Celtic Interconnector

Volume 3C Part 1

Environmental Impact Assessment Report

June 2021

Co-financed by the European Union
Connecting Europe Facility

Tionscadal Éireann
Project Ireland
2040

EIRGRID

The Oval, 160 Shelbourne Road, Ballsbridge, Dublin D04 FW28
Telephone: 01 677 1700 • www.eirgrid.ie

Mott MacDonald
South Block
Rockfield
Dundrum
Dublin 16
D16 R6V0
Ireland

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

Volume 3C Part 1 Environmental Impact Assessment Report

Celtic Interconnector

June 2021

Document reference: 229100428 | 507 | C

The contents of this publication are the sole responsibility of the author and do not necessarily reflect the opinion of the European Union

Information class: Standard

Contents

Tables

Figures

Abbreviations

Abbreviation	Full Title
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AAP	Area/feature of Archaeological Potential
ABP	An Bord Pleanála
AC	Alternating Current
ACA	Architectural Conservation Area
AOD	Above Ordnance Datum
AQS	Air Quality Standards
CDP	County Development Plan
CEMP	Construction Environmental Management Plan
CRU	Commission for Regulation of Utilities
DAU	Development Applications Unit
DCCAE	Department of Communications, Climate Action and Environment
DEHLG	Department of the Environment Heritage and Local Government
DECC	Department of the Environment, Climate and Communications
DHLGH	Department of Housing, Local Government and Heritage
DECLG	Department of the Environment, Community and Local Government
DC	Direct Current
DMRB	Design Manual for Roads and Bridges
EC	European Council
EU	European Union
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environment Protection Agency
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HV	High Voltage
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HWM	High Water Mark
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
LAP	Local Area Plan
LCA	Landscape Character Area
LGV	Light Goods Vehicle
MHW	Mean High Water
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework

Abbreviation	Full Title
NPWS	National Parks and Wildlife Service
PCI	Project of Common Interest
pNHA	Proposed Natural Heritage Area
PS	Protected Structure
RMP	Recorded Archaeological Monument
RTE	Réseau de Transport d'Électricité [French TSO]
SAC	Special Area of Conservation
SPA	Special Protection Area
TB	Townland Boundary
TEN-E	Regulation (EU) No 347/2013 guidelines for trans-European energy infrastructure
TJB	Transition Joint Bay
TSO	Transmission System Operator
UBH	Unregistered Built Heritage site
UCH (1)	Unregistered Cultural Heritage Site that comprises extant remains
UCH (2)	Unregistered Cultural Heritage Site that does not comprise extant remains
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

1.1 Introduction

The Celtic Interconnector[1] project will create an electrical interconnection between Ireland and France to allow the exchange of electricity between the two countries. It is being jointly developed by EirGrid, the electricity Transmission System Operator (TSO) in Ireland, and its French counterpart, RTE (Réseau de Transport d'Électricité).

The connection will link an existing electricity transmission substation located in Knockraha in east Cork, Ireland, with a substation in La Martyre in Brittany, France. Designated as a Project of Common Interest (PCI) by the European Union, see Volume 2A (Planning Report) of the application, the Celtic Interconnector project responds to European challenges regarding energy transition and addresses climate change by facilitating progress towards a low-carbon electricity mix. It will contribute to more secure, more sustainable and better priced electricity.

Separate, though integrated, Environmental Impact Assessment Reports (EIARs) have been prepared to accompany an application for statutory approval to An Bord Pleanála (ABP) for the Ireland Onshore element of the Celtic Interconnector project (Volume 3C), and a Foreshore Licence application to the Department of Housing, Local Government, and Heritage (DHLGH) for the Ireland Offshore element of the Celtic Interconnector project (Volume 3D). This document comprises the introductory chapters to the EIAR for the proposed Ireland Onshore development (Volume 3C Part 1). Further detail is provided in Section 1.5 below.

1.2 About EirGrid

EirGrid is the state-owned independent Transmission System Operator (TSO) and developer of Ireland's national high voltage electricity grid (also called the "Transmission System"). The European Communities (Internal Market in Electricity) Regulations 2000 (SI 445 of 2000) sets out the role and responsibilities of the TSO in particular Article 8(1) (a) gives EirGrid, as TSO, the exclusive function:

"To operate and ensure the maintenance of and, if necessary, develop a safe, secure, reliable, economical, and efficient electricity transmission system, and to explore and develop opportunities for interconnection of its system with other systems, in all cases with a view to ensuring that all reasonable demands for electricity are met having due regard for the environment." (emphasis added).

Further discussion regarding the statutory functions of EirGrid is set out at Section 1 of Volume 2A (Planning Report) of the application.

1.3 About RTE

RTE is the French TSO. Its fundamental mandate is to provide its customers with an economical, safe and clean supply of electricity.

RTE supplies its customers through appropriate infrastructure and provides them with all systems and services they require to meet their needs in terms of economic efficiency, respect for the environment and the security of their energy supply. To this end, RTE operates, maintains and develops high voltage (HV) and very high voltage networks. It guarantees that

[1] An interconnector is an electrical transmission connection which crosses or spans a border between countries connecting the transmission systems of those countries.

the electricity system operates safely and correctly. RTE is also responsible for routing electricity from other electricity suppliers (both French and European) to its consumers.

