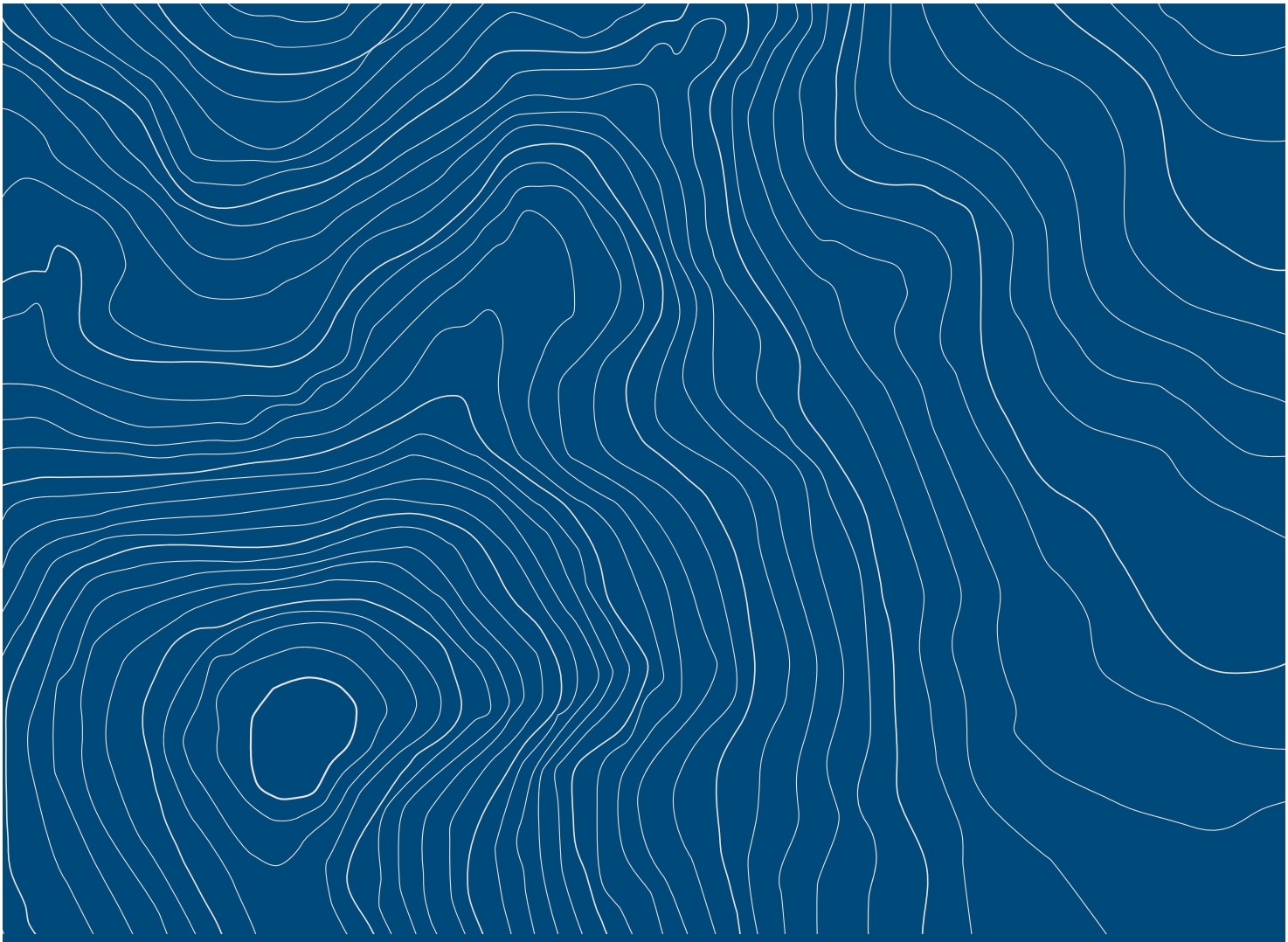

DublinArray
Generation for generations

EIAR Volume 5: Onshore Infrastructure Assessment Chapters Chapter 3: Land, Soils and Geology

Kish Offshore Wind Ltd

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

Dublin Array Offshore Wind Farm

Environmental Impact Assessment Report

Volume 5, Chapter 3: Land. Soils and Geology

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Glossary

Term	Definition
Alluvial soils	Fertile soils formed by the deposition of sediments by rivers, streams, or waves, typically found in floodplains and deltas
An emergency spill response	A collection of equipment designed to contain, control, and clean up hazardous spills. It typically includes absorbent materials, personal protective equipment (PPE), and disposal bags
The Applicant	The Applicant for Dublin Array is Kish Offshore Wind Limited on behalf of Kish Offshore Wind Limited and Bray Offshore Wind Limited with the written consent of DLRCC.
Bedrock	The solid rock layer beneath soil and loose material, forming the Earth's crust foundation
Borehole	Hole drilled into the ground used for geological studies to investigate ground conditions.
Brownfield land	Previously developed land
Construction Environmental Management Plan (CEMP)	A plan outlining measures to manage and mitigate environmental impacts during construction.
County Geological Site	A County Geological Site (CGS) is a location recognized for its significant geological features, requiring protection and promotion
Geohazard	A geohazard is a natural geological process capable of causing damage, loss of property, and/or injury and loss of life
Geotechnical survey	A geotechnical survey is an investigation of the physical and mechanical properties of the seabed and subsurface soils. This survey involves sampling and testing sediment layers to assess soil strength, composition, and stability.
Glacial till	Unsorted sediment deposited directly by glaciers, containing a mix of clay, silt, sand, gravel, and boulders
Hydrocarbons	Organic compounds consisting entirely of hydrogen and carbon atoms, commonly found in petroleum and natural gas
Landfall Site	The location for the two underground TJBs at Shanganagh Cliffs where the onshore and offshore ECRs join also including the associated temporary infrastructure to support the Landfall Site TCC.
Landfill Gas Combustion Plant	A facility that captures and burns landfill gas, primarily methane, to generate energy and reduce greenhouse gas emissions
LiDAR	Remote sensing method using laser pulses to measure distances and create precise 3D maps
Made ground	Soil or other material that has been artificially placed or modified for construction purposes, rather than naturally occurring
Onshore Export Cable Corridor	The route corridors within which the proposed cables will be installed underground from the landfall to OCC and beyond the OCC to the GCP.
Onshore Electrical System (OES)	All of the proposed Dublin Array transmission infrastructure from the TJB to the Carrickmines GCP i.e. the TJBs, onshore underground cables and associated infrastructure, the OSS and the onshore grid connection point.

Term	Definition
Onshore infrastructure	The OES and the O&M Base of the Dublin Array.
Operation and Maintenance Base (O&M Base)	This is the location from where the daily operations and normal repairs, replacement of parts and structural components, and other activities needed to preserve the offshore assets will be conducted.
Sectors	The onshore ECR has been subdivided into seven sectors to aid the reader in identifying specific locations along the 7.4 km route between the TJBs and the OSS.
Sedimentary siliceous stones	Rocks primarily composed of silicon dioxide often formed from silica-secreting organism
Subsoil	Subsoil is the layer of soil beneath the topsoil, consisting of minerals and organic matter.
Temporary Construction Compounds (TCCs)	Four main TCCs will be utilised for parking, welfare facilities, site office cabins, construction equipment, construction material laydown and storage for the duration of the OES construction phase with an occupation of up to 36 months. Three locations are identified to temporarily support the installation of the OES: Landfall Site TCC (Shanganagh Cliffs) Clifton Park TCC Leopardstown TCC OSS TCC
Transition Joint Bay (TJB)	The proposed infrastructure at the landfall location where the offshore and onshore cables connect.

Acronyms

Term	Definition
CCGT	Combined Cycle Gas Turbine
CEMP	Construction Environmental Management Plan
CGS	County Geological Site
CIWEM	The Chartered Institution of Water and Environmental Management
DART	Dublin Area Rapid Transit
DCC	Dublin County Council
DLRCC	Dún Laoghaire Rathdown County Council
DPM	Direct Pipe Method
EC	European Commission
ECR	Export Cable Route
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EU	European Union
ESB	Electricity Supply Board
GCP	Grid Connection Point
GCS	County Geological Site
GLs	Gravels derived from Limestones
GSI	Geological Survey of Ireland
GW	Gigawatts
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene
IGI	Institute of Geologists of Ireland
IFS	Irish Forestry Soils
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
ISIS	Irish Soil Information System
JB	Joint Bay
LSG	Land, Soil and Geology

Term	Definition
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NOx	Nitric Oxide
mAOD	Metres Above Ordnance Datum
MBs	Marine beach sands
MHWS	Mean High Water Springs
OD	Ordnance Datum
OES	Onshore Electrical System
O&M	Operations and Maintenance
OSi	Ordnance Survey of Ireland
OSS	Onshore Substation
PVC	Polyvinyl Chloride
SDZ	Strategic Development Zone
SO_x	Sulphur Oxides
TCC	Temporary Construction Compound
TJB	Transition Joint Bay
WWTP	Wastewater Treatment Plant

3 Land, Soils & Geology

3.1 Introduction

3.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) assesses the impacts on land, soils and geology receptors arising from the construction, operation and decommissioning of the Dublin Array Offshore Wind Farm (Dublin Array) onshore infrastructure.

3.1.2 The onshore infrastructure comprises the Onshore Electrical System (OES) and the Operation and Maintenance Base (O&M Base) as described in detail in Volume 2, Chapter 2.6 – Project Description (hereafter referred to as the Project Description chapter). The OES comprises the Landfall Site, the Onshore Export Cable Route (onshore ECR),the Onshore Substation (OSS) and the grid connection.

3.1.3 For ease of reference in the EIAR technical chapters, the Onshore ECR has been split into 7 sectors: Sector 1 through to Sector 7. Sector 1 starts west of the proposed TJBs at the Landfall Site at Shanganagh Cliffs and Sector 7 at the western end at the site of the proposed OSS. These sectors have been included in Figure 1 within this chapter to aid the reader identify features identified in the EIAR along the onshore ECR.

3.1.4 The potential impacts which may occur as a result of the construction, operation and decommissioning of the Dublin Array onshore infrastructure and the determination of sensitivity of the receiving environment; the magnitude of the impact, and the overall significance of each effect will be presented herein. Specifically, this chapter considers impacts on receptors above the High Water Mark (HWM). For clarity, 'the Site', as referred to in this chapter, is the boundary of the onshore infrastructure (i.e. Landfall, Onshore ECR, OSS and O&M Base) as defined in the planning application.

3.1.5 This chapter should be read in conjunction with Volume 6, Appendix 6.5.3.1 Land, Soils & Geology Onshore Technical Baseline Report (hereafter referred to as the LSG Onshore Technical Baseline Report), and associated annex and drawings, due to the interactions between the technical aspects. In particular, the following Annex in the LSG Onshore Baseline Report should be referenced:

- Volume 6, Appendix 6.5.3.1 Land, Soils & Geology Onshore Technical Baseline Report, Annex 1: Shanganagh Cliff Baseline Erosion Survey (SLR, May 2024); (hereafter referred to as the Cliff Baseline Erosion Survey)

3.1.6 There are also two separate technical appendices that support this chapter, as follows:

- Causeway Geotech - Dublin Array Onshore Site Investigation Report (Report No. 21-1443E, May 2023) which is provided in Volume 6, Technical Appendix 6.5.3-2 (hereafter referred to as the Onshore SI Report);
- Causeway Geotech - Dublin Array Onshore Cable Route Ground Investigation Report (Report No. 23-0343, February 2024) which is provided in Volume 6, Technical Appendix 6.5.3-3 (hereafter referred to as the Onshore Cable Route Ground Investigation Report).

