquifer is discussed in Section 8.4.3.

8.4.2.6 Landslides

The GSI indicated that the landslide susceptibility classification is Low across most of the study area, however minor areas of moderately low susceptibility are present within the site and within 250m of the site. A minor area of 'moderately high' landslide susceptibility is present 70m to the east of Area A. Landslide susceptibility is shown in Figure 8.6. No landslide extents are mapped within the site or within 250m.

Due to the distance of the moderately high landslide susceptibility from the site and the topography of the site, the impact of the landslides on the site is considered to be imperceptible and is not being assessed further in this EIAR.

Figure 8.6: Landslide Susceptibility

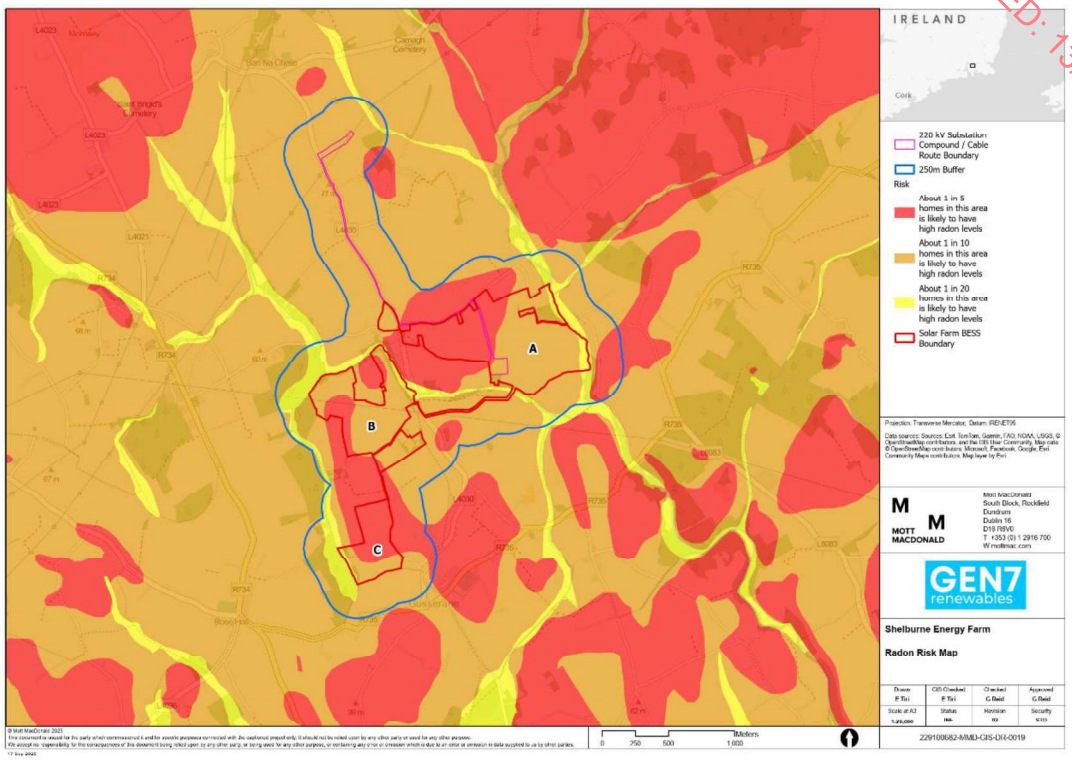


Source: Mott MacDonald 2025 from ArcGIS including data from the Geological Survey (Geological Survey Ireland, 2025)

8.4.2.7 Radon

The EPA Radon map, categorises radon risk based on indoor radon measurements and geological information, including bedrock type, quaternary geology, soil permeability and aquifer type (Environmental Protection Agency, 2025). This map shows that the study area is primarily located in an area where 20% of homes are estimated to be above the reference level of 200 becquerels per cubic metre (Bq/m^3). Radon risk in these areas is considered to be High. However, there are areas estimated as having 5 and 10% of homes above the 200Bq/m^3 reference level, which are classified as moderate risk. A radon test is legally required for ground floor and basement workplaces located in high radon areas and new buildings should be consider including radon protection measures (Government of Ireland, 2023 (amended)).