1.4 Project Overview

The Celtic Interconnector is a primarily subsea link that will enable the exchange of electricity between the electricity transmission grids in Ireland and France. The link will have the capacity to carry up to 700 MW of electrical energy between the two systems.

The transmission grids in both Ireland and France are operated at High Voltage Alternating Current (HVAC). High Voltage Direct Current (HVDC) is used for the transmission of electrical power over large distances where HVAC is not technically or economically feasible. Converter stations are therefore required in both France and Ireland to convert the HVDC power to HVAC.

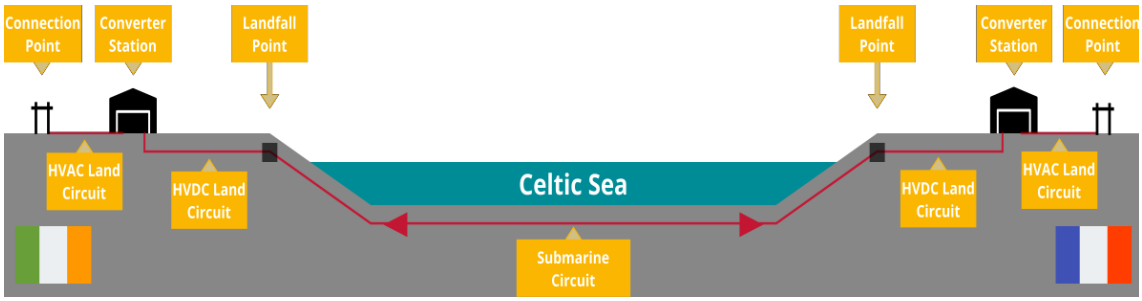
The main elements of the overall Celtic Interconnector project are:

- A High Voltage Direct Current (HVDC) submarine cable of approximately 500km in length laid between the coast in Brittany France, and the Cork coast in Ireland. The submarine cable will be either buried beneath the seabed or laid on the seabed and covered for protection;
- A landfall location in Ireland and France, where the HVDC submarine circuit will come onshore and terminate at a Transition Joint Bay (TJB);
- A HVDC underground cable (UGC) in both countries between the landfall location and a converter station compound;
- A converter station in both countries to convert the electricity from HVDC to High Voltage Alternating Current (HVAC) and vice versa;
- A HVAC UGC in both countries between the converter station compound and the connection point to the National Grid;
- A connection to the National grid; and,
- A fibre optic link, with associated power supply, will also be laid along the route for operational control, communication and telemetry purposes.

The key elements of the project are illustrated in Figure 1.1 and Figure 1.2.

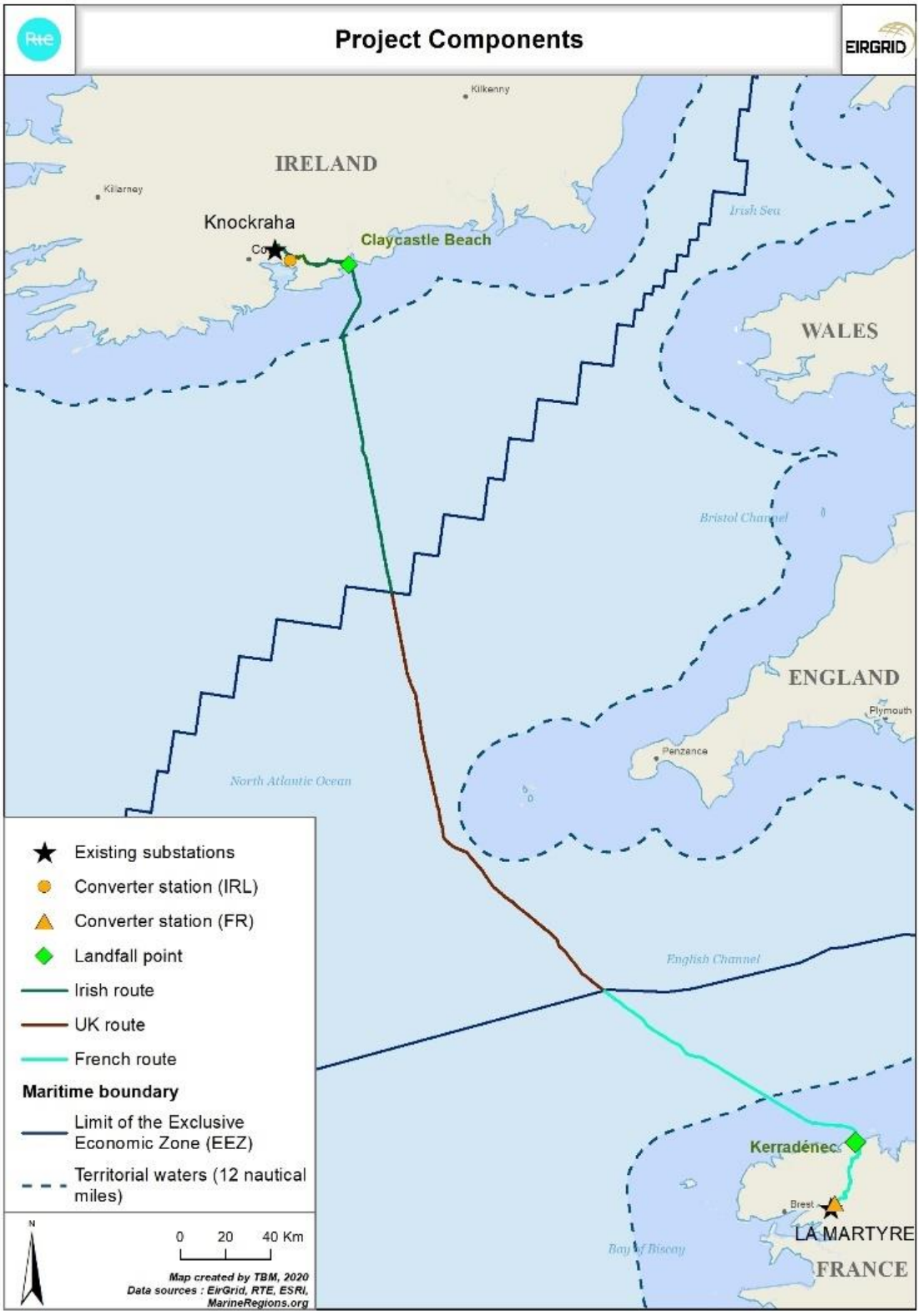
An overview of the proposed Ireland Onshore element of the overall Celtic Interconnector project is presented in Chapter 3 *Project Description Overview*. A detailed description of the proposed development is provided in Volume 3C Part 2 of this EIAR. A detailed description of the Ireland Offshore element of the overall project is provided in Volume 3D.