3.1.7 This chapter has also been informed by the following documents of the EIAR:

- Volume 2, Chapter 6: Project Description;
- Volume 5, Chapter 4: Water (Hydrology, Hydrogeology and Flood Risk);
- Volume 7, Appendix 7.8 : Onshore Construction Environmental Management Plan (CEMP).

3.2 Regulatory background

3.2.1 The regulatory background relevant to this chapter is presented in Table 1 below.

Table 1 Legislation, policy context and guidelines

Policy/Legislation /Publisher	Name/Reference/Key provisions	What is covered/Section where provision is addressed
Statutory		
Legislation		
S.I. No. 296 of 2018	European Communities (Planning and Development) (Environmental Impact Assessment) Regulations, 2018. https://www.irishstatutebook.ie/eli/2018/si/296/made/en/print?q=296	These Regulations were introduced to give further effect in Ireland to Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014.
Non-Statutory		
Guidelines and technical standards		
EPA, 2022	Guidelines on the Information to be Contained in Environmental Impact Assessment Reports https://www.epa.ie/publications/monitoring—assessment/assessment/EIAR_Guidelines_2022_Web.pdf	These Guidelines apply to the preparation of all Environmental Impact Assessment Reports undertaken in the State (Ireland) and have been used by the authors to inform the structure and content of this chapter.
EC, 2017	Environmental impact assessment of projects - Guidance on the preparation of the environmental impact assessment report. https://op.europa.eu/en/publication-detail/-/publication/2b399830-cb4b-11e7-a5d5-01aa75ed71a1	Directive 2011/92/EU as amended by 2014/52/EU) - These European Guidelines published in 2001 and updated in 2017 are provided to guide developers in the practical application of EIA Directive 2011/92/EU as amended by 2014/52/EU. They have been used by the authors to inform

Policy/Legislation /Publisher	Name/Reference/Key provisions	What is covered/Section where provision is addressed
		the structure and content of this chapter.
Department of Housing, Planning and Local Government, 2018	Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. https://www.gov.ie/en/publication/53aee9-guidelines-for-planning-authorities-and-an-bord-pleanala-on-carrying/	Guidelines for Planning Authorities - Regard was had to these Guidelines, written for the benefit of planning authorities and An Bord Pleanála, for information as regards best practice when structuring this chapter.
Institute of Geologists of Ireland, 2013.	Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. https://igi.ie/assets/files/Codes%20and%20Guidelines/IGI%20Enviro%20Impact%202013.pdf	The LS&G chapter methodology follows these guidelines, subject to any amendments required by Directive 2014/52/EU as informed by the Guidelines listed above.

3.3 Consultation

3.3.1 Consultation is a key part of the EIAR process, encompassing informal topic specific ongoing consultation, public consultation with the public, and scoping with key stakeholders. Consultation responses inform the site layout and design, assessment and specialist reports where required. Table 2 sets out the key consultation responses received that is relevant to this topic.

Table 2 Summary of consultation relating to Land, Soils and Geology

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
13/11/20	Scoping	The Geological Survey of Ireland (GSI) were concerned that there is a risk to the County Geological Site (CGS) within the vicinity of the proposed potential export cable Landfall zone. The CGS in question is Killiney Bay. The GSI identified a potential impact to the integrity of the Killiney Bay County Geological Site (CGS). They stated that the site's integrity should not be damaged. They accepted that mitigation methods would be applied to minimise the potential impacts of the development. Where integrity cannot be preserved, GSI requested that careful consideration be given in design to accommodating preservation of exposures and access to the site during	The design of the TJB and Landfall Site has been developed to minimise disturbance to the CGS. The full design description is set out in the Project Description chapter. The potential impacts from the proposed development on the Killiney Bay CGS are assessed in this chapter.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
		construction to record the exposures to strengthen their knowledge and datasets.	
		The GSI were identified a potential risk to groundwater flow, quality and distribution. They requested that that the use of the GSI 'GWFlood' tool is deployed to ensure that all appropriate information is used in the EIAR report.	The GW Flood tool was used in the study of the baseline environment. The description of the baseline environment is set out in the LSG Onshore Technical Baseline Report.
		The GSI stated that they maintain a large dataset of bedrock and subsoil geological mapping information and encouraged its use for the assessment process.	The dataset was used in the review of the baseline environment as described in the LSG Onshore Technical Baseline Report.
		The GSI recommended that geohazards, particularly flooding, to be taken into consideration for the project and the use of their data when doing so.	The study area (described in Section 3.4) has been reviewed for the presence of geohazards.
		The GSI recommended that their geotechnical database is used as a part of any baseline geological assessment of the proposed development.	This data source has been used in the review of the baseline environment as described in the LSG Onshore Technical Baseline Report.
		GSI recommended that their Aggregate Potential Mapping[1] is utilised to enable the identification of high to very high source aggregate potential within the study area.	The mapping was used in the review of the baseline environment as described in the LSG Onshore Technical Baseline Report.
		The GSI recommended that their Marine and Coastal Unit datasets and maps are utilised for this project, including INFOMAR which contains products such as Shipping and Navigation, Fisheries Management, Aquaculture, Marine Leisure & Tourism and Coastal Behaviour alongside seafloor mapping products.	The data source was used in the review of the baseline environment for the marine environment and is included in Volume 3 Offshore Infrastructure Technical chapters and Volume 4 Offshore Technical appendices.
		The GSI advised that a new coastal vulnerability mapping initiative, which uses coastal vulnerability indices to	This data source has been used in the review of the baseline environment as

[1] The GSI Aggregate Potential Mapping shows the potential for crushed rocks and for sand and gravel (https://www.gsi.ie/en-ie/data-and-maps/Pages/Minerals.aspx#APM)

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
		provide detailed maps should be utilised.	described in the LSG Onshore Technical Baseline Report.
		The GSI requested a copy of reports detailing any site investigations carried out as part of the proposed development. They also requested that should any significant bedrock cuttings be created they will remain visible as rock exposure rather than covered and vegetated. Alternatively, they request that a digital photographic record of significant new excavations is provided.	Copies of these reports are included in the LSG Onshore Technical Baseline Report.

3.4 Methodology

Study area

3.4.1 The following study areas have been adopted:

- The Onshore Electrical System (OES) study area; and
- Operations and Maintenance (O&M) Base study area.

3.4.2 The study areas are shown in Figure 1.

OES study area

3.4.3 The OES study area comprises the area within which the proposed onshore ECR will be constructed. The study area also includes the proposed Landfall Site, located at Shanganagh Cliffs, immediately to the south of the existing Shanganagh Wastewater Treatment Plant (WWTP), and the proposed OSS, located adjacent to the Ballyogan Recycling Facility. The proposed TCC locations at the Landfall Site, Clifton Park (Sector 1) and Leopardstown are also included.

3.4.4 The OES study area has been set at 2 km from the planning application boundary for the OES. This is the limit to which direct and indirect effects relating to the land, soils and geological environment are expected to occur. The study area of 2 km follows the Institute of Geologists Ireland (IGI) guidelines for environmental impact assessment reports (IGI, 2013).

3.4.5 When describing the onshore ECR the study area is split into 7 sectors (Sectors 1 to 7) for ease of reference (Figure 1).

O&M Base study area

3.4.6 The Operations and Maintenance (O&M) Base will be located in Dún Laoghaire Harbour. The O&M Base will consist of a building providing office space, warehousing and welfare facilities located at Saint Michael's Pier. The O&M Base will also comprise a new gangway and 70 m long pontoon, which will be installed adjacent to St. Michael's Pier.

3.4.7 The study area for the proposed O&M Base extends outwards to 2km from the planning boundary of the O&M Base.

3.4.8 Figure 1 indicates the relevant study area for this Chapter.

Application Site Boundary

Onshore Electrical System (OES) and Operations and Maintenace Base (O&M) 2 km Study Area

Export Cable Route (ECR) Sector

- Sector 1
- Sector 2
- Sector 3
- Sector 4
- Sector 5
- Sector 6
- Sector 7

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri ©Ordnance Survey Ireland 2023 © Tailte Eireann. (CYSL50270365) Not to be used for Navigation. Irish National Soils Map, 1:250,000k, V1b(2014).Teagasc, Cranfield University.Jointly funded by the EPA STRIVE Research Programme 2007-2013 and Teagasc

PROJECT TITLE

Dublin Array

DRAWING TITLE

Land, Soils and Geology: Study Area

DRAWING NUMBER: 1

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-12-18	DRAFT	JK	SW	AE

0 0.3 0.5 0.8 1 Kilometres

0 0.3 0.5 0.8 1 Miles

GRID NORTH

SCALE 1:50,000 PLOT SIZE A3

DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW

PRJ IRENET95 Irish Transverse Mercator

SLR

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Baseline data

3.4.9 Baseline information on the receiving environment for Land, Soil and Geology is set out in the LSG Onshore Technical Baseline Report which includes information obtained from the:

- Ordnance Survey of Ireland (OSi) mapping;
- Teagasc/Environmental Protection Agency (EPA)/Geological Survey of Ireland (GSI) soil and subsoils mapping;
- GSI geological information including borehole records; and
- Ground investigations undertaken throughout the OES (as set out in the Onshore SI Report and the Cable Route Ground Investigation Report).

Assessment methodology

3.4.10 The methodology for undertaking this impact assessment has comprised a combination of a detailed desktop review of the data collated for the baseline characterisation report on the onshore land, soils and geology environment within the defined study areas, and all associated appendices, drawings, survey, and site walkover information.

3.4.11 Consideration has been given to feedback received during the consultation phase (see Section 3.3). This assessment has been undertaken with due regard to the appropriate published standards and guidelines, as outlined in Section 3.2.

3.4.12 The baseline study referred to for this impact assessment (LSG Onshore Technical Baseline Report) describes the receiving environment at and in the immediate vicinity of the Site using the available baseline information gathered, specifically:

- Context of the receiving environment - location/magnitude/spatial extent and trends of the environmental factors;
- Character of the receiving environment - distinguishing aspects of the environment being considered here;
- Significance of the receiving environment - the quality, value or designation is assigned to the existing environment; and
- Sensitivity of the receiving environment - how sensitive is the aspect of the environment to change.

3.4.13 The baseline study is a review of the available information based on professional experience and interpretation of the data.

3.5 Assessment criteria

3.5.1 As set out in Section 3.2 the evaluation of impacts in this chapter is based on the methodologies set out in the 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' published by the IGI (2013).

3.5.2 As with other EIAR chapters it also follows the guidelines set out in 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' by the EPA (2022).

Sensitivity of receptor criteria

3.5.3 The sensitivity or importance of the identified receptor is based on the context, character, significance and sensitivity of the receptor as set out in the guidelines (EPA, 2022), see Table 3.

Table 3 Receptor baseline description for receptor sensitivity and importance (EPA, 2022)

Description	Criteria for importance
Context	The location, magnitude, spatial extent and trends of the environmental receptor
Character	Distinguishing aspects of the environment under consideration
Significance	Quality, value or designation is assigned to this aspect of the existing environment or receptor
Sensitivity	How sensitive is this aspect of the environment to change.

Table 4 Sensitivity/importance of geological features (IGI Guidelines, 2013)

Receptor importance	Criteria for importance	Typical 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 the OES or O&M Base is significant on a national or regional scale	Geological feature rare on a regional or national scale. Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale.	Contaminated soil on site with previous heavy industrial usage.