Figure 8.7: Radon risk



Source: Mott MacDonald 2025 from ArcGIS including data from the Environmental Protection Agency

8.4.2.8 Sensitivity

A summary of the identified soils and geology receptors and associated sensitivity classifications is provided in Table 8.8

Table 8.8: Soils and Geology Sensitivity

Receptor Category	Receptor	Distance from Redline boundary (m)	Sensitivity
Soils	Clonroche association	On-site	High
	River association	On-site	High
	Kilpierce association	On-site	Medium
Human Health	Agricultural Land use	On-site	High
	Industrial Land use	On-site	Medium
Geology- Superficial Deposits	Fen Peat	On-site (locally to the southwestern border)	Low
	Alluvium	On-site (localised to adjacent to watercourses)	Low
	Glacial Till derived from Lower Palaeozoic shales	On-site	Low
	Glacial Till derived from acidic volcanic rocks	On-site	Low
	Bedrock Outcrop or Subcrop	On-site	Low

Receptor Category	Receptor	Distance from Redline boundary (m)	Sensitivity
Geology - Bedrock	Slieve Gullion Complex (Dolerite Dykes)	Adjacent to the site	Low
	Campile Formation (Rhyolitic volcanics, grey and brown slates, Felsic volcanics and intermediate volcanics)	On-site	Medium
Landslides*	Low Susceptibility	On-site	N/a
	Moderately Low Susceptibility	On-site	N/a

*Landslides not considered a receptor – assessed in relation to potential impacts of landslides on surrounding receptors

8.4.3 Hydrogeology

A series of hydrogeological elements/attributes including groundwater karst features, aquifer designations, aquifer vulnerability, groundwater abstraction sources, public supply source protection areas (PSSPA), group scheme preliminary source protection areas (GSPSPA) and springs have been screened for the study area, to classify hydrogeological sensitive receptors, with the support of mapping tools available on the GSI Groundwater Data Viewer (Geological Survey Ireland, 2025). Hydrogeological receptors sensitivity/value is based on classification described in Table 8.4.

8.4.3.1 Aquifers

The Campile Formation and Dolerite Dykes which underly the whole study area are classified as regionally important Aquifers associated with the fissured bedrock.

There are no sand and gravel aquifers within the study area associated with the superficial deposits.

Groundwater vulnerability within the study area, identified using the GSI Groundwater Data Viewer (Geological Survey Ireland, 2025) ranges between low to extreme, with some areas classified as ‘rock at or near surface or Karst’. The areas of extreme groundwater vulnerability within the study area occur where the fractured bedrock is outcropping or near surface, with the groundwater vulnerability classification decreasing with distance away from the outcrop. In general, areas of extreme and high groundwater vulnerability are predominant within the site.

8.4.3.2 Wells springs and Abstractions

No Group Scheme or Public Supply Scheme Source Protection Areas are located within the study area (Geological Survey Ireland, 2025). It is assumed that all residential properties obtain their potable water supply from a private well, due to the absence of water mains identified within the study area. The location of private wells is not mapped; however, private wells are required to be located in the overall residential property boundary and not lands private adjacent lands (i.e. private wells are not located within the Project site). There are a total of 47 residential properties within the study area, and therefore it is assumed each property obtains drinking water from their own private well.

A screening of larger private groundwater abstractions has been carried out using the GSI Groundwater Data Viewer (Geological Survey Ireland, 2025). The available dataset does not provide the exact location of abstractions but rather provides circles within which the abstractions are located, with differing sized circles shown depending on location accuracy. No private groundwater abstractions have been identified with location radii which intersect the study area. The closest private groundwater abstractions radius is 400m to the east of the site

where two radii are located. Due to the distance of the abstractions from the site the sensitivity of the abstractions is not being assessed.

There are no sand and gravel aquifers or groundwater Source Protection Areas within the vicinity of the study area.

An on-site well named Saint Colman's Well is mapped on the historical environmental viewer, it should be noted that according to the notes on the feature it could not be found in 1988 and is unlikely to be in use (National Monument Service, 2025). Additional historical springs and wells are mapped adjacent to the west of the site boundary, these are not mapped on modern maps and their current status is unknown, it should be noted that these wells are not recorded in the dataset of abstractions (Geological Survey Ireland, 2025).

8.4.3.3 WFD Groundwater Bodies screening

The study area is located within the Adamstown WFD Groundwater Body (IE_SE_G_001) which is classified as productive fissured bedrock. The WFD status of the groundwater body is 'Good', and the risk status is currently 'Not at Risk' (Environmental Protection Agency, 2025).

8.4.3.4 Summary

A summary of the identified hydrogeological receptors, and associated sensitivity classifications is provided in Table 8.9.

Table 8.9: Summary of Hydrogeological Receptors

Receptor	Distance From Red Line Boundary	Sensitivity
Aquifers		
Campile Formation (regionally important aquifers)	On-site	High
Dolerite Dykes (regionally important aquifers)	On-site	High
Source Protection Areas		
No Group Scheme or Public Supply Scheme Source Protection Areas are located within the study area. The closest Source protection area is approximately 5.5km northeast. This is not considered to be sensitive to activities within the study area		
Wells, springs and abstractions		
Mapped groundwater abstraction wells /Private residential wells	>400m	Not considered to be sensitive to activities within the site.
Historical wells	On-site	Low (not anticipated to be in use)
Historical mapped spring	Off-site adjacent to west of site	Low
Groundwater/surface water interactions		
No groundwater/surface water interaction features have been identified in relation to ecologically designated SPA/SAC sites.		