Figure 1.1: Celtic Interconnector (Project Overview)



Source: EirGrid

Figure 1.2: The Celtic Interconnector



Source: TBM Consulting Group

1.5 Structure of Whole of Project Environmental Appraisal

The Celtic Interconnector project is, by its nature multi-jurisdictional, and is being jointly developed by the two TSOs of Ireland and France. In addition, while not occurring within UK territory, it will be located, in part, within the UK Exclusive Economic Zone (EEZ).

In response, and to ensure a comprehensive environmental appraisal of the overall end-to-end project, a multi-volume application has been prepared by a multi-organisational team of competent experts working collaboratively. This has ensured that this overall environmental appraisal is robust and objective.

Having regard to this multi-jurisdictional project, this whole-of-project environmental appraisal is set out in a number of volumes. This is intended for the convenience of the various Competent Authorities, prescribed bodies and the general public as it allows specific focus on those particulars of relevance to each jurisdiction, set within a whole-of-project framework. It also facilitates the fact that the different jurisdictions have different legislative requirements and processes in respect of environmental assessment. The multi-volume approach is set out in Table 1.1 below

Table 1.1: Multi-Volume Application and Supporting Documentation

Volume	No	Details	Organisation
Strategic Infrastructure Development (SID) Planning Application			
Volume 1	1A	Statutory Particulars	Mott MacDonald
	1B	Planning Drawings	Mott MacDonald
Volume 2	2A	Planning Report	EirGrid
	2B	Public and Landowner Consultation Report	EirGrid
Volume 3	3A	Non-Technical Summary (NTS) for EIAR for Ireland Onshore**	Mott MacDonald
	3C Part 1 (hereafter 3C1)	EIAR for Ireland Onshore (Introductory Chapters)	Mott MacDonald
	3C Part 2 (hereafter 3C2)	EIAR for Ireland Onshore (Technical Chapters)	Mott MacDonald
Volume 4		Environmental Report for UK Offshore*and **	Wood
Volume 5		Joint Environmental Report (JER)	TBM Consulting Group
Volume 6	6A	Onshore Natura Impact Statement (NIS) for Ireland (including in-combination effects)*and**	Mott MacDonald
Foreshore Licence Application			
Volume 3	3B	NTS for Ireland Offshore*	Wood
	3D Part 1 (hereafter 3D1)	EIAR for Ireland Offshore (Introductory Chapters)*	Wood
	3D Part 2 (hereafter 3D2)	EIAR for Ireland Offshore (Technical Chapters)*	Wood
Volume 4		Environmental Report for UK Offshore* and **	Wood
Volume 5		Joint Environmental Report (JER)	TBM Consulting Group
Volume 6	6B	Offshore NIS for Ireland (including in-combination effects)*	Wood
Volume 7	7A	Statutory Particulars	Wood
	7B	Foreshore Licence Drawings	Wood
Volume 8	8A	Planning and Consultation Report	Wood
	8B	Marine Strategy Framework Directive Assessment	Wood

Volume	No	Details	Organisation
	8C	Water Framework Directive Assessment	Wood
CRU Consent Applications:			
Volume 9	9A	Draft Application Form under Section 16(1)(b) of the 1999 Act for Authorisation to Construct an Interconnector	EirGrid
	9B	Draft Application under Section 48 of the 1999 Act for Consent to Lay Electric Cables Applications	EirGrid
		Draft Application under Section 49 of the 1999 Act for Consent to Lay Electric Cables Applications	EirGrid

* This is proposed to be submitted as part of the SID Application for information purposes.