Receptor importance	Criteria for importance	Typical example
	Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying the OES or O&M Base is significant on a local scale	Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (CGS). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
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 the OES or O&M Base 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 route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Magnitude of impact criteria

3.5.4 Definitions for the magnitude of impact follows the EPA guidelines (EPA, 2022) using the following definitions:

- Extent - the area, the number of sites and/or the proportion of a population affected over which an impact occurs, the nature, transboundary nature, intensity/complexity and probability;
- Duration and Frequency - the expected onset and time for which the effect occurs and how often the effect occurs;

- Quality - is the effect positive, neutral or negative/adverse;
- Probability - how likely the effect is to occur;
- Consequences - the degree of change relative to the baseline level, whether it is reversable and the change in character.

Table 5 Magnitude

Magnitude	Definition
High	**Extent:** Impact that would reach beyond the study area **Duration:** The duration of effects are long-term lasting 15-60 years. **Frequency**: The Effect will occur constantly throughout the relevant project phase. **Probability:** The impact can reasonably be expected to occur. **Consequences:** Permanent changes across the near - and far-field environment to key characteristics or features of the particular environmental character or distinctiveness. The reversibility of these changes is likely.
Medium	**Extent:** Impact across a significant portion of the receptor area (within the study area). **Duration:** The effect is medium term lasting 7 - 15 years. **Frequency:** Regular occurrences expected during the relevant project phase. **Probability:** Likely occurrence of the impact. **Consequences:** Permanent or enduring changes across a substantial part of the receptor area, affecting key characteristics or features of the environment. The reversibility of these changes is possible.
Low	**Extent:** Impact across a limited portion of the receptor area. **Duration:** The effect is temporary to short term lasting less than a year to 7 years. **Frequency:** Intermittent occurrences during specific project activities. **Probability:** Likely, but infrequent, occurrence of the impact. **Consequences:** Temporary alterations within a restricted area, limited impact on the environment's key characteristics or features. The changes are reversible.
Negligible	**Extent:** Impact confined to a very small area directly within the project site. **Duration:** Momentary or brief lasting less than one day. **Frequency:** Rare occurrences within specific project phases. **Probability:** Unlikely but sporadic occurrence of the impact. **Consequences:** Barely discernible changes over a small, localized area, negligible impact on key environmental characteristics or features. Reversibility of these changes is immediate.

Defining the significance of effect

3.5.5 Using the sensitivity and importance of the receptor as indicated in Table 3 and Table 4 and the magnitude definition as set out in Table 5, Table 6 indicates how the assessment of the significance of an effect has been concluded.

Table 6 Significance of potential effects

Description of impact – Magnitude		Existing environment – Sensitivity			
		Very High	**High**	**Medium**	**Low**
Adverse impact	**High**	Profound or Very Significant	Significant	Moderate	Imperceptible
	Medium	Significant	Moderate	Slight	Imperceptible
	Low	Moderate	Slight	Slight	Imperceptible
Neutral impact	**Negligible**	Not significant	Not significant	Not significant	Imperceptible
Positive impact	**Low**	Moderate	Slight	Slight	Imperceptible
	Medium	Significant	Moderate	Slight	Imperceptible
	High	Profound or Very Significant	Significant	Moderate	Imperceptible

3.6 Receiving environment

3.6.1 This section summarises the baseline conditions/receiving environment in terms of land use, soils and geology attributes within the study areas described in Section 3.4.

3.6.2 This EIAR chapter is principally concerned with identifying significant effects and, as such, importance is placed on aspects of the environment that are likely to be (or may be) significantly affected by the construction, operation and decommissioning of the Dublin Array onshore infrastructure. The LSG Onshore Baseline Report has been produced and can be referred to for a presentation of wider baseline data. This section is a summary of the key findings of the LSG Onshore Baseline Report (and points of relevance to the assessment).

Onshore Electrical System study area

Land use

3.6.3 The land use throughout the OES study area is predominantly residential with areas of parkland and open space focussed mainly along the river valleys of the Shanganagh River, Kill-o-the-Grange Stream and Carrickmines Stream. Other land uses include light industrial and commercial, agriculture and transport including road, light-rail (Luas) and heavy-rail (Iarnród Éireann). While a significant portion of the Cherrywood Strategic Development Zone Planning Scheme was classified as construction land cover within the 2018 CORINE dataset; these lands are now a combination of residential with extensive construction occurring in 2024.

3.6.4 The proposed new Beckett Road which will travel alongside the M50 and link to Carrickmines and the Glenamuck Road. A total of 1.4 km of the proposed 2 km Beckett Road is expected to progress into construction in 2025. In addition, there are significant lands for development within the Cherrywood Strategic Development Zone (SDZ) with significant changes likely to take place with the construction of apartments and recreational facilities. This will change the landscape in this area significantly over the coming years in line with the details set out in the Cherrywood Planning Scheme.

3.6.5 The proposed OSS will be located on land adjacent to the former Ballyogan Landfill (part of the Ballyogan Landfill Facility and Recycling Park [Waste Licence No. W0015-01]. The Ballyogan Landfill has ceased operations and has been capped and the only waste operations at this location are the operations at the nearby recycling centre (Ballyogan Recycling Park). The capped landfill has a landfill gas collection system in operation. Associated Landfill Gas Combustion Plant are located within the study area adjacent to the proposed OSS location. The area within which it is proposed to construct the substation building was formerly used as settlement ponds for the landfill site. Site investigations have confirmed that no landfilling took place on the site of the proposed OSS. Further details of these site investigations are presented in the Onshore SI Report.

3.6.6 The Ballyogan Landfill Facility and Recycling Park is approximately 50 hectares (ha) in size, 43 ha of which were previously used for landfilling. The remaining area consists of the site entrance and service roads, site compound, wetland and other services. The Ballyogan Recycling Park occupies a further 9 ha and is located to the eastern side of the site adjacent to Ballyogan Road.

Soils and subsoils

3.6.7 The urban areas within the OES study area (including the proposed OSS and grid connection to the existing Carrickmines substation at Ballyogan) are classified as Urban Soils within Teagasc/EPA/GSI soil and subsoils mapping, where the urban development has occurred, and the natural soils have been disturbed.

3.6.8 Along the watercourses Alluvial Soils occur which host the channel water flows.

3.6.9 The remainder of the study area is underlain by soils from the Clonroche Soil Association which is a Brown Earth soil comprised from a predominantly fine loamy glacial till parent material primarily composed of sedimentary siliceous stones/geology.

3.6.10 The soils are underlain by glacial till and alluvium subsoils with some beach deposits at the coastline at Killiney bay. There are also extensive areas of 'made ground' which are areas mapped by the GSI where the natural soil has been built over or modified such as urban development, golf courses and sports grounds.

O&M Base study area

3.6.11 The principal natural physical features within the O&M Base study area include coastline features such as stretches of rocky shoreline and the Irish sea. The area in Dún Laoghaire is largely urbanised, with the Dublin Area Rapid Transit (DART) train line running through the study area, and the active harbour contributing to a large portion of the study area. Land-use within the O&M Base site area is classified as Sea Port in the Corine land cover classification[2].

3.7 Defining the sensitivity of the baseline

3.7.1 The sensitivity for the baseline receptors using the criteria outlined Table 4, are presented in Table 7 below.

Table 7 Sensitivity of baseline receptors

Baseline receptor	Sensitivity Assigned	Criteria for Sensitivity	Where present in study area
Killiney Bay County Geological Site (Site Code DLR007)	High	Attribute has a high quality, significance or value on a local scale only. The Killiney Bay CGS is considered to be a Geological feature of high value on a local scale and is included in the DLR County Development Plan as a designated site. The site is potentially sensitive to the proposed development if there was an adverse impact on the site arising.	At the eastern most end of the OES study area at the proposed Landfall Site.

[2] EPA Data viewer - Irish national CORINE 2018 dataset (2018 update of the COPERNICUS pan-European landcover data series.

Baseline receptor	Sensitivity Assigned	Criteria for Sensitivity	Where present in study area
Contaminated land/soils	High	Contaminated land/soil is considered to be of High Importance. The potential impact is from excavated contaminated material on other soils which are not contaminated. Any soil which is thought to be contaminated upon excavation will need to be tested and disposed of appropriately.	Based on preliminary ground investigations undertaken by Dublin Array (Onshore Cable Route Ground Investigation Report), no evidence of contaminated land has been identified within the OES study area. Potential for this to be encountered does remain with highest likelihood for occurrence at the site of the proposed OSS at Ballyogan and the O&M Base.
Land Use	Low	Existing land cover and land use along the OES which is not considered to be particularly unique or sensitive to potential adverse impacts which could arise from the proposed development. All land use is considered to be of local value.	Land use in terms of residential, commercial, infrastructure and recreational related land use, all considered to be of local value, occur throughout OES and O&M Base.
Soil quality	Low	Attribute has a low quality, significance or value on a local scale. Existing soils within the OES are classified as Urban/Made Ground soils and therefore are not considered to be particularly sensitive to potential adverse impacts which could arise from the proposed development. Land at the O&M Base comprises brownfield	Areas of soft ground occur in all sectors of the onshore OES.

Baseline receptor	Sensitivity Assigned	Criteria for Sensitivity	Where present in study area
		land formerly used as a ferry terminal.	
Bedrock Geology	Low	The bedrock within the OES and the O&M Base is not considered to be unique or sensitive to potential adverse impacts which could arise from the proposed development.	Occurs throughout OES and O&M Base.

3.8 Uncertainties and technical difficulties encountered

3.8.1 This EIAR chapter has been prepared based on existing available desktop information which is in the public domain, ground investigations and reports, site walkover surveys and the professional expertise and knowledge of the authors.

3.8.2 For many of the boreholes researched, no ground elevation is provided in the records, making the visual representation a challenge. LiDAR and satellite data were used to approximate the elevation of the boreholes missing this information. These approximate levels are clearly marked in the relevant figures presented in the baseline report.

3.9 Scope of the assessment

Scoped in

3.9.1 The potential impacts on land, soils and geology are scoped in here for the construction, operation and decommissioning phases of the Dublin Array onshore infrastructure.

Construction phase

3.9.2 The following impacts have been scoped-in:

- Impact 1: Alterations to land use and land take;
- Impact 2: Loss of soils and subsoils during construction;
- Impact 3: Soil contamination by a fuel or oil spill or leakage from plant and machinery;
- Impact 4: Excavation of contaminated soils/materials; and
- Impact 5: Coastal erosion: cliff stability and erosion of Shanganagh Cliffs during construction and future cliff erosion on operation of the offshore export cable corridor and TJBs. It should be noted that this impact also includes the operational phase of the landfall.

Operational phase

3.9.3 The following operational phase impacts have been assessed:

- Impact 6: Site activities for the maintenance of the OES including any required site work and excavations to undertake repairs along the OES.

Scoped out from further evaluation in this EIAR

Construction phase

3.9.4 No bedrock exposures have been identified in the OES and O&M Base study areas. As set out in the Project Description chapter, the Onshore ECR will predominantly be installed using standard open-cut trenching techniques. Due to the shallow depth of the excavation these are not expected to encounter bedrock.

3.9.5 In addition, there will be a total of 8 locations where trenchless (i.e. below ground) drilling will be undertaken along the onshore ECR and a ninth location at the Landfall Site to install the offshore Export Cable Corridor (ECC). These locations are presented in the Project Description chapter. Trenchless drilling for the onshore ECR will encounter bedrock but there will be no potential impact as the volume of rock drilled through will be small and it will be all subsurface. The bedrock across the study areas does not have any specific qualifying attributes to be considered as a sensitive receptor. Therefore, the potential impacts on bedrock have been scoped out.