8.5 Likely Significant Impacts

Construction phase effects considered include those include which have the potential to impact the following receiving environments:

- Land and land use;

- Soils and Geology; and
- Hydrogeology.

8.5.1 Do Nothing

In the event that the Proposed Project does not proceed, the 'do nothing' effect would be that effects on land, soils and hydrogeology would not occur. The positive benefits of generating renewable energy solar will not be realised if the Proposed Project is not developed.

8.5.2 Construction Phase

The construction phase activities associated with the construction of the BESS and Solar Farm, which could pose risks to land, soils and hydrogeology, are summarised below, and are described in more detail in Chapter 5 – *Description of Development* of this EIAR.

The site preparation works for the whole Proposed Project will include vegetation removal and re-contouring including earthworks (mostly located in the area of BESS development and substation, with minimal earthworks anticipated within the solar farm area). A temporary construction compound/laydown area is proposed.

8.5.2.1 Assessment of Effects

The construction phase assessment of effects for lands, soils and hydrogeology are summarised in Table 8.10.

Table 8.10: Construction Phase Assessment of Effects

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
Land Use	Solar Array	**Loss/change of land use.** Temporary works during the construction of the solar array include foundations works, re-contouring, profiling of internal access tracks for drainage.	Solar array has been designed such that post construction the land use can remain as agricultural land. The land surface adjacent to solar arrays will be restored following construction to similar to existing conditions. Access roads allowed to grass over post construction. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: Medium Significance of effect: Imperceptible	Construction (temporary)
	BESS	**Loss/change of land use.** The BESS will be built on an area of agricultural land use. Temporary works during the construction of the BESS re-contouring, internal access tracks and associated access track drainage	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Slight	Construction (temporary and permanent)
	Substation	**Loss/change of land use.** The substation will be built on an area of agricultural land use. Temporary works during the construction of the substation include re-contouring and foundation works.		Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Slight	Construction (temporary and permanent)
	Cable route	**Loss/change of land use.** Temporary works during the construction of the cable route include temporary excavations in agricultural land and within roads.	Installation of the cable route will be undertaken sequentially and the construction area will move in tandem with the progress of the installation, to	Magnitude and Quality of Impact: Negligible (neutral)	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
			minimise the section of the route cordoned off at any point. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Receptor Sensitivity: Medium Significance of effect: Imperceptible	
Land and Soils	Solar Array	**Impact on land/soils.** Localised Topsoil stripping may be required as part of the solar array works to allow for piling works.	Staged construction is planned to minimise disturbance to soils. Additional hedgerow planting proposed in solar array area. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: Medium/High Significance of effect: Imperceptible	Construction (temporary)
	BESS	**Impact on Soils.** Topsoil will be stripped from the BESS area to allow for construction of the BESS platform.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Construction (temporary and permanent)
	Substation	**Impact on Soils.** Topsoil will be stripped from the substation area to allow for construction of the substation platform.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Construction (temporary and permanent)
	Cable route	**Impact on land/soils.** Localised Topsoil stripping may be required as part of the	Staged construction is planned to minimise disturbance to soils.	Magnitude and Quality of Impact: Negligible (neutral)	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
		cable installation works to allow for installation.	Topsoil will be stored within the construction swathe during installation to allow for re-use. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Receptor Sensitivity: High Significance of effect: Imperceptible	
	All	**Impact on land/Soils.** Vegetation clearance is to take place around the site where required.	Additional hedgerow planning proposed in solar array area. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: Medium/High Significance of effect: Imperceptible	Construction (temporary and permanent)
Soils, Geology and hydrogeology	Solar Array and cable route	**Exposure to Radon**: Areas of high radon risk are located within the Solar Array areas and cable route area of the site. It is unlikely that the solar array and cable route will include areas requiring person entry as such radon risk is considered low. This should be confirmed during detail design. Human health receptors in this area are considered to have a High sensitivity.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7. However, it is unlikely that the solar array and cable route will require structures with enclosed structures as such no effect is anticipated.	No effect anticipated.	Construction (temporary)
	BESS and substation	**Exposure to Radon.** The site is located in an area that radon tests are recommended within. Human health receptors in this area are considered to have a Medium sensitivity.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7. Dependant on the design of structures with person entry radon protection measures may be necessary.	Magnitude and Quality of Impact: Large Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Significant	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
Soils, Geology and hydrogeology	Solar Array	**Loss of Bedrock.** The solar array foundations dimensions are currently unknown. Minor re-profiling is also required in areas of the Project to provide a flat platform for the containerised transformer systems Some excavation of bedrock could be required in areas where bedrock is close to the surface	The volume of potential bedrock excavation in comparison to the volume of the geological formation is considered to be negligible. This is not expected to significantly impact local or regional scale geological receptors.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low/ Medium Significance of effect: Imperceptible	Construction (permanent)
	BESS	**Loss of Bedrock.** The BESS compound including the retention basin requires approximately 23,540m^3 of cut. Groundwater vulnerability underlying the BESS is moderate suggesting that bedrock could be close to the ground surface. As such it is possible that some bedrock excavation may be required into the Campile Formation Aquifer.		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of effect: Imperceptible	Construction (permanent)
	Substation	**Loss of Bedrock.** The substation covers an area of approximately 7200m^2, and requires 5650m3 of cut, with foundations required for the GIS building, AIS transformer, and control building. Re-profiling is also required in areas of the project. Some excavation of bedrock could be required in areas where bedrock is close to the surface.		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of effect: Imperceptible	Construction (permanent)
	Cable route	**Loss of Bedrock.** The 220kV cable route is 2.9 km long and a minimum depth of ca.1.75 m it is possible that Some excavation of bedrock could be required in areas where bedrock is close to the surface.		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low/medium	Construction (permanent)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