** This is proposed to be submitted as part of the Foreshore Licence Application for information purposes.

With regard specifically to matters of environmental assessment, this Volume 3C1 provides an overview of the Celtic Interconnector and the project need and the methodology applied in the preparation of the EIARs that have been prepared for the Irish jurisdiction [Volume 3C2 (onshore) and Volume 3D (offshore)] - as set out in Table 1.1.

Where considered appropriate and / or relevant, reference is made in Volume 3C to Volume 3D and those project elements and processes relating to the offshore elements of the project. In addition, and in the interests of enabling a holistic environmental appraisal to be undertaken, Volume 4 UK Offshore Environmental Report and Volume 5 the Joint Environmental Report forms part of the PCI and SID application packs.

Mott MacDonald has led the project design and environmental assessment for the Ireland Onshore element of the overall Celtic Interconnector project (Volume 3C). Wood has led the project design and environmental appraisal for the Ireland Offshore element of the project (Volume 3D). Both of these Volumes comprise Environmental Impact Assessment Reports (EIARs) prepared in accordance with relevant legislation and established guidance.

In respect of the UK offshore element of the project (Volume 4), the Competent Authority, the UK Marine Management Organisation (MMO), has determined that no EIA is required in respect of the proposed development within the UK Exclusive Economic Zone'. As such, an Environmental Report has been prepared by Wood that is consistent with the structure and provisions of the EIARs carried out for the other jurisdictions, in order to ensure an adequate and robust whole-of-project environmental appraisal to assist the Competent Authorities in their assessments and decision-making.

TBM Consulting Group has led the environmental assessment for the French Onshore and Offshore elements. While EIARs have been prepared for the French onshore and French offshore project elements, the specifics of the French consenting process requires that, at the time of submitting the consents applications in Ireland, the French EIARs are not publicly available. A Joint Environmental Report (JER) has however been prepared in accordance with EU *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects* to present a whole-of-project environmental assessment for the benefit of the Competent Authorities, relevant Prescribed Bodies and the general public.

Details of the competencies of the respective EIAR contributors to Volume 3C and Volume 3D are provided in Appendix 1 *EIAR Competencies.* It should be noted that the same contributors for Volume 3D undertook the environmental appraisals contained within Volume 4 (UK Offshore).

Specific to the EIARs carried out in the Irish jurisdiction, Volume 3C addresses the proposed development (Ireland Onshore element of the overall Celtic Interconnector project) between the grid connection point at Knockraha substation and the area of the High Water Mark (HWM) at Claycastle Beach in Youghal, both in County Cork. Volume 3D addresses the proposed

development (Ireland Offshore element of the overall Celtic Interconnector project), between the area of the HWM at Claycastle Beach and the outermost limit of the Irish Exclusive Economic Zone (EEZ). This ensures an appropriate interface between the two EIARs at the landfall area.

The structure of Volume 3C and Volume 3D is presented in Table 1.2 below.

Table 1.2: Structure of the EIAR for the Irish jurisdiction

Volume	Chapter	Title
Volume 3C1 EIAR for Ireland Onshore	1	Introduction
	2	Project Need
	3	Project Description Overview
	4	EIAR Methodology
Volume 3C2 EIAR for Ireland Onshore	1	Alternatives Considered
	2	Description of the Onshore Development
	3	Onshore Construction Phase Activities
	4	Population and Human Health
	5	Air Quality and Climate
	6	Land, Soils and Hydrogeology
	7	Surface Water, including Flood Risk
	8	Biodiversity
	9	The Landscape
	10	Archaeology and Cultural Heritage
	11	Roads and Traffic
	12	Material Assets
	13	Noise and Vibration
	14	Major Accidents and / or Disasters
	15	Interaction of Effects
	16	Summary of Cumulative Effects and Transboundary Effects
	17	Summary of Monitoring and Mitigation Measures
	18	References
Volume 3D1 EIAR for Ireland Offshore	1	Introduction
	2	Project Need
	3	Project Description Overview
	4	EIAR Methodology
Volume 3D2 EIAR for Ireland Offshore	5	Description of Landfall
	6	Description of Offshore Cable
	7	Alternatives Considered
	8	Population and Human Health
	9	Air Quality and Climate
	10	Marine sediments Quality
	11	Marine Physical Process
	12	Marine water Quality
	13	Biodiversity
	14	Seascape and Landscape
	15	Archaeology and Cultural Heritage
	16	Material Assets

Volume	Chapter	Title
	17	Noise and Vibration
	18	Shipping and Navigation
	19	Commercial Fisheries
	20	Major Accidents and/or Disasters
	21	Summary of Transboundary and Cumulative Impact
	22	Summary of Monitoring and Mitigation
	23	Interaction of Effects

2 Project Need

2.1 Introduction

This chapter sets out the need for the Celtic Interconnector Project. The text of this chapter is also set out in Section 1 of the Volume 2A Planning Report; it is however also being included in this EIAR for completeness.