3.10 Key parameters for assessment

3.10.1 For each of the impacts 'Scoped-in' to the assessment and as described in the preceding (Section 3.9), the relevant design parameter used in assessing the impact are set out in Table 8.

3.10.2 For the purpose of environmental assessment, the design parameters that could give rise to the maximum potential adverse impacts, in respect of receptors, has been chosen as the design parameter to assess impact against.

Table 8 Key design parameters considered for land, soils and geology assessment

Potential impact	Key design parameters assessed	Justification
Construction stage		
Impact 1: Alterations to land use and land take	**OSS** The proposed OSS will be situated within a 2 ha site, with 1.7 ha dedicated to the OSS itself and the remaining area used for enabling works, temporary storage, and laydown areas during construction. A further 0.52 ha will be permanently changed through landscaping proposals (new tree planting and wildflower meadow).	The construction of the OES will result in temporary alterations to land use as a result of construction activity, with some permanent change in land use as a result of the OSS. The assessment has been based on the maximum footprint and areas of temporary and permanent infrastructure which will be required. Full details are provided in Volume 2, Chapter 6 Project Description.
	Onshore ECR - Temporary Changes to Land Use Temporary changes in land use will occur from cable installation works: ▪ Total length of onshore ECR will be 7.4 km. There will be an additional 750 m of cabling between the OSS and the existing substation at Carrickmines. ▪ Number of Cable trenches: Two trenches side by side that accommodates cable ducts. ▪ Typical Cable trench dimensions: 1425 x 700 mm ▪ Working corridor width requirements on a plan: typically 3- 6 m, but could be up to 10 m in the agricultural land in Sector 4 where permanent access will be required ▪ All cable trenches associated with the construction phase will be reinstated. Temporary changes in land use will occur at the TCC locations: ▪ **Landfall Site TCC**: A TCC of approximately 9,500 m² will be required throughout the Onshore ECR and TJB construction works. Minor earthworks will be necessary to ensure the TCC is on level ground. Topsoil and subsoil excavated during preparation will be stored separately in line with best practice, ensuring they can be reinstated appropriately after construction. An additional area	

Potential impact	Key design parameters assessed	Justification
	of approximately 6,500 m² is required to the east between the existing WWTP and the existing fence line along the cliffs will be temporarily fenced off from public access to facilitate cable duct laydown and assembly during the trenchless crossing activities. HGV access to the Landfall Site TCC will follow the existing path from the Shanganagh Cliffs public road. This path is proposed to be upgraded and widened to 4 m suitable for the delivery of plant, equipment and construction materials. The 500 m long access track will incorporate four 3 m wide passing bays to facilitate two-way traffic movement and to reduce traffic waiting on the public road at the entrance. ▪ **Clifton Park TCC:** A TCC of approximately 4,000 m² will be required throughout the onshore ECR construction works. Topsoil and subsoil excavated during preparation will be stored separately in line with best practice, ensuring they can be reinstated appropriately after construction. ▪ **Leopardstown TCC**: A TCC of approximately 14,000 m² will be required throughout the onshore ECR construction works. Topsoil and subsoil excavated during preparation will be stored separately in line with best practice, ensuring they can be reinstated appropriately after construction. **Landfall Site - Permanent Changes to Land Use** Permanent changes to land use at the Landfall Site will comprise the following: ▪ Two TJBs will be located underground at the Landfall Site. Each TJB will have a link box chamber and a communications chamber with an	

Potential impact	Key design parameters assessed	Justification
	inspection manhole cover above them (i.e. four covers above ground). : A small area of land (typically be less than 5 m^2) will be permanently lost for this above ground infrastructure associated with each TJB and up to 10 m^2 will be permanently changed from the existing grassed area (refer to Project Description chapter). **Onshore ECR - Permanent Changes to Land Use** Permanent changes to land use along the onshore ECR will comprise the following: ▪ A number of underground cable joint bays (JBs) will be constructed along the proposed onshore ECR every 600 – 850 m. Similar to the TJBs, each JB will required a link box chamber and a communications chamber co-located underground, with an inspection manhole cover at surface level (i.e. two covers at each JB location that will typically be less than 5m^2 in combined area), with JBs located in pairs (one for each circuit). There will be up to 10 sets of JBs along the ECR comprising: ▪ Two sets of JBs located in public open space/amenity ground (20m^2 in total) in Sector 2; ▪ Fours sets of JBs (40m^2 in total) will be located within, or adjacent to, road carriageways (Sectors 2, 3, 4, 5, 6); ▪ One set of JBs (10m^2 in total) located in agricultural ground at intersection of Sector 4 and 5; ▪ One set of JBs (10m^2 in total) in land associated with the former Ballyogan Landfill Facility in Sector 7; and	

Potential impact	Key design parameters assessed	Justification
	▪ Two sets of JBs (20m^2 in total) in soft ground to the east of the M50 and south of Cherrywood development scheme in Sector 4. Of the 10 sets of JBs, those proposed in or adjacent existing or proposed highways will continue to maintain functionality as public roads so do not represent change of land use. The total area of permanent land change as a result of JBs is 60 m^2. ▪ A permanent access track of 3 m wide and approximately 210 m in length (630 m^2 total) will be constructed to access the JBs in green field north of the Beckett Road in Sector 4, east of the M50. This track will be constructed first and utilised during construction on the onshore ECR, JBs and crossing under the M50 (TX-07). In total it is estimated that less than 700 m^2 of land will be permanently changed along the route of the full onshore ECR.	
	The O&M Base The site of the proposed O&M Base in Dún Laoghaire Harbour is located in an existing marine quayside including parking areas for the former ferry terminal. The land is currently used as storage by DLRCC and some office cabins and occasionally used for embarking or disembarking cruise ships.	The proposed use of the land for the construction and operation of the O&M Base will ensure that it is retained in commercial use associated with the operation of the Port. The design scenario assessed will ensure that minimal change will occur from the previous commercial use.
Impact 2: Loss of soils and subsoils during construction	**OSS** Topsoil and subsoil removed as part of the construction of the OSS will be stored in an appropriate area on the site of the OSS and reused in landscaping works.	The estimates are based on design work undertaken by Dublin Array during design development work for the onshore infrastructure. The quantities of topsoil and subsoil anticipated to be excavated and disposed of in a licenced facility during the
	Onshore ECR Where there are trenchless crossings in areas of soft ground, where possible topsoil	

Potential impact	Key design parameters assessed	Justification
	will be removed and stored in an appropriate area for reuse at the reinstatement stage. The excavation will commence downwards in layers, until the size and depth of both pits have been achieved. The excavated material will be stored a safe distance away from the excavation and will be reinstated upon completion of the works. The three TCC sites (Landfall Site, Clifton Park and Leopardstown) will be prepared by removing topsoil, which will be set aside for reuse. A geotextile or similar separation membrane will then be placed over the subsoil, followed by layers of granular stone. Alternatively, protective matting, temporary metal road surfaces (such as trackway system), or a tarmac surface may be used. After construction, foundations for the site cabins will be installed. Excavated topsoil and subsoils from the green space and agricultural fields will be temporarily stored for final surface reinstatement. Any waste material from trench excavation which is not suitable for re-use will be removed and disposed of at a licensed disposal facility in compliance with waste management regulatory requirements.	construction of the proposed development are set out below: Topsoil: 4,000 – 4,500 m^3 Subsoil: 28,000 to 30,000 m^3
	O&M Base There will be no soil or subsoil removed as part of the construction of the O&M Base.	
Impact 3: Soil contamination by a fuel or oil spill or leakage from plant and machinery including drilling activities at trenchless crossings	Refuelling will only take place at the TCC locations, the site of the proposed OSS and the proposed O&M Base and would be undertaken in accordance with the agreed CEMP. For trenchless crossings including the works proposed at the Landfall Site, drilling fluids will be required. Drilling fluids have the potential to lead to contamination of soils and subsoils. Drilling fluids will be handled in strict accordance with the protocol set out	Fuel, oil leaks and spills are a potential indirect impact associated with construction work and construction machinery. During construction (in particular whilst soil excavation is taking place) there will be an increased risk of pollution to soil and bedrock should a leak or spill occur.

Potential impact	Key design parameters assessed	Justification
	in the following section relating to mitigation (Section 3.11).	
Impact 4: Excavation of contaminated soils/materials.	No evidence of contaminated land has been identified in the surveys undertaken to inform the design of the infrastructure and/or inform the EIA. However, the potential exists where the onshore infrastructure is being constructed on previously developed ground. Procedures for the management of any such material will be set out in the CEMP.	No evidence of contaminated land found during survey of the study areas. Key project design parameters represent a worst-case should any be encountered during construction works.
Impact 5: Coastal erosion - Cliff stability and erosion of Shanganagh Cliffs during construction and future cliff erosion on operation of the offshore export cable corridor and TJBs	Trenchless techniques (Horizontal Directional Drilling or Direct Pipe Method) will be used to install the connection between the offshore export cable and the TJB. The methodology that will be adopted (Horizontal Directional Drilling (HDD) or Direct Pipe Method (DPM))) for the trenchless technique including the location of the TJB follows extensive surveys to determine the optimal location for this. Onshore site investigation at the Landfall Site was undertaken in September 2022 and 2023, and a further nearshore/intertidal site investigation campaign was also carried out in June 2024 which included geotechnical and geo-environmental studies and testing to understand the geology and geomorphology of Shanganagh Cliffs. Details are set out in the LSG Onshore Technical Baseline Report. Design of the trenchless technique and location of the TJB will ensure that the physical integrity of the cliff remains intact.	Both trenchless techniques (HDD or DPM) would have similar physical effects on the stability of the cliff. Design parameters used in the assessment represents a worst-case.

Potential impact	Key design parameters assessed	Justification
Operational stage		
Impact 6: Site activities for the maintenance of the onshore infrastructure	Leakage of fuel, oil leaks and spills during maintenance activities where vehicles are used. Refuelling would only take place at the O&M Base or the OSS.	The worst-case scenario is the accidental spillage of fuel from a supply tanker used for refuelling at the site during operational maintenance activities where vehicles are used.

3.11 Project Design Features and other avoidance and preventative measures

3.11.1 As outlined within the Methodology Chapter (Volume 2, Chapter 3) and in accordance with the EPA Guidelines (2022), this EIAR describes the following:

- Project Design Features: These are features of the Dublin Array project that were selected as part of the iterative design process, which are demonstrated to avoid and prevent significant adverse effects on the environment in relation to material assets. These are presented within Table 9.
- Other Avoidance and Preventative Measures: These are measures that were identified throughout the early development phase of the Dublin Array project, also to avoid and prevent likely significant effects, which go beyond design features. These measures have been incorporated in as constituent elements of the proposed infrastructure design, they are referenced in the project description chapter of this EIAR and they form part of the project for which development consent is being sought. These measures are distinct from design features and are found within the suite of management plans. These are also presented within Table 9.
- Additional Mitigation: These are measures that have been introduced to the Dublin Array project after a likely significant effect was identified during the EIA assessment process. These measures either mitigate against the identified significant adverse effect or reduce the significance of the residual effect on the environment. The assessment of impacts is presented in Sections 3.12 to 3.15 of this EIAR chapter.

3.11.2 All measures are detailed within Volume 8, Chapter 4, Schedule of Measures.

3.11.3 Where additional mitigation is identified as being required to reduce the significance of any residual effect in EIA terms, this is presented in Sections 3.12 to 3.15.