				Significance of effect: Imperceptible	
	All	**Use of Concrete.** Concrete is highly alkaline and can affect groundwater and surface water quality through direct spillages and/or migration through the subsoil. Contamination from wet concrete and concrete wash-out during construction has the potential to infiltrate through the subsoil and migrate to the Campile Formation aquifer and Dolerite aquifer.	Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided. The Contractor will ensure that all concrete truck wash watering/cleaning is undertaken offsite and/or within a contained system where possible. A concrete washout procedure will be developed by the contractor prior to works commencing.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	All	**Leaks/spills from construction vehicles.** A maximum of approximately 26 HGV movements per day will be required during construction phase, corresponding to 52 two-way movements. There is risk of contamination of soils and groundwater from increased use of vehicles during construction, that have the potential to leak/spill hydrocarbons onto the road surface. Groundwater vulnerability is Low to Extremely High across the site, indicating that there is the potential for a rapid pathway from ground surface to groundwater in the area. Soils in this area are classified as High sensitivity. The Campile Formation aquifer and Dolerite aquifer is classified as High sensitivity.	Additional mitigation measures are to be considered in areas of High and Extreme groundwater vulnerability. This could include additional speed restrictions, wheel washing and exclusion of refuelling activities in these areas. Following adherence to the avoidance and mitigation measures listed above, the risk of a serious pollution incident from leaks and spills from construction vehicles is considered to be <0.5% annually.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
Hydrogeology	All	**Migration of residual agricultural contaminants to groundwater.** Potential to encounter residual agricultural	None in current design.	Magnitude and Quality of Impact: Negligible	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
		contaminants that could become remobilised during excavation works. Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils. However, this is unlikely and will be confirmed during a ground investigation.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Receptor Sensitivity: High Significance of effect: Imperceptible	
	Solar Farm	**Migration of contamination along piled foundations.** There is potential for piling works to act as a preferential pathway for contaminants from the ground surface to groundwater, especially in areas where there are no significant superficial deposits. In areas where the full thickness of superficial cover is removed, a permanent, more permeable pathway from ground surface to the aquifer may be created. Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils. However, this is unlikely and will be confirmed during a ground investigation.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Negligible Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (permanent and temporary)
	Solar Farm	**Groundwater contamination from silt and stockpile runoff.** It is anticipated that a quantity of soil will be stockpiled for a limited time prior to reinstatement or removal from site. This poses some contamination risk to receptors from turbidity/silt runoff	Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to watercourses and groundwater. Silt fences will be installed downslope of any area where silt is generated. Daily visual monitoring of the slit fences will be undertaken.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	BESS	**Groundwater contamination from silt stockpile runoff.** Material will be		Magnitude and Quality of Impact: Negligible (Neutral)	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
		excavated from the BESS platform and a will require some short- term stockpiling required before it is removed from site or reinstated. This will be stockpiled for a limited time. This poses some contamination risk to receptors from turbidity/silt runoff	Particular attention should be made to areas of High and Extreme groundwater vulnerability. Soil stockpiles from topsoil stripping will be maximum 2m in height depending on local soil conditions, as well as working strip width, to preserve topsoil integrity. Excavated soils shall not be placed within 10m of watercourses or wetlands where it could be eroded and enter the watercourse.	Receptor Sensitivity: High Significance of effect: Imperceptible	
	Substation	**Groundwater contamination from stockpile runoff.** It is anticipated that a quantity of soil will be stockpiled for a limited time prior to reinstatement, use or removal from site. This poses some contamination risk to receptors from turbidity/silt runoff		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	Cable Route	**Groundwater contamination from silt and stockpile runoff.** Soil will be stockpiled for a limited time prior to reinstatement or removal from site. This poses some contamination risk to receptors from turbidity/silt runoff		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	All	**Accidental leakages and spills.** Numerous substances used on construction sites have the potential to pollute water if not properly managed and treated. Such substances include fuels, lubricants, cement, silt, and other substances which arise during construction. Accidents may result in spillage or leakage of fuel or oil and pose a contamination risk. In areas of High and Extreme groundwater vulnerability, there is likely a rapid pathway from ground	Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces. All tanks and drums will be bunded in accordance with established best practice guidelines. Spill kits will be provided at all compound locations.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of effect	Duration of Effect
		surface to the Campile Formation and Dolerite Dykes aquifer.			
	Solar Farm	**Dewatering impacts (if required) on nearby groundwater abstractions.** Due to the shallow nature of the excavations for the site. It is likely that dewatering will not be required during construction. There are no recorded abstractions within the site and the closest recorded abstractions are not anticipated to be impacted by any abstractions.	No mitigation is possible in relation to the impact of dewatering on groundwater abstractions. However, construction will be phased and as such dewatering would only occur over a small area at a time. Monitoring requirements are considered in Section 8.7.	Magnitude and Quality of Impact: Small adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Construction (temporary)
	All	**Preferential flow pathway through dewatering wells (if required).** Shallow contamination from agricultural sources or from construction phase leaks/spills have the potential to migrate to the Dolerite and Campile Formation aquifer via borehole flooding/cross completion of dewatering wells. Due to the shallow nature of the proposed excavations, it is likely that dewatering will not be required during construction.	None included in current design. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Small adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Construction (temporary)
	Solar Farm	**Potential for groundwater abstractions to be located within red line boundary.** No recorded groundwater abstraction wells are located within the site boundary, historical wells are recorded within the site boundary however, it is unknown if these are in use.	None included in current design. Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low Significance of effect: Imperceptible	Construction (permanent and temporary)