2.2 Project Need

The Celtic Interconnector project, being jointly developed by EirGrid and RTE, will create an electrical interconnection between Ireland and France to allow the exchange of electricity between the two countries.

The Celtic Interconnector is being developed in response to European challenges such as the energy transition and the management of climate change. Designated as a Project of Common Interest (PCI) by the European Union (see Volume 2A for more discussion re PCI projects), the project meets the criteria detailed in Article 4 of the EU Regulation 347/2013 on guidelines for trans-European energy infrastructure - i.e. the project contributes significantly to at least one of the following specific criteria:

- **Market integration**, *inter alia*, through lifting the isolation of at least one Member State and reducing energy infrastructure bottlenecks; competition and system flexibility;
- **Sustainability**, *inter alia*, through the integration of renewable energy into the grid and the transmission of renewable generation to major consumption centres and storage sites; and
- **Security of supply**, *inter alia*, through interoperability, appropriate connections and secure and reliable system operation.

The Celtic Interconnector will:

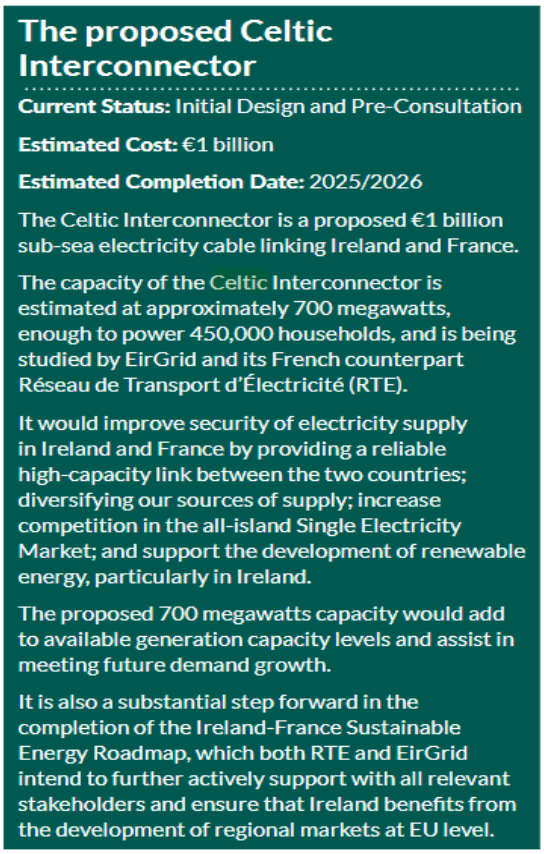
- **Facilitate an increase in the use of renewable energy**: an interconnection between Ireland and the continent and will increase the integration of renewable energy at the European level and enable France and Ireland to move forward in terms of the energy transition (in line with national policies in respect of the development of renewables);
- **Provide security of supply**: pooling resources will enable both countries to better cope with contingencies and spikes in electricity consumption. Interconnection will promote mutual assistance between both countries and will work in both directions;
- **Improve European solidarity on energy**: the Celtic Interconnector project will be a benchmark project in terms of European Solidarity on energy. It will enable Ireland to benefit directly from the European integrated electricity market. The Celtic Interconnector will be Ireland’s only direct transmission link with another Member State of the European Union;
- **Promote the movement of electricity flows at a European level**: by promoting the movement of electricity in Ireland, in France and throughout all of continental Europe, the Celtic Interconnector will enable European consumers to benefit from a more open electricity market; and
- **Support the development of a more sustainable electricity mix in France and in Ireland**: The Celtic Interconnector will contribute to European objectives of a low-carbon energy future, promoting the development of other renewable energy sources and their integration into the European electricity system.

In this context, the project enjoys strong support from both the French and Irish governments, as well as from the European Commission. Of particular note in this regard, the completion of the project is specifically included in the current Programme for Government, as follows:-

- In respect of Mission: A Green New Deal, the Programme states*: "We will take the necessary action to deliver at least 70% renewable electricity by 2030. To achieve this, we will:……Complete the Celtic Interconnector to connect Ireland's electricity grid to France"* (p35); and
- In respect of Mission: At the Heart of Europe and Global Citizenship, and in particular respect of Ireland at the Heart of Europe, the Programme states*: "We Will…..Support work on the Celtic Interconnector, which will link Ireland to Europe's energy grid, increase competition in electricity prices, and help Ireland to switch to at least 70% renewable electricity"* (p111).

The Celtic Interconnector project is also specifically included in Project 2040: The National Development Plan 2018-2027. In particular respect of Strategic Outcome 8: Transition to a Low-Carbon and Climate-Resilient Society, the project is identified as a commercial state sector investment (p 78-79 and Figure 2.1 below).

Figure 2.1: Extract from Project 2040: The National Development Plan 2018-2027 (P79)



Source: The National Development Plan 2018-2027

3 Project Description Overview

3.1 Ireland Onshore Element of the Overall Celtic Interconnector Project – the Proposed Development

This section of the EIAR presents an overview of the proposed SID development – comprising the Ireland Onshore element of the overall Celtic Interconnector project. A more detailed description of the proposed development is provided in Chapter 2 of Volume 3C2 of this EIAR. In addition, Chapter 1 of Volume 3C2 relates to Consideration of Alternatives for the Irish onshore elements, while Chapter 3 provides a description of the construction methodology proposed to be employed. These chapters should be referred to for detailed information on the proposals.