3.11.4 Project design and other avoidance and preventative measures are outlined in Table 9.

Table 9 Project design features and other avoidance and preventative measures relating to Land, Soil and Geology

Project design feature/other avoidance and preventative measures	Where secured
Project design features	
Landfall Site The installation of the offshore export cable ducts under Shanganagh Cliffs and the beach will be carried out using trenchless techniques. This approach will avoid any excavation of the cliff face thereby protecting the physical integrity of the cliff face to install the offshore export cable ducts. This will avoid any exacerbation of coastal erosion or cliff stability that could be caused by standard open-cut trenching construction methods. Horizontal Directional Drill (HDD) or Direct Pipe Method (DPM) have been identified as the preferred trenchless techniques. Either method involves drilling at a minimum depth of 20 m below the cliff edge and minimum 10 m below the cliff base with either end of the drill profile set back sufficient distances (landside approximately 90 m and seaside a minimum of 600 m) from the cliff face to maintain the integrity of the cliff morphology within the limits of the longitudinal profile limitations of the technique being employed. Pre-construction verification vibration monitoring will be undertaken in the vicinity of the cliffs as part of the detailed design to gather background data on vibration levels under normal conditions. This data will be examined to establish a suitable vibration limit which will be maintained during drilling to ensure the integrity of the cliffs are maintained. Vibration monitoring points will then be undertaken in the vicinity of the cliffs for the duration of the drilling to inform the drilling management process thereby protecting the integrity of the cliffs	Project Description Chapter
Onshore ECR Trenchless techniques (HDD or similar) have been identified as the preferred construction method at 8 locations along the onshore ECR	Project Description Chapter

Project design feature/other avoidance and preventative measures	Where secured
to install the export cable ducts. Trenchless drilling methods avoid open-cut trenching through significant transport networks and watercourses.	
Other avoidance and preventative measures	
Construction phase	
A planning stage CEMP has been included with the application for development consent and is included in Volume 7, Appendix 8. The purpose of the planning stage CEMP is to set out the measures which will be taken to manage the potential environmental impacts of the onshore construction of Dublin Array and limit the disturbance from onshore construction activities such as site preparation, material delivery and removal, works activities and site reinstatement as far as is reasonably practicable. The CEMP is a planning stage document that, by reference to the assessments reported in the Environmental Impact Assessment Report (EIAR), sets out the key construction stage environmental commitments. The Final Construction Stage CEMP will be sent by the Applicant to the Planning Authority for approval, as a condition of the development consent. The CEMP sets out environmental management measures to be adopted, relating to land, soils and geology during the construction phase including: Hazardous material, found during the construction phase, will be stored in a safe and secure manner whilst waiting to be removed from site by authorised waste contractor and brought to a licensed facility. Hazardous materials to be used on site will be securely stored with records and labelling/signage indicating contents. Hazardous materials will be secured in suitable storage receptacles and the MSDS records stored and requirements supplied by the manufacturers.	Volume 7, Appendix 8: CEMP

Project design feature/other avoidance and preventative measures	Where secured
Onshore ECR The land impacted in the construction phase will be reinstated to their previous above-ground land use. The only exception to this is the access track used to access cable joint bays in in green field north of the Beckett Road in Sector 4, east of the M50 and a number of joint bay locations in soft ground. In order to reduce the risk of localised erosion (and potential dust emissions) during the excavation and infilling, the area of bare or exposed soils and rock will be kept to a minimum, insofar as practicable, by progressive restoration of final and backfilled surfaces. Where required, stockpiled soils (pending re-use) or exposed surfaces (pending further backfilling to final ground level) will be temporarily covered. All activities will be undertaken in accordance with the provisions in the Waste Management Act 1996 (as amended). Any waste material from trench excavation which is not suitable for re-use will be removed and disposed of at a licensed disposal facility in compliance with waste management regulatory requirements.	Project Description Chapter.
Pollution risk control measures – accidental spillage The following measures will be adopted: ▪ Refuelling of mobile plant will be undertaken using double skinned bowsers; ▪ Potentially polluting, or hazardous substances (or any associated wastes) will be stored within TCCs. Potentially polluting or hazardous materials will be stored under cover, over fuel spill trays/bunded containers within designated storage areas. ▪ Good site management practices will be implemented to reduce risks of spills, including regular monitoring and inspection of storage vessels and regular maintenance and servicing of construction plant and equipment;	Volume 7, Appendix 7.8 CEMP.

Project design feature/other avoidance and preventative measures	Where secured
▪ Plant and equipment used in construction will be in good working order and comply with the CEMP. ▪ Contingency plans/procedures will be developed to adequately respond to potential spills. Emergency spill equipment will be made appropriately available on site. ▪ When an accidental spill results in contamination of soil, the extent of contaminated soil or subsoil will be identified and removed to a waste licenced facility for appropriate disposal.	
Handling of drilling fluids used during trenchless crossings including the Landfall For trenchless crossings (TX-02/TX-04/TX-05/TX-06/TX-07), temporary drilling compounds will be established on either side of the watercourse to facilitate the set-up of the necessary plant and equipment. Limited surface excavation works will be required to create the launch and exit pit in the temporary drilling compounds. The excavated drill pit will collect drill mud returns, the pumps will move the fluid from the pit into the recycling plant/tanks. Drilling fluid will be pumped through the drill rods during drilling operations. A mixture of bentonite clay and clean water (Drill mud) will be used to stabilise the hole and remove the cuttings out from the drill hole in addition to cooling the reamer. The final condition of the bore will consist of the cable duct surrounded by the remaining drill mud. Drilling mud will be monitored at all stages of the drilling operations to ensure that no loss of fluid occurs down the bore. This monitoring will be undertaken by the drill rig operator and the drill mud engineer on site. Any remaining drilling fluids and cuttings from the mud recycling system will be disposed of in compliance with the Waste Management Act 1996 as amended. The recycling unit will be dismantled and removed.	Project Description Chapter

Project design feature/other avoidance and preventative measures	Where secured
Operational phase	
Measures to avoid accidental spillages during operation and maintenance phase The following good practice measures will be adopted: ▪ Ensuring that any refuelling of mobile plant undertaken is only undertaken using double skinned bowsers located either within the site of the OSS or the O&M Base; ▪ Fuel oils and chemicals will be stored under cover, on trays or in bunded containers in designated storage areas. Good site management practices will be implemented to reduce risks of spills, including regular monitoring and inspection of storage vessels and regular maintenance and servicing of any plant and equipment; Contingency plans/procedures will be developed to adequately respond to potential spills. Emergency spill equipment will be appropriately available on site. When an accidental spill results in contamination of soil, the extent of contaminated soil or subsoil will be identified and removed to a waste licensed facility for appropriate disposal.	Project Description Chapter

3.12 Environmental assessment: Construction stage

3.12.1 Construction works, including excavations will be required for the OES and the O&M Base.

Impact 1: Alterations to land use and land take

3.12.2 The vast majority of land take for cable installation works on the ECR will be short term and temporary only (maximum of 2 months at any particular location) during the construction stage and the lands will be restored on a rolling basis during construction so that at any one time during this stage the construction footprint will be minimised all along the onshore ECR. Reinstatement measures are set out in the Project Description chapter.

As set out in

3.12.3 Table 8 Key design parameters considered for land, soils and geology assessment alterations to land use will be permanent at the following locations:

- The OSS: a total of 1.7 ha of land will be permanently lost to above ground infrastructure with a further 0.52 ha permanently changed through proposed landscape planting (new tree planting and wildflower meadow). The land is a brownfield site and currently vacant having previously been used as settling ponds associated with the former adjacent landfill.
- The O&M Base: The site of the proposed O&M Base in Dún Laoghaire harbour is existing marine quayside including parking areas for the former ferry terminal. The land is currently used for storage, together with occasional embarking/disembarking of passengers on to cruise ships. There are some cabin offices located here also.

3.12.4 The onshore ECR including the TJB. The only permanent change will comprise the communications chamber covers and link box chambers covers (refer to the Project Description chapter), which will be installed at the TJB and JB locations, as described in Table 8.

3.12.5 A permanent access track of 3 m wide and approximately 210 m in length (630 m^2 total) will be constructed to access the two JBs in green field north of the Beckett Road in Sector 4. In total, approximately 700 m^2 of land (0.07 Ha) will be permanently changed along the route of the full onshore ECR.

Table 10 Impact 1: Determination of magnitude for land take

Loss of land	Justification
Extent - Low	Permanent impacts will be confined to localised areas totalling less than 2.3 ha and representing a limited portion of the receptor area. The largest of these will be the site of the OSS where 1.7 ha of land will permanently change from its current brownfield condition (land formerly used as settling ponds for the Ballyogan Landfill Facility and Recycling Park) to the site of the proposed OSS. A further 0.52 ha permanently changed as a result of proposed landscape planting (new tree planting and wildflower meadow). Soft ground along the route of the onshore ECR which will be permanently lost as a result of will be limited to less than 700 m^2. Land at the O&M Base will continue its former use for commercial purposes associated with the harbour. Temporary impacts would extend across the OES construction footprint including areas of open trenching, trenchless crossing areas and TCCs (as set out in Table 8), noting that the cable trench will be reinstated on a rolling basis during construction so that at any one time during this stage the construction footprint will be minimised all along the onshore ECR.

Loss of land	Justification
Duration – Medium comprising both Temporary (low) and Long-term) (where permanent changes are occurring) (high	The vast majority of land use change will be temporary in nature (lasting less than the 7 year duration listed in Table 5) and will be reinstated to its previous use post completion of the construction phase works. Permanent land use changes described in the preceding part of this table (OSS, O&M Base and the small areas along the route of the onshore ECR) would be long term in duration lasting the operational lifetime of the project.
Frequency - Medium	Regularly occurring during this phase of the project. Progressive reinstatement of the onshore ECR trenches will ensure that exposed areas are minimised.
Probability – Medium	Likely probability that impact will occur
Consequence - Low	The vast majority of land use change represents temporary alterations within a restricted area comprising the construction working area, with limited impact on the environment's key characteristics or features (the land use receptors where direct impacts will occur are of local value only). Permanent changes will be restricted to the OSS, permanent access track and communications chamber covers and link boxes at the TJBs and JBs comprising less than 700 m^2 of land along the ECR and 2.2 ha at the OSS. The changes are reversible.
Overall magnitude	The potential magnitude on land use is rated as being **Medium** to **Low**. It is therefore treated as **Medium**.' (the greater of the impacts in the range)

Table 11 Impact 1: Determination of sensitivity for land use to loss of land

Loss of Land	Justification
Context	**Adaptability:** Local land uses along the onshore ECR are continuously evolving with pressures for development in the local area. **Tolerance:** Land will be reinstated to existing land use following construction for the majority of the onshore infrastructure works. Areas where permanent impacts will arise (those areas set out above in Impact 1) are all considered to be tolerant to the change as they will involve the use of either brownfield/previously developed land or areas of existing road carriageway. In certain locations the works will involve soft ground which is amenity ground where the amenity ground is of a scale that it is considered to be tolerant of the small amount of change that will occur. **Recoverability:** The majority of existing land use will be restored following construction phase and the reinstatement of the land to existing land use. Only a small area will be permanently changed.

Loss of Land	Justification
Value	The value of the land use is considered to be Low as the attribute has a low quality or value on a local scale only.
Overall sensitivity	The land use attribute is considered to be **Low** as the attribute has a low quality, significance or value on a local scale only.

3.12.6 The magnitude of the impact has been assessed as **Medium**, with the maximum sensitivity of the receptors being **Low**. Therefore, the significance of effect from changes in land use occurring as a result of the onshore infrastructure is **Imperceptible Adverse**, which is **Not Significant** in EIA terms.