8.5.3 Operation and Maintenance Phase

Construction phase effects considered include those include which have the potential to impact the following receiving environments:

- Land and land use;
- Soils and Geology; and
- Hydrogeology.

Operational phase activities, outlined in Chapter 5, are assessed in Table 8.11.

Table 8.11: Operational Phase Assessment of Effects

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of Effect	Duration of Effect
Land Use	Solar Farm and cable route	**Loss/change of land use.** The land use will be re-instated post construction for the solar farm and cable route as such the land use will return to agricultural use.	None required	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of effect: Imperceptible	Operational (long term)
	BESS and substation	**Loss/change of land use.** The land use will be altered in areas of BESS and substation. The land use sensitivity will be altered from a medium sensitivity land use.	Additional mitigation measures have been proposed to manage this effect, which are included in Section 8.7.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Slight	Operational (long term)
Soils and Geology	All	No soils and geology impacts anticipated during operational phase.	None required	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)
Geology, Soils and Hydrogeology	Solar Farm and cable route	**Exposure to Radon**: Areas of high radon risk are located within the Solar Array areas and cable route area of the site. It is unlikely that the solar array and cable route will include areas requiring person entry as such radon risk is considered low. This should be confirmed during detail design. Human health receptors in this area are considered to have a High sensitivity.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 8.7. However, it is unlikely that the solar array and cable route will require structures with enclosed structures as such no effect is anticipated.	No effect anticipated.	Operational (long term)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of Effect	Duration of Effect
	BESS and substation	**Exposure to radon.** The BESS and substation areas are located in areas that radon testing is recommended		Magnitude and Quality of Impact: Large Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Significant	Operational (long term)
Hydrogeology	Solar Farm	**Impact on groundwater flow.** Solar panel foundations could act as a barrier to groundwater flow.	Due to the anticipated shallow and diffuse nature of the subsurface structures, these are considered unlikely to significantly impede groundwater flow.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)
	BESS	**Impact on groundwater flow.** BESS foundations could act as a barrier to groundwater flow.	Due to the anticipated shallow nature of the subsurface structures, these are considered unlikely to significantly impede groundwater flow.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)
	Substation	**Impact on groundwater flow.** Substation foundations could act as a barrier to groundwater flow.	Due to the anticipated shallow nature of the subsurface structures, these are considered unlikely to significantly impede groundwater flow.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)
	Cable route	**Impact on groundwater flow.** The installation of cables in the subsurface could act as a barrier to groundwater flow. Excavations are expected to extend to a depth of approximately 1.75m below ground level.	Due to the shallow and insignificant nature of the subsurface structures, these are considered unlikely to significantly impede groundwater flow.	Magnitude and Quality of Impact: Negligible (Neutral)	Operational (long term)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of Effect	Duration of Effect
				Receptor Sensitivity: High Significance of effect: Imperceptible	
	BESS	**Groundwater abstractions impact on groundwater levels** A groundwater abstraction well is proposed for firefighting at the BESS site.	Groundwater abstraction is only in the case of a fire, as such. regular abstraction is not anticipated.	Magnitude and Quality of Impact: Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Operational (long term)
	Substation	**Groundwater abstractions impact on groundwater levels** A potable groundwater abstraction well is proposed for welfare facilities at the substation site.	Groundwater abstraction is required for the welfare facilities at the GIS substation building, regular abstraction is anticipated, which will be required to serve four maintenance persons during maintenance visits, which will occur on average once per month. Therefore, water requirement for the operational and maintenance phase will be significant below 25m3 per day. If daily abstraction is greater than 25m^3/d an abstraction license will also be obtained from the EPA (Environmental Protection Agency, 2024). The two fire water tanks will be filled at the beginning of the operational and maintenance phase to ensure supply is present, these tanks will only be filled after depleted from fire fighting activities.	Magnitude and Quality of Impact: Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Operational (long term)
	BESS	**Site water dischargers.** Discharges, such as firewater discharge may contain contaminants that have the potential to pollute groundwater.	In a fire event, surface water from the BESS area will automatically be redirected to a firewater storage tank via an automated penstock. The tank	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High	Operational (long term)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and quality of remaining impact and significance of Effect	Duration of Effect
			will be sized to ensure no flooding of the proposed site occurs for the critical storm with a 1 in 10-year return period, including a 30% allowance for climate change. The facilities themselves will store potentially contaminative substances in secure bunded areas which are further secured by the site drainage system.	Significance of effect: Imperceptible	
	Substation	**Site water dischargers.** Discharges, from welfare facilities on-site.	It is anticipated that any foul water from welfare facilities on site will be connected to existing sewer network or will be managed on-site and will not be discharged to groundwater.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)