The Celtic interconnector will connect to the Irish electricity transmission system at Knockraha substation in County Cork via a High Voltage Alternating Current (HVAC) underground cable of approximately 11km in length. Alternating current (AC) is the technology utilised on the Irish electricity transmission network.

Electricity is best carried over long distances by means of High Voltage Direct Current (HVDC) technology. As such, a HVDC submarine cable will connect to a HVDC onshore underground cable at a Transmission Joint Bay (TJB) north of the car park at Claycastle Beach near Youghal in County Cork. The HVDC onshore UGC is approximately 32km in length.

The majority of the HVAC and HVDC underground cables (UGCs) will be installed within the existing public road network. Off-road routes are proposed at particular locations. In particular, these include:-

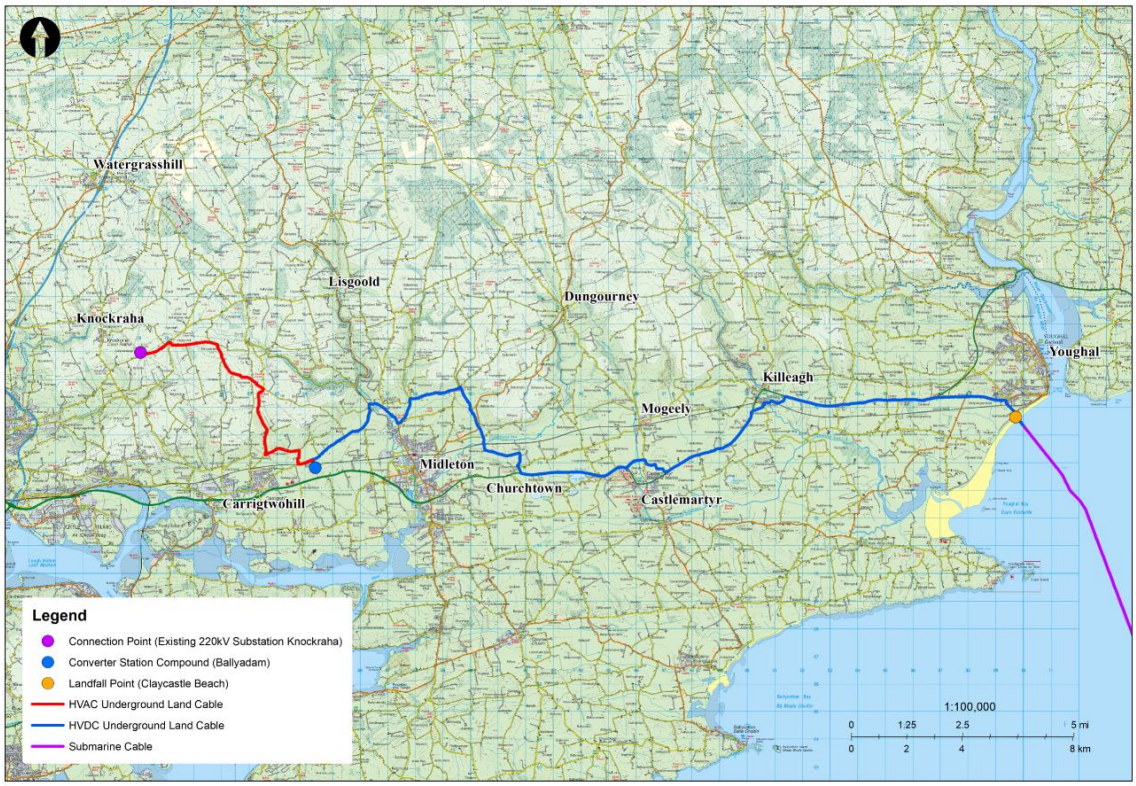
- The villages of Killeagh and Castlemartyr will be avoided by means of cross-country routing. this will minimise disruption and nuisance for these villages, their residents and communities, and for traffic passing through the villages which are both located on the N25 Cork-Waterford-Wexford / Rosslare National route.
- North of Claycastle Beach where, due to structural constraints associated with an existing narrow railway bridge, it will be necessary to divert the UGC off road under the planned Midleton to Youghal Greenway (currently under construction). Approximately 65 metres of the 241 metres of land cable for this off-road section will be installed within Ballyvergan Marsh proposed Natural Heritage Area (pNHA) (site code 000078).

The HVAC and the HVDC UGCs will terminate at a proposed converter station compound on a brownfield site within the Industrial Development Authority (IDA) development landholding at Ballyadam, between Carrigtwohill and Midleton, East Cork.

As the name suggests, the converter station will convert HVDC electricity to HVAC, and vice versa. The converter station compound will measure approximately 3.5 hectares and will include three main buildings, the tallest element being up to 25m in height. The compound will also include associated and ancillary development such as electrical equipment and apparatus, stores and other buildings, drainage, road and landscaping infrastructure.