Additional Mitigation

3.12.7 No further mitigation beyond the measures set out in Section 3.11.

Residual effect assessment

3.12.8 Residual effects are considered to be **Not Significant**.

Impact 2: Loss of soils or soil degradation

3.12.9 Soils and subsoils will be required to be excavated for open-cut trenching within areas of soft ground along the route of the onshore ECR. Soils and subsoils will also be excavated for the TJBs at the Landfall Site and at the proposed OSS location. An estimation of the volume of topsoil and subsoil to be removed is set out in Section 3.10. No Topsoil or Subsoil excavation will be necessary at the site of the proposed O&M Base.

3.12.10 Soils excavated to facilitate the construction of the OSS will be stored in an appropriate area on the site of the OSS and reused in landscaping works.

3.12.11 For the onshore ECR, the excavated topsoil and subsoils will be stored a safe distance away from the excavation and will be reinstated upon completion of the works. Excavated material will be reused during backfilling of the trenches where possible. Any waste material from trench excavation which is not suitable for re-use will be removed and disposed of at a licensed disposal facility in compliance with waste management regulatory requirements.

Table 12 Impact 2: Determination of magnitude for loss of soils and soil degradation

Definition and Magnitude	Justification
Extent – Low	Loss of soils and subsoils during construction where they cannot be reused on the site for backfilling and/or restoration will be confined to a small area as set out in Section 3.10 that represents a limited portion of the receptor area. The quantities of topsoil and subsoil anticipated to be excavated and disposed of in a licenced facility during the construction of the onshore infrastructure are set out below:

Definition and Magnitude	Justification
	▪ Topsoil: 4000 to 4,500 m^3. ▪ Subsoil: 28,000 to 30,000 m^3
Duration - Medium comprising both Temporary (low) and Long-term impacts where permanent changes are occurring) (high)	Temporary change expected throughout project duration where soils are restored. Soils would be reinstated to their previous condition through careful handling. The loss of soils and subsoils which cannot be used in backfilling and restoration will be permanent but will be small in area. Topsoils and subsoils will be used elsewhere.
Frequency - Medium	Regular occurrence expected during project phase.
Probability - Medium	This impact is likely to occur during the construction phase.
Consequence - Negligible	Barely discernible change over a small localised area with negligible impact on key environmental characteristics..
Overall magnitude	The potential magnitude on soils and subsoils is rated as Low to Medium in relation to the above. It is therefore treated as **Medium**.' (the greater of the impacts in the range)

Table 13 Impact 2: Determination of sensitivity for loss of soils and soil degradation

Soils and subsoils	Justification
Context	**Adaptability:** With careful handling during construction phase soils are considered to be adaptable to changes occurring as a result of the construction phase. **Tolerance:** Where possible Soils and subsoils will be reinstated following completion of the construction phase and will be returned to existing condition. **Recoverability:** Existing soils will be appropriately restored following construction and the reinstatement of the soils and subsoils.
Value	The soils and subsoils attribute are considered to be Medium sensitivity only as they are considered important on a local scale in recreation areas only, and are not considered to be of a particular value for agriculture.
Overall sensitivity	The potential sensitivity on soils and subsoils is considered to be **Medium**.

3.12.12 The magnitude of the impact has been assessed as **Medium**, with the maximum sensitivity of the receptors being **Medium**. Therefore, the significance of effect from changes in soils and subsoils occurring as a result of the construction of the onshore infrastructure is **Slight Adverse** and **Not Significant**.

Additional Mitigation

3.12.13 No further mitigation beyond the measures set out in Section 3.11.

Residual effect assessment

3.12.14 Residual effects are considered to be **Not Significant.**

Impact 3: Pollution risk

3.12.15 Fuel, oil leaks and spills are a potential indirect impact associated with construction work and necessary machinery for construction. During the construction phase and in particular whilst soil excavation is taking place there will be an increased risk to soil and bedrock should a leak or spill occur.

3.12.16 Construction works will predominantly involve open cut trenching and trenchless crossings with duct installation as part of cable-laying works or laying of foundations for the OSS and O&M Base which will occur within a short time period, reducing the potential exposure risk, except for those areas where trenchless installation is required at linear infrastructure crossings. Mitigation measures are set out in Section 3.11.

3.12.17 During construction, excavation and trenchless techniques will be carried out by excavators and heavy machinery which have the potential to leak/spill fuels and oils. However, given the confined natured of the works, i.e. small working trench area and small trenchless crossing compound areas, only a small number of heavy vehicles and machinery will be in use at any one time while excavating or backfilling the trench cable route and drilling. It is considered unlikely in this scenario that a large-scale fuel or oil leakage could occur and any incidents would be relatively small and easily contained before substances could leak into the underlying sediments and bedrock. Mitigation measures are set out in Section 3.11.

Table 14 Impact 3: Determination of magnitude for Pollution Risk

Definition and magnitude	Justification
Extent - Low	Mitigation measures set out in Section 3.11 will ensure that if a spillage occurred the extent of this would be very confined affecting only a limited portion of the receptor area.
Duration - Low	Mitigation measures set out in Section 3.11 will ensure that if a spillage occurred the duration of this would be very limited.
Frequency - Negligible	Accidental spillage is considered to be a very rare occurrence during the construction phase.
Probability – Low	Mitigation measures set out in Section 3.11 will ensure that likelihood of a spillage occurring will be very low.

Definition and magnitude	Justification
Consequence - Low	As soils and subsoils would not be adaptable to spillages of fuel they would be removed from site and disposed of at an approved waste management facility. The consequence to the receptor would be Low with only temporary alterations within a restricted area, limited impact on the environment's key characteristics.
Overall magnitude	The potential magnitude on soils and subsoils is rated as **Negligible to** Low. It is therefore treated as Low.' (the greater of the impacts in the range)

Table 15 Impact 3: Determination of sensitivity for Pollution Risk

Soils and Subsoils	Justification
Context	**Adaptability:** The soils, subsoils and bedrock are not adaptable to accidental spillages of fuel, oil leaks and spills. **Tolerance:** Any soils or subsoils which become contaminated following an accidental pollution incident will be removed from site and disposed of at an approved waste management facility to take such material. **Recoverability:** Any contaminated soils and subsoils will be excavated and removed off site to an approved waste management facility.
Value	The soils and subsoils attribute is considered to be Low as it has a low quality, significance and value on a local scale.
Overall sensitivity	The potential sensitivity on soils and subsoils is considered to be **Low**.

3.12.18 The magnitude of the impact has been assessed as **Low**, with the maximum sensitivity of the receptor being **Low**. Therefore, the significance of effect from the accidental contamination of soils and subsoils occurring as a result of an accidental leakage of fuel, oil leaks and spills is **Imperceptible Adverse** and **Not Significant.**

Additional Mitigation

3.12.19 No further mitigation beyond the measures set out in Section 3.11 are considered to be necessary.

Residual effect assessment

3.12.20 Residual effects are considered to be **Not Significant**.

Impact 4: Contaminated soils and material

3.12.21 There is the potential for excavations required for the construction of the onshore infrastructure to encounter previously unknown contaminated soils and/or material during the construction phase. The potential impact is from excavated contaminated material on other soils which are not contaminated.

Based on preliminary ground investigations undertaken by Dublin Array no evidence of contaminated land has been identified within the OES study area including the OSS and in the site of the proposed O&M Base. However, greater risk of contaminated ground is expected at key locations: the site of the proposed OSS (including the proposed grid connection to the existing Carrickmines substation); and the proposed O&M Base due to previous land use activities at these locations, namely the former landfill and the former ferry port respectively. Areas of road carriageway which will be used for the construction of the onshore ECR are likely to present a greater risk also.

Table 16 Impact 4: Determination of magnitude for contaminated soils/material

Definition and Magnitude	Justification
Extent - Negligible	Potential impact confined to very small area directly within the project site. No evidence identified during baseline study but greater risk in areas of previously developed ground at site of the proposed OSS and the O&M Base and along sections of the proposed onshore ECR where it will follow road carriageways.
Duration - Negligible	Temporary change only observed occasionally.
Frequency - Low	Based on the evidence collected during the baseline surveys encountering contaminated material is considered unlikely.
Probability - Negligible	Based on the evidence collected during the baseline surveys encountering contaminated material is considered unlikely.
Consequence - Low	If encountered, previously unknown contaminated soils and/or material would result in temporary alterations within a restricted area with limited impact on the environment's key characteristics or features. The changes are reversible as the contaminated ground would be removed.
Overall magnitude	The potential magnitude from the excavation of contaminated material on uncontaminated soils is rated as **Negligible to Low**. It is therefore treated as **Low**.' (the greater of the impacts in the range)

Table 17 Impact 4: Determination of sensitivity of receptors

Soils and Subsoils	Justification
Context	**Adaptability:** Soils are not considered to be adaptable to contaminated material. **Tolerance:** Any contaminated material encountered will be removed from site, tested and disposed of at a suitable waste licensed facility. **Recoverability:** Any contaminated soils and subsoils will be excavated and removed of site.
Value	The soils attribute is considered to be Low as it has a low quality, significance and value on a local scale.
Overall sensitivity	The potential sensitivity on soils is considered to be **Low**.

3.12.22 The magnitude of the impact has been assessed as **Low**, with the maximum sensitivity of the receptor being **Low**. Therefore, the significance of effect from the accidental contamination of soils occurring as a result of the excavation of contaminated material is **Imperceptible Adverse** and **Not Significant**.

Additional mitigation

3.12.23 No further mitigation beyond the measures set out in Section 3.11 are considered to be necessary.

Residual effect assessment

3.12.24 Residual effects are considered to be **Not Significant**.

Impact 5: Coastal erosion: Cliff stability and erosion of Shanganagh Cliffs during construction and future cliff erosion on operation of the offshore export cable corridor and TJBs

3.12.25 The Landfall Site will be the location where the offshore export cable corridor (offshore ECC) will meet the coastline and terminate in underground TJBs. As set out in the Project Description chapter the proposed Landfall Site will be located at Shanganagh Cliffs, immediately south of the Uisce Éireann Shanganagh Wastewater Treatment Plant (WWTP). Onshore, the Landfall Site is bounded in the east by the Shanganagh cliffs, Shanganagh beach and the Irish Sea. To the west, the route crosses under an access road for the WWTP, a community garden and beyond that the East Coast Railway line from Dublin to Wexford. The effluent outfall servicing the WWTP runs approximately parallel to the proposed Landfall Site TCC, with the existing effluent pipeline diverging away from the Landfall Site TCC as it traverses east, with the closest proximity onshore at the head of the Shanganagh Cliffs. As set out in Section 3.10 a TCC will be required, which will be used as the location for plant and equipment associated with the construction of the TJB and latterly, the installation of cable ducts for both the onshore and offshore export cable ducts under the railway line and cliffs respectively.

Effect of landfall construction on stability and erosion of the cliffs

3.12.26 In recognition of the natural configuration of the sea cliffs at Shanganagh, an early project design decision was taken not to bring the subsea cables onshore using a trenched 'open cut' solution. A feasibility assessment of various engineering installation methods was completed to identify a trenchless (i.e. below ground) methodology appropriate for local site conditions at Shanganagh. Following a review of the below ground geological profile prevailing at the intended location of the landfall, two different trenchless installation techniques were identified as being suitable - HDD and DPM. Either method is suitable for use with a negligible impact on the stability of the cliff. Both of these methods have been described in full in the Project Description Chapter.

3.12.27 Either method involves drilling at a minimum depth of 20 metres below the cliff edge and minimum 10 metres below the cliff base with either end of the drill profile set back sufficient distances (landside approximately 90 metres and seaside a minimum of 600 metres) from the cliff face to maintain the integrity of the cliff morphology within the limits of the longitudinal profile limitations of the technique being employed.