8.5.4 WFD Groundwater Status

The groundwater screening assessment is summarised in Table 8.12. The small scale of the Proposed Project relative to the magnitude of the WFD waterbody is deemed to pose very low risk to the delivery of long term WFD no deterioration and status objectives, such that no further (additional) assessment is required.

Table 8.12: WFD Groundwater Assessment

Test	Impact Assessment
Quantitative Status	
Saline (or other) intrusions	No impact on saline intrusions is anticipated due to the distance of the site from saline waterbodies.
Impact of groundwater on surface water ecological/quantitative status	In areas where the superficial deposits are thin or absent, groundwater within the Campile Formation and Dolerite aquifers is likely to be in continuity with surface water. Potential dewatering during construction works have the potential to impact groundwater levels and baseflow to rivers, especially works adjacent to the River Owenduff and unnamed streams. There is also potential for construction phase activities to impact on groundwater quality, which could impact local surface water bodies. However, if required, dewatering is anticipated to be short-term and localised, and following the mitigation measures outlined in Sections 8.5.2 and 8.5.3, no significant impacts are anticipated to effect recharge or water quality in the aquifer. As such, the remaining risk to surface water is low from an ecological/quantitative perspective
Groundwater Dependant Terrestrial Ecosystem (GWDTE) quantitative status	Adamstown WFD Groundwater body has been designated as a protected area for Groundwater in SAC habitats. However, the closest SAC area to the scheme is the River Barrow and River Nore SAC located more than 5km southwest of the Proposed Project and the Proposed Project is unlikely to have any significant impact on the GWDTE.
Water balance	No predicted impact to water balance of the WFD groundwater body. Dewatering, if required, will be temporary and phased over small areas. Addition of hardstanding across the BESS area will slightly reduce recharge locally. However, due to the relatively minor size of the site compared to the underlying groundwater body, the impact is considered to be negligible. The ground surface beneath the solar farm will be reinstated to natural conditions, so this element will not have any significant impacts on recharge rates.
Chemical Status	
Saline (or other) intrusions	No impact on saline intrusions is anticipated due to the distance of the site from saline waterbodies.
Impact of groundwater on surface water ecological/quantitative status	Dewatering discharge locations have not been identified. There is potential for small amounts of groundwater intercepted in excavations to be discharged to local streams or watercourses. Any discharges to surface water will be treated to remove contaminants and silt in accordance with IFI requirements. This may have a minor, local, temporary impact on surface water chemistry, but would be expected to have a negligible temporary impact (and no permanent impact) to the wider WFD surface water bodies.
GWDTE quantitative status	Adamstown WFD Groundwater body has been designated as a protected area for Groundwater in SAC habitats. However, the closest SPA/SAC area to the scheme is the River Barrow and River Nore SAC located more than 5km southwest of the Proposed Project and the Proposed Project is unlikely to have any significant impact on the GWDTE.
Drinking Water Protected areas	Carrigbyrne PWS, located approximately 5.5km northeast of the Proposed Project, is the closest Public Supply Source Protection Areas. Due to its distance from the Proposed Project, the impact to this water source from the Proposed Project is considered to be negligible. No designated public supply or group scheme source protection areas have been identified within 2.5km of the scheme and therefore the impact of this scheme to drinking water supplies is considered negligible.
General chemical assessment	The risk of accidental spills and leaks of contaminants (accidents and disasters), such as hydrocarbons, will be minimised by the embedded and additional

Test	Impact Assessment
	mitigation measures implemented during construction and operation. The impact to the chemical status of the Adamstown WFD groundwater body is considered negligible.