Figure 3.2 below illustrates the geographical context of the proposed development.

Figure 3.1: The Proposed Development (Ireland Onshore) and the Ireland Offshore Submarine Cable



Source: Mott MacDonald

As noted above, Chapter 3 of Volume 3C Part 2 addresses construction of the proposed development. In overview, in respect of the UGC, cable trenches will be excavated (as noted above these will primarily be within public roads), and ducts will be installed, with the road reinstated. The UGC will be delivered to site on drums and will be pulled through the cable ducts. Fibre optic cables will also be laid along with the electricity cables.

Joint bays (underground chambers) will also be constructed along the cable routes, and are used to join together ('joint') consecutive lengths of cable and to facilitate the cable pulling. Typically, joint bay separation for a HVAC cable is between approximately 500m and 850m and joint bay separation for a HVDC cable is between approximately 750 to 1000 metres.

To facilitate traffic management at locations where joint bays are to be located within the carriageway, the use of temporary passing bays is proposed. These are strips of land at the edge of a public road on one side of a joint bay (approximately 50-80m in length), that are temporarily cleared and laid with a hard surface in order to facilitate vehicle movements around the joint bay, thereby avoiding or minimising the need for road closures. This will entail removing the top layer of ground to the side of the carriageway (including removal of hedges if present) and temporarily storing it locally to the site for reinstatement following the works. New hedges would generally be planted as part of re-instatement works.

Other traffic control measures will also be implemented as appropriate along the cable routes. These are likely to include road diversions, temporary closures and stop / go traffic management. All traffic management measures will be implemented in the context that the laying of UGC is a linear construction process, generally at a rate of approximately 50m per day for public roads where there are generally little or no access constraints, and at a rate of approximately 20m per day on more constrained local roads.

A number of crossings of watercourses, drainage ditches, utilities, railway lines and the Midleton to Youghal Greenway will also be required along the cable route. These crossings will be facilitated by either open cut trenching or by use of Horizontal Directional Drilling (HDD). The specific detail of each crossing will be developed by the appointed contractor within the parameters assessed in this EIAR.

Laydown areas, where construction materials can be temporarily stored, and construction compounds, where car parking and welfare facilities are provided, will also be provided along the route. These are identified on the statutory planning drawings (Volume 1B).

In respect of the converter station construction, it is expected that a peak of approximately 300 Heavy Goods Vehicles (HGV) movements per day will be required during the most intense period of the construction phase of the proposed development. It is also expected that approximately ten abnormal load movements will be required. Abnormal load deliveries will include elements such as construction cranes, the transport of electricity transformers to the site, and equipment to place the transformers on their plinths.

Vegetation removal will be required to facilitate the works. The removal of hedgerows, treelines or scrub vegetation will not take place from March to August inclusive having regard to the Wildlife Act 1976 S.I. No. 39/1976., as amended (unless a suitably experienced ecologist has determined that nesting birds are absent or otherwise protected from injury or disturbance). Where possible, vegetation will be re-instated and habitat enhancement incorporated on completion of the works.

The number of construction workers anticipated to be employed during the construction phase is expected to peak at approximately 100 persons for the converter station. Crew sizes for the installation of the cable routes are estimated at approximately 10 persons per crew.

Subsequent to the grant of statutory approvals, it is anticipated that construction of the converter station, including enabling works and equipment installation, will take approximately 36 months, with the construction phase commencing in Q4 2022 and construction works anticipated to commence in Q1 2023. Installation of the land cables is anticipated to take approximately 24 months. Overall, construction of the Celtic Interconnector project is currently anticipated to be complete by 2026. Thereafter, there will be a number of months of testing and commissioning prior to full energisation of the Interconnector. Safety requirements for the installation operations / procedures and weather conditions will however ultimately dictate the final programme.

In respect of the connection point at Knockraha substation, this will require the provision of three operational transformers, and one spare transformer, to transform the HVAC electrical power from 400 kV to 220 kV which is the operating voltage of the substation. In addition, other electrical apparatus and equipment will be constructed within the substation, including lightning protection masts.

EirGrid PLC will ultimately own the Celtic Interconnector, while ESB will own the transmission asset infrastructure within Knockraha substation.

3.2 Ireland Offshore Element of the Overall Celtic Interconnector Project

This section presents an overview of the Ireland Offshore element of the overall Celtic Interconnector project, including the proposed development of the landfall below the HWM. A more detailed description of this element of the overall project is provided in Volume 3D2.

As noted above, the subsea cable will connect to the onshore cable at the Transmission Joint Bay (TJB) north of the car park at Claycastle Beach. The HVDC subsea cables will be buried within conduits beneath the beach and car park at Claycastle Beach. The cables will be pulled

ashore through the conduits and into the TJB by a temporary winch. Once the cable is secured in the TJB, the offshore cable lay and burial process will commence. For this, a plough / jetter will be transferred to the beach to bury the cable seaward.

The cable landfall installation method selected for Claycastle Beach is an open cut installation method to be constructed in two phases.