3.12.28 HDD and DPM use rotary rather than percussive drilling, limiting the nature and extent of any ground borne vibration arising from same. The detailed design will be developed to take into account the anticipated levels of vibration from the proposed drilling equipment to ensure the integrity of the cliff. The drill profile will be established to take into account the capacity/size of the drill rig being utilised and the vibration levels generated by the drill operations, to ensure the integrity of the cliff is not compromised during drilling. The HDD/DPM drill profile will be designed to ensure the HDD/DPM bores can achieve the maximum possible depth beneath the cliffs whilst maintaining the electrical design parameters of the cable in order to minimise the risk of the drilling technique to the stability of the cliffs.

3.12.29 Pre-construction verification vibration monitoring will be undertaken in the vicinity of the cliffs as part of the detailed design to gather background data on vibration levels under normal conditions in advance of commencement of any drilling activity. This data will be examined to establish a suitable vibration limit which will be maintained during drilling to ensure the integrity of the cliffs are maintained. Vibration monitoring points will then be undertaken in the vicinity of the cliffs for the duration of the drilling to inform the drilling management process thereby protecting the integrity of the cliffs.

3.12.30 Coastal erosion would not be exacerbated as a result of the HDD or DPM which will pass beneath the intertidal zone and cliffs at landfall. Exit pits will be located within the offshore ECC seaward of the MLW at a point/depth where cable installation vessels can operate. No cable protection will be used inshore of the exit pits.

Effect of future coastal erosion on the integrity of the TJB

3.12.31 The studies commissioned by Dublin Array included a Cliff Baseline Erosion Study which is included in the Cliff Baseline Erosion Survey. The aim of the study was to provide a record of the erosion of the Shanganagh sea cliffs across the survey area at a point in time (April 2024), which could be used as a reference point for any future survey of the sea cliffs across the survey area.

3.12.32 The Cliff Baseline Erosion Survey sets out that a number of projects have estimated coastal erosion and coastal erosion rates in the vicinity of the development at Shanganagh. These are listed below and presented in full in the Cliff Baseline Erosion Survey:

- Irish Coastal Protection Study (ICPS) Report, 2010 (OPW/RPS);
- Coastal vulnerability assessment, 2018 (Caloca-Casado); and
- East Coast Railway Infrastructure Protection Projects (ECRIPP) Public Consultation, December 2024 (Irish Rail and Jacobs).

3.12.33 The estimated coastal erosion rates vary from 0.65 m per year to 0.88 m per year with estimated cliff erosion of between c. 22.75 m and 30.8 m over the lifetime of the project.

3.12.34 The Dublin Array TJBs will be located approximately 90 m back from the present-day cliff face at Shanganagh. Using the most conservative scenario for estimated coastal erosion, which is c. 30.8 m over the lifetime of the project, the studies show that the TJBs will not be impacted by cliff retreat during the lifetime of Dublin Array.

3.12.35 A worst-case erosion rate prediction was used to conclude that the TJB would not be compromised by erosion over the design life of the offshore export cables or TJBs.

Table 18 Impact 5: Coastal erosion: failure and erosion of Shanganagh Cliffs during construction and operation of the Landfall Site - magnitude

Definition and magnitude	Justification
Extent – Negligible	HDD or DPM drilling methods will run underneath the cliff and avoid any direct interaction with the cliff face. The location of the 2 TJBs are sufficiently inland from the existing cliff face to avoid being compromised by ongoing coastline retreat and the erosion of the coastline over the lifetime of Dublin Array.
Duration – Negligible	Cliff stability will not be affected through the use of HDD or DPM that would pass a minimum of 10m depth beneath the cliff base. The rate of coastal erosion would not be exacerbated as a result of the HDD or DPM. The duration would be negligible. The TJBs are not anticipated to be affected by future coastal erosion This impact is not expected to occur during construction and operational phases of Dublin Array.
Frequency - Negligible	Cliff stability will not be affected through the use of HDD or DPM Coastal erosion would not be exacerbated as a result of HDD or DPM activities. The TJBs are not anticipated to be affected by future coastal erosion The frequency would be negligible.
Probability – Negligible	The impact upon cliff stability or coastal erosion is not expected to occur during construction and operational phases of Dublin Array.
Consequence - Negligible	Consequence considered to be negligible due to the very low probability and extent of the impact. Designed-in measures set out in Section 3.11 will avoid any direct effects on the physical stability of the cliffs. Location of the 2 TJBs will be sufficiently inland from the existing cliff face to avoid being compromised by ongoing erosion of the coastline.
Overall magnitude	The potential for failure and erosion of Shanganagh Cliffs during construction and of future erosion on the operation

Definition and magnitude	Justification
	of the export cables and TJBs is considered to be **Negligible**.

Table 19 Impact 5: Determination of sensitivity for coastal erosion

Soils and Subsoils	Justification
Context	**Adaptability:** The cliff face at Shanganagh is continually evolving and changing with ongoing coastal erosion along the coastline. **Tolerance:** The coastline at the Landfall Site is considered highly vulnerable to coastal erosion. Poorly sited or engineered works affecting the coastline have the potential to further exacerbate the rate of coastal erosion. **Recoverability:** If subject to enhanced erosion as a result of the proposed development it is not considered possible for the cliff face to 'recover' its former position.
Value	The coastal section is considered to be of High value due to its Geological heritage designation (Killiney Bay County Geological Site).
Overall sensitivity	The potential sensitivity on the coastal cliffs is considered to be **Very High**.

3.12.36 The magnitude of the impact has been assessed as **Negligible** impact, with the maximum sensitivity of the receptors being **Very High**. Therefore, the significance of effect from changes in coastal erosion occurring as a result of cable installation activities is **Not Significant.**

Additional Mitigation

3.12.37 No further mitigation beyond the measures set out in Section 3.11 is considered to be necessary.

Residual effect assessment

3.12.38 Residual effects are considered to be **Not Significant**.

3.13 Environmental Assessment: Operational phase

Impact 6: Site activities for the maintenance of the onshore infrastructure

3.13.1 During the operational and maintenance phase effects on land, soils and geology are expected to be limited to accidental fuel leaks from maintenance plant and machinery. Proposed avoidance and preventative measures are presented in Table 3.11.

3.13.2 The determination of magnitude for accidental fuel leak during the operational and maintenance phase is set out in the following table.

Table 20 Impact 6: Determination of magnitude for operational and maintenance phase site activities

Definition and Magnitude	Justification
Extent - Negligible	Potential impact confined to within the OSS and O&M Base
Duration - Negligible	Accidental spillage is considered to be highly unlikely to occur.
Frequency - Negligible	Accidental spillage is considered to be highly unlikely to occur
Probability - Negligible	The probability of a spillage occurring is considered to be negligible
Consequence - Low	Consequence considered to be Low due to the very low probability and extent of the impact. Measures set out in Section 3.11 will limit the opportunity for the impact arising.
Overall magnitude	The potential magnitude on soils and subsoils is rated as **Negligible** to **Low**.

Table 21 Impact 6: Determination of sensitivity for operational and maintenance phase site activities

Soils and Subsoils	Justification
Context	**Adaptability:** Soils or subsoils are not adaptable to accidental spillages of fuel, oil leaks and spills. **Tolerance:** Any soils or subsoils which become contaminated following an accidental pollution incident will be removed from site and disposed of at a suitable licensed facility to take such material. **Recoverability:** Any contaminated soils and subsoils will be excavated and removed off site.
Value	The soils and subsoils attribute is considered to me **Low** as it has a low quality, significance and value on a local scale.
Overall sensitivity	The potential sensitivity of soils and subsoils is considered to be **Low**.

3.13.3 The magnitude of the impact has been assessed as **Low**, with the maximum sensitivity of the receptor being **Low**. Therefore, the significance of effect from the accidental contamination of soils and subsoils occurring as a result of an accidental leakage of fuel, oil leaks and spills is **Imperceptible adverse** and **Not Significant**.

Additional mitigation

3.13.4 No further mitigation beyond the measures set out in Section 3.11 is considered to be necessary.

Residual effect assessment

3.13.5 Residual effects are considered to be **Not Significant**.

3.14 Environmental assessment: Decommissioning phase

Onshore Electrical System

3.14.1 The construction, operation and maintenance works associated with the OES will be managed by the Applicant until the end of the proving period and handover of ownership to EirGrid. As the enduring asset owner, EirGrid will become responsible for decommissioning of the transferring assets at the end of their deemed lifetime.

3.14.2 Accordingly, the planning application does not seek permission for decommissioning of the OES. However, for the purpose of enabling a comprehensive environmental impact assessment, the recommended approach to decommissioning is set out below, should EirGrid choose to decommission any aspect of the OES. This approach is informed by Dublin Array's experience of decommissioning onshore substations and onshore export cables on other projects and knowledge of how EirGrid typically do this.

3.14.3 In addition, we have set out below the factors which should inform any decision by EirGrid to decommissioning:

- The baseline environment at the time decommissioning works are carried out;
- Technological developments relating to decommissioning of onshore transmission infrastructure;
- Changes in what is accepted as best practice relating to decommissioning of onshore transmission infrastructure;
- Submissions or recommendations made by interested parties, organisations and other bodies concerned with decommissioning of onshore transmission infrastructure; and
- Any new relevant regulatory requirements.

3.14.4 Further, any decommissioning works must:

- Comply with any decommissioning specific conditions in the Development Consent;
- Ensure that the environmental impacts are consistent or less in scale and magnitude to those predicted in the EIAR, Natura Impact Statement and Water Framework Directive Assessment associated with the Development Consent or any amendment of the Development Consent or any subsequent consent EirGrid might be granted in respect of decommissioning; and
- Comply with the relevant health and safety regulations.

3.14.5 A decommissioning plan, along with an environmental management plan, will be prepared before any decommissioning works begin. If necessary, an application for consent should be made by EirGrid, and submitted to the relevant competent authority, in respect of any decommissioning works which require consent. Dublin Array anticipate that any such application to involve further environmental assessment and public participation, and for any decision made by the competent authority to be judicially reviewable.

O&M Base

3.14.6 A Decommissioning and Restoration Plan has been included in Volume 7, Appendix 7.: Decommissioning and Restoration Plan of the EIAR. As outlined in the Decommissioning and Restoration Plan, the O&M building will be either re-purposed for an alternative use, or demolished following the decommissioning of the offshore infrastructure.

3.14.7 Following the decommissioning of the offshore infrastructure the fencing and pontoon will be removed and the hardstanding area will be taken over by DLRCC for general harbour operations.

3.14.8 Decommissioning activities for the OES and the O&M Base are not anticipated to exceed the construction phase design parameters which have been assessed in the impact assessment. Accordingly, it is anticipated that there would be the same level of impact and resulting level of effect and significance (or less) in comparison to the assessment of construction effects set out in Section 3.12 of this chapter.

3.15 Environmental assessment: Cumulative effects

Onshore projects for cumulative assessment

3.15.1 The specific projects scoped into this cumulative impact assessment, and the tiers into which they have been allocated are presented in Table 22 below. The operational projects included within the table are included due to their completion/commission subsequent to the data collection process for Dublin Array and as such not included within the baseline characterisation.