8.5.5 Decommissioning Phase

Subject to the granting of statutory approval, the Shelburne Energy Farm and grid connections will form part of the national electrical grid infrastructure. The design life of the PV Solar Farm and BESS is 30 years and 20 years respectively, where the planning permission for the operational life span of the Proposed Project overall is 40 years. It is not possible to identify at time of writing the waste management routes or specific facilities that will be used, as these are liable to change over such a timescale.

Where decommissioning takes place, is it assumed that all above-ground components associated with the Shelburne Energy Farm will be disassembled and removed from the site, as per the Decommissioning and Land Restoration Plan, Appendix 3.1, Volume 3 of this EIAR.

It is expected that the substation and 220kV Grid Connection will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

8.6 Cumulative Effects

Cumulative effects are those arising from impacts of the Proposed Project in combination with impacts of other proposed or consented development projects that are not yet built or operational.

An assessment of potential cumulative effects is provided below. There are no intra-project effects as this EIAR has been prepared for all elements of the Project, cumulative effects from other Developments are detailed below.

8.6.1 Other Developments

Further to a review of planning applications undertaken in September 2025 (as presented in Table 3.2, Chapter 3 of this EIAR), a list of other known existing and/or approved developments and other known planned developments, which may result in cumulative effects was undertaken.

No significant developments were identified within 2.5km of the site, as such, no cumulative effects are anticipated.

8.7 Mitigation and Monitoring Measures

Design and embedded mitigation measures are specified in Table 8.11. A Construction Environmental Management Plan (CEMP) will be prepared, included within the planning application, and implemented during the construction phase in consultation with the Planning Authority. This will specify the range of measures to avoid and minimise impacts that may occur in construction. This requires the appointed contractor to have in place appropriate consents for works that could affect groundwater and to implement specific measures to protect nearby receptors. Key CEMP measures of relevance to soils geology and hydrogeology will include;

- Fuel storage - bunded tanks to prevent spillages and designated fuelling areas with spillage control;

- Chemical storage - all potentially polluting chemicals will be stored in secure weatherproof enclosures with spill kits;
- Concrete to be brought to site by covered truck, with wet concrete operations adjacent to watercourses avoided;
- Concrete truck wash watering/cleaning will be undertaken off-site if possible;
- Failing concrete washout being carried out offsite a concrete washout management plan will be developed prior to construction by the appointed contractor;
- All concrete wash water generated on site will be collected;
- The site will be kept secure to prevent vandalism which can lead to pollution from stored liquids escaping and entering drains;
- Any spillages will be cleared immediately by excavating and disposing of affected soils in accordance with the Waste Management Act 1996, and associated regulations;
- Silt control measures will be used to control run-off generated from activities on site and prevent it from entering nearby waterbodies; and,
- A dewatering management plan will be developed by the contractor before construction work commences. All construction activities, including construction traffic, will be managed through the site Construction Environmental Management Plan (CEMP), which will set out key mitigation measures for, and monitoring of, potential impacts from traffic.
- Should dewatering be required any discharges will be treated to remove contaminants and silt and disposed of in accordance with EPA requirements.
- Bentonite Breakout procedure will be developed.
- An appropriately qualified person will be present on-site during construction to identify visual and olfactory evidence of contamination during excavation.
- Any contaminated ground will be characterised according to generic screening criteria and dealt with via a bespoke remediation strategy or a materials management plan.
- Any waste arising will be managed in accordance with the Waste Management Act 1996 (as amended) and associated Regulations.
- In addition to the above, a pre-construction confirmatory survey of wells and groundwater abstractions will be undertaken.
- Should dewatering be required, water level monitoring will be undertaken pre-construction, during construction and post-construction for groundwater abstractions which may be impacted by dewatering. A dewatering license will also be obtained for any dewatering operations over 25m^3/d, in line with EPA regulations and EU law (Environmental Protection Agency, 2024).
- Water quality testing will also be undertaken pre-construction, during construction and postconstruction for any identified drinking water abstraction sources which may be impacted by construction activities.
- To address risks of exposure to radon, workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019 (Minister for Communications, Climate Action and Environment, 2019). Radon barriers are also to be installed in areas where a high radon risk have been identified.

The following mitigation measures will be implemented to address residual risk to soils, landslide risk and risk of contaminant migration (as summarised in Section 8.8):

- Soil Management Plan - based on recognised best management practices to minimise the loss of soil quality during handling. This will include a suitable soil survey within the area of permanent land take to inform on the soils sensitivity to handling and its potential for reuse on or off site;

- Where groundwater seepage poses a risk to excavation stability, additional measures (such as dewatering) will be used to mitigate these risks.
- A suitably designed drainage system will be installed to divert water away from the landslide risk zones.
- A phase of ground investigation prior to construction will include an assessment of shallow groundwater quality within the superficial deposits (if present) and shallow bedrock. This will identify existing contamination and inform any requirement of remediation (as outlined in the CEMP detailed above).