Phase 1 of the installation involves the installation of conduits within a trench excavated across the beach and extending across an existing car park located above the beach to the area of the TJB. Two options are proposed for these works:-

1. Install the conduits almost to the Lowest Astronomical Tide (LAT) level. This minimises disruption to the beach during the high amenity season as these works can be carried out in the winter season; however, they involve a significant construction effort as a causeway and extensive cofferdam piling are required. This activity is expected to take up to 10 weeks.
2. Install the conduits for a shorter distance below the beach. This significantly reduces the construction effort, as in particular there would be no requirement for a causeway and the extent of cofferdam piling would be minimal, thereby reducing associated construction noise and traffic. This option would result in a short duration (approximately seven days in total) public exclusion from a 50m corridor of the beach for the installation of each of the two cables, with pedestrian diversions on the beach during the cable installation (the works might occur in the high amenity season). However, the car park would remain fully accessible, and would facilitate the diversion around the exclusion zone.

Phase 2 of the installation sequence involves pull-in of the submarine cables through the pre-installed conduits and into the TJB using a cable winch. The specific location of the receiver pit will vary between Option 1 and Option 2; however, all other activities are similar between the two options.

Temporary laydown areas and a construction compound will be required along the beach, in the car park, and on the section of grass which separates the car park from the year-round holiday park for the installation of the onshore trench, the TJB and the winch platform.

The offshore cable route through the Irish Territorial Waters is approximately 34km, and 117km in the Irish EEZ. The offshore works involve a number of vessels (survey vessels, cable lay vessels and support vessels). The installation of the submarine cable will typically follow the general sequence below:

- Contractor survey, route engineering and finalisation;
- Unexploded Ordnance (UXO) intervention campaign;
- Boulder clearance;
- Sandwave pre-sweeping (not required in Irish Territorial waters or Irish EEZ);
- Pre-lay grapnel runs;
- Construction of infrastructure crossings;
- Pre-lay route survey;
- Cable lay;
- Post-lay survey;
- Cable burial;
- External / Secondary protection; and
- Post-burial survey.

The first activity of the offshore works will be the pre-lay survey expected to last 28 days in Irish waters and performed well in advance of the main construction activity. The preparatory works

will be carried out in advance of cable lay for approximately 30 days in Irish TW and EEZ. Offshore Cable installation is envisaged using standard burial tools (plough or a mechanical trenching tool). There is approximately 34km of the marine route in the Irish EEZ (Kilometre Point (KP) 57.5 to KP 90.7) that has more challenging strata, consisting of underling chalk. Sections of this route may pose a challenge to cable burial using standard burial tools and may require the use of specialist rock cutting tools for trenching. The overall schedule for cable lay and burial in Irish Territorial Waters and EEZ excluding weather or mechanical damage stand by is 60 days.

A rock placement vessel, only if required in the Irish EEZ, will follow cable installation and be required in Irish TW and EEZ for up to 16 days.

3.3 UK Offshore Element of the Overall Celtic Interconnector Project.

The cable route through the UK EEZ is approximately 211 km and does not enter the Territorial Waters of the UK. The installation of the submarine cables will follow the same approach and processes as described above for the Ireland Offshore elements of the project, and will require a marine licence.

The first activity will be the pre-lay survey expected to last 40 days in the UK EEZ. There is approximately 120km of the marine route in the UK EEZ (KP 185.0 to KP 305.0) that has a relatively challenging strata, consisting of underling chalk. Sections of this route may pose a challenge to cable burial using standard burial tools and may require the use of specialist rock cutting tools for trenching. The overall schedule for cable lay and burial in UK EEZ excluding weather or mechanical damage stand by is 139 days.

3.4 French Offshore Element of the Overall Celtic Interconnector Project

The cable route within French waters covers approximately 48km of French Territorial Waters, and 87km of the French EEZ. The installation of the cable will follow the same approach and processes as described above for the UK Offshore elements of the project.

3.5 French Onshore Element of the Overall Celtic Interconnector Project

The French onshore UGC route is located between the landfall point at Kerradénec in Cléder and the connection point at the existing substation at La Martyre. Volume 5, the Joint Environmental Report (JER) provides a detailed description of the French Onshore infrastructure, mapping and all associated environmental appraisals.

The UGC and associated infrastructure, as well as the nature and extent of the proposed converter station, are as per the description of the proposed Ireland Onshore developments.

The onshore HVDC cable corridor in France is proposed to follow generally a North – South direction from Kerradénec to the converter station location near La Martyre. No town or settlement centres are traversed by the cable route although there are some residential and commercial buildings that are mainly related to agricultural activities such as greenhouses, livestock buildings and farms. The UGC extends southwards from the geographical area of the "Roscoff onion" towards the Elorn. In this region, agricultural activities are more oriented towards livestock farming and tillage. A number of businesses and service providers are located in the villages near the study area. Industrial and economic infrastructure is mainly located in the nearby major cities: Plouescat, Landivisiau, Landerneau and Brest. The Landivisiau naval aviation base extends over the municipalities of Bodilis, Saint-Servais, Saint-Derrien, Plougar and Plounéventer and is an intermittent source of noise (aircraft). There is a working quarry to the South of the Elorn.