Table 22 Tier descriptions

Tiers	Development stage
Tier 1	Project under construction. Those projects that are only partially constructed at the time that baseline characterisation is undertaken; Those that were only recently completed, during the development of the baseline characterisation, the full extent of the impacts arising from the development(s) may not be reflected in the baseline; and/or which may have consent or licences to undertake further work, such as maintenance dredging or notable maintenance works which may arise in additional effects.
Tier 2	Permitted application(s), but not yet implemented;

Tiers	Development stage
Tier 3	Submitted application(s), but not yet determined;
	Identified in the relevant development plan (and emerging development plans – with appropriate weight given as they move closer to adoption) recognising that much information on any relevant proposals will be limited; and
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward

Effect 1: Potential cumulative effects on land, soils and geology

Overview

3.15.2 This section outlines the cumulative impact assessment on land, soils and geology and takes into account the impacts of the proposed development alone, together with other plans and projects. As outlined in the Cumulative Impact Assessment Methodology chapter (Volume 2, Chapter 4), the screening process involved determination of appropriate search areas for projects, plans and activities and Zones of Influence (ZoIs) for potential cumulative effects. These were then screened according to the level of detail publicly available and the potential for interactions with regard to the presence of an impact pathway as well as spatial and temporal overlap.

3.15.3 The CEA long list of projects, plans and activities with which Dublin Array's onshore infrastructure has the potential to interact with to produce a cumulative impact is presented within the Cumulative Impact Assessment Methodology chapter. Each plan and project has been considered on case by case basis with the maximum suite of projects identified from a long list within a search area defined as 500 m beyond the site boundary of the onshore infrastructure.

3.15.4 The greatest potential for cumulative effects arises when the construction phase of another development overlaps with the construction phase of the onshore infrastructure, as activities that could be potentially detrimental to the ground conditions and land use environment are greatly reduced during the operational phase of developments. Potential cumulative effects to the land, soils and geology between the onshore infrastructure and other proposed or consented developments are considered plausible only where the development footprint of both developments overlap, therefore a 500 m search area is more than sufficient to encapsulate relevant developments.

Projects for cumulative assessment

3.15.5 The specific projects scoped into this cumulative impact assessment on land, soils and geology receptors, and the tiers into which they have been allocated are presented in Table 23 below.

Table 23 Projects for cumulative assessment

Development type	Project name	Current status of development	Data confidence assessment/phase	Planned programme
Tier 1				
District Road Scheme	Glenamuck District Road Scheme	Consented – construction commenced	High – Consented	Construction has started. Construction will have completed by the time construction starts on Dublin Array onshore infrastructure.
Tier 2				
Road Re-alignment and Ancillary Amendments	Beckett Road Re-alignment and Ancillary Amendments	Consented	High – Consented	Construction has not started. It is anticipated that construction will have completed by the time construction starts on Dublin Array onshore infrastructure.
Tier 3				
Flood relief scheme	The Deansgrange Flood Relief Scheme at Glenavon Park	Pre-application	High – designs developed	Post 2025
Coastal protection measures	The East Coast Railway Infrastructure Protection Project (ECRIPP).	Pre-application	Low – currently at project concept, feasibility and option selection stage	Post 2027
Electricity infrastructure	Dublin Replacement Underground Cable Programme CP1146 Carrickmines to Poolbeg Cable Replacement	Pre-application	Medium – route options identified	Post 2026
National Watersports Campus	National Watersports Campus, Dún Laoghaire	Pre-application	Medium - concept development	Post 2026

Impact 7: Cumulative effects on land, soils and geology.

3.15.6 The potential for significant cumulative effects is presented in Table 24 .

Table 24 Determination of potential for cumulative effects on soils and geology

	Justification
Step 1: Drivers	Changes to the baseline environment arising from the construction and operation of the shortlisted projects in the preceding section could potentially affect land, soils and geology receptors.
Step 2: Pressures	**Soils and geology** Interaction between the shortlisted projects in the preceding section and the Dublin Array onshore infrastructure could potentially have an additive effect on soils and geology receptors. However, mitigation measures such as the use of a CEMP during construction works will be necessary to ensure no significant effects arise cumulatively on soils and geology during the construction phase of these developments. Furthermore, all of these projects will be physically separated from the Dublin Array onshore infrastructure construction areas or will be built on different timelines to Dublin Array. Pollution control measures will be in place for Dublin Array (refer to Section 3.11) which will ensure that the risk of pollution impacting soils and geology will be strictly controlled throughout the duration of the construction phase and once the project is operational. **Land use** At Dún Laoghaire Harbour, there is a risk that the proposed National Watersports Campus leads to significant cumulative effects with the O&M Base on land use within the harbour area during both the construction phase and operational phases. The two projects will occupy land and berthing space within the same harbour potentially leading to additive effects on land use. As concluded in the impact assessment, it is anticipated that the O&M Base will have no significant adverse effects on land use within the harbour. Given the complimentary nature of the O&M Base to the existing harbour operations, using existing brownfield land and space within the port it is considered that the two uses can co-exist in land use terms and not lead to significant cumulative effects.
Step 3: States	The states that may be affected are the land, soils and geology receptors within the study area.
Step 4: Impacts	The effects on land, soils and geology from the project alone were deemed to be Not Significant. Despite being potentially additive, it is not anticipated that the cumulative changes arising from the developments would be measurable or be significant in EIA terms when considered cumulatively.
Step 5: Responses	No additional mitigation to that already identified in Section 3.11 is considered necessary to prevent significant effects.
Conclusion	Despite being potentially additive, it is not anticipated that the cumulative changes arising from the developments would be measurable at the identified receptors or be significant in EIA terms when considered cumulatively.

3.16 Interactions of the environmental factors

3.16.1 A matrix illustrating the likely interactions of the foregoing arising from the proposed development on Land, Soils, and Geology receptors is provided in Volume 8, Chapter 1: Interactions of the Environmental Factors.

3.16.2 Interactions of the foregoing are considered to be the effects and associated effects of different aspects of the proposal on the same receptor. These are considered to be:

- **Project lifetime effects**: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, operation and decommissioning) to interact and potentially create a more significant effect on a receptor than if just assessed in isolation in these three project phases.
- **Receptor-led effects:** Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. For example, all effects on soil quality such as compaction, contamination, and changes in soil structure may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short-term, temporary or transient effects, or incorporate longer term effects.

3.16.3 As indicated in the interactions matrix (Volume 8, Chapter 1: Interactions of the Environmental Factors), there are linkages between the topic-specific chapters presented within this EIAR, whereby the effects assessed in one chapter have the potential to result in secondary effects on another receptor (e.g., effects on soil erosion have the potential to result in secondary effects on water quality).

3.16.4 The different Land, Soils, and Geology effects are already inter-related. Therefore, these linked processes have been considered within the assessment. The potential effects on Land, Soils, and Geology during construction, operational and decommissioning phases of the Dublin Array have been assessed in Sections 3.12 to 3.15. In turn, this assessment of changes to Land, Soils, and Geology has been used to inform other EIA aspects.

3.16.5 Effects on Land, Soils, and Geology (e.g. from soil compaction or accidental release of contaminants) also have the potential to have secondary effects on other receptors which have been fully assessed in the topic-specific chapters. These receptors are:

- Marine Water – Volume 3, Chapter 2;
- Water (Hydrology, Hydrogeology and Flood Risk) – Volume 5, Chapter 4;
- Human Health – Volume 5, Chapter 9; and
- Air Quality – Volume 5, Chapter 10.

3.16.6 The following potential effects have been considered within the interactions assessment:

- Accidental releases or spills of materials or chemicals during construction/decommissioning works or during operation and maintenance phase.

Project lifetime effects

3.16.7 Project lifetime effects consider impacts from the construction, operation, or decommissioning of the proposed development on the same receptor (or group). The potential inter-related effects that could arise in relation to Land, Soils, and Geology receptors are presented in Table 25.

Table 25 Project lifetime effects assessment for potential inter-related effects on Land, Soils, and Geology.

Impact type	Effects (assessment alone)			Interaction assessment
	Construction	O&M	Decommissioning	Project lifetime effects
Accidental releases or spills of materials or chemicals during construction/ decommissioning works or during operation and maintenance phase	Slight adverse	Slight adverse	Slight adverse	Potential changes to ground conditions during construction, decommissioning or operational phase works could affect the quality of ground or surface waters or marine waters. The greatest potential effect is likely to occur if there is an accidental release of pollution (Impact 3) or if contaminated ground is encountered during the construction phase (Impact 4). Similarly, potential changes to ground conditions during the construction and decommissioning phases could affect the air quality by mobilisation of dust.

Impact type	Effects (assessment alone)			Interaction assessment
	Construction	O&M	Decommissioning	Project lifetime effects
				The potential for effects of Dublin Array to result in consequential effects on other receptors would be controlled by the avoidance and preventative measures set out in this chapter in Section 3.11, which will be secured through use of a CEMP as presented in Volume 7 of the EIAR. The effects identified within this chapter are predicted to be at worst **slight adverse**. None of these effects would be significant in EIA terms. There are not considered to be any significant inter-related effects between offshore and onshore parts of Dublin Array in respect of Land, Soils and Geology.

Receptor-led effects

3.16.8 Potential exists for spatial and temporal interactions between degradation or loss of soil; release of contaminants (through handling of contaminated materials) and accidental release or spills of contaminants effects during the lifetime of Dublin Array. Based on current understanding, the greatest scope for potential interactions between impacts is predicted to arise through the interaction of soil loss or soil degradation and the potential impacts arising from the release of contaminants during the construction phase caused by accidental spills or handling of contaminated materials which might be encountered during the construction phase works.

3.16.9 These individual impacts were assigned a significance of slight adverse as standalone impacts. Whilst potential combined impacts may arise, it is unlikely they would occur at the same time or in the same location. In-combination and taking account of the preventative and avoidance measures set out in Section 3.11, the effects are not expected to be greater than currently predicted. No significant effects are predicted to arise.

3.17 Transboundary effects

3.17.1 The onshore infrastructure of the proposed development is located wholly within the Republic of Ireland. There are no transboundary effects associated with land, soil and geology in relation to this proposed development.

3.18 Summary of effects

3.18.1 This section provides a summary of the residual effects from the identified impacts with the mitigation measures in place.

Table 26 Summary of residual effects

Description of effect	Effect	Mitigation measures	Residual effect (with mitigation)
Construction phase			
Impact 1	Alterations to land use and land take	None beyond measures set out in Section 3.11	No significant adverse residual effects
Impact 2	Loss of soils or soil degradation	None beyond measures set out in Section 3.11	No significant adverse residual effects
Impact 3	Pollution risk	None beyond measures set out in Section 3.11	No significant adverse residual effects
Impact 4	Excavation of contaminated soils and material	None beyond measures set out in Section 3.11	No significant adverse residual effects
Impact 5	Coastal erosion: Cliff stability and erosion of Shanganagh Cliffs during construction and future cliff erosion on operation of the offshore export cable corridor and TJBs	None beyond measures set out in Section 3.11	No significant adverse residual effects
Operation phase			
Impact 6	Site activities for the maintenance of the onshore infrastructure	None beyond measures set out in Section 3.11	No significant adverse residual effects
Decommissioning			
Decommissioning activities are not anticipated to exceed the construction phase worst case criteria which were assessed in Section 3.12.			

Description of effect	Effect	Mitigation measures	Residual effect (with mitigation)
Cumulative effects			
Impact 7	Cumulative effects on land, soils and geology	None beyond measures set out in Section 3.11	No significant adverse residual effects
Transboundary			
There are no transboundary effects for this development in relation to land, soil and geology. The proposed project does not extend across an international boundary and there is no direct link between the onshore site and an international boundary.			

3.19 References

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RPS, June 2010, for Office of Public Works (OPW), Irish Coastal Protection Strategy Study Phase 2 - South East Coast, Work Packages 2, 3 & 4A - Appendix 8 - Erosion Mapping.

Registered office:
Unit 5,
Desart House,
Lower New Street,
Kilkenny
www.RWE.com