8.8 Residual impacts

Following mitigation, the remaining component of an effect is considered a residual effect. Significance of residual effects is also determined using the criteria of Table 8.5.

In assessments for both construction and operational phase, the majority of impacts are negligible or minor and would be mitigated by rigorous land, soils and hydrogeology protection measures, resulting in effects which are imperceptible. However, following the mitigation measures included in the design, some risks remain with effects which are Slight, Moderate/Significant and Profound. To address these outstanding risks, additional mitigation measures have been proposed, which result in residual effects which are all imperceptible. These are summarised in Table 8.13.

Table 8.13: Residual Effects

Receiving Environment	Design Element	Potential Residual Impact	Magnitude and quality of remaining impact and significance of effect	Further Mitigation	Residual Effect	Duration of effect
Land Use	BESS and substation	**Loss/change of land use.** The land use will be altered in areas of BESS and the substation. The land use sensitivity will be altered from a medium sensitivity land use.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of effect: Slight	No further mitigation.	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: Medium Significance of effect: Imperceptible	Construction (temporary and permanent) Operational (long term)
Land and Soils	BESS	**Impact on Soils.** Topsoil will be stripped from the BESS area to allow for construction of the BESS platform.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Soil stripping, excavation and temporary storage will be undertaken in accordance with recognised good management practices to minimise/avoid loss of quality (TEAGASC, 2022; EPA, 2021; EPA, 2019; EPA, 2024). Where soils are not to be replaced (i.e. BESS area), appropriately managed soil handling will allow for suitable of site reuse. Sustainable handling will be informed by the production and use of a soil management plan	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary and permanent) Operational (long term)
	Substation	**Impact on Soils.** Topsoil will be stripped from the substation area to allow for construction of the substation platform.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate		Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary and permanent) Operational (long term)
Land, Soils, Geology and hydrogeology	BESS and substation	**Exposure to Radon.** The site is located in an area that radon tests are recommended within.	Magnitude and Quality of Impact: Large Adverse (Negative)	Radon protection measures should be designed into structures with person entries, workplace radon tests will be	Magnitude and Quality of Impact: Negligible (neutral)	Construction (temporary)

Receiving Environment	Design Element	Potential Residual Impact	Magnitude and quality of remaining impact and significance of effect	Further Mitigation	Residual Effect	Duration of effect
		Human health receptors are considered to have a Medium sensitivity.	Receptor Sensitivity: Medium Significance of effect: Significant	carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019 (Government of Ireland, 2023 (amended)). Radon barriers are to be installed in areas where a high risk has been identified.	Receptor Sensitivity: Medium Significance of effect: Imperceptible	Operational (long term)
Hydrogeology	Solar Farm	**Dewatering impacts (if required) on nearby groundwater abstractions.** Due to the shallow nature of the excavations for the site. It is possible that dewatering will not be required during construction. There are no recorded abstractions within the site and the closest recorded abstractions are not anticipated to be impacted by any abstractions.	Magnitude and Quality of Impact: Small adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	A no derogation agreement will be made with owner/operators of groundwater sources to ensure continuity of water supply during period in which water supply may be impacted.	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	All	**Preferential flow pathway through dewatering wells (if required).** Shallow contamination from agricultural sources or from construction phase leaks/spills have the potential to migrate to the Dolerite and Campile Formation aquifer via borehole flooding/cross completion of dewatering wells. Due to the shallow nature of the proposed excavations, it is possible that dewatering will not be required during construction.	Magnitude and Quality of Impact: Small adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate		Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Construction (temporary)
	BESS	**Groundwater abstractions impact on groundwater levels** A groundwater abstraction well is proposed for firefighting at the BESS site.	Magnitude and Quality of Impact: Adverse (Negative)		Magnitude and Quality of Impact: Negligible (neutral)	Operational (long term)

Receiving Environment	Design Element	Potential Residual Impact	Magnitude and quality of remaining impact and significance of effect	Further Mitigation	Residual Effect	Duration of effect
			Receptor Sensitivity: High Significance of effect: Slight/Moderate		Receptor Sensitivity: High Significance of effect: Imperceptible	
	Substation	**Groundwater abstractions impact on groundwater levels** A potable groundwater abstraction well is proposed for welfare facilities at the substation site.	Magnitude and Quality of Impact: Adverse (Negative) Receptor Sensitivity: High Significance of effect: Slight/Moderate	Groundwater abstraction is for the welfare facilities at the substation; regular abstraction is anticipated. Pumping tests should be undertaken as part of ground investigation works prior to construction to determine feasibility. If daily abstraction is greater than 25m^3/d a dewatering license will also be obtained for any dewatering operations over 25m3/d, in line with EPA regulations and EU law (Environmental Protection Agency, 2024).	Magnitude and Quality of Impact: Negligible (neutral) Receptor Sensitivity: High Significance of effect: Imperceptible	Operational (long term)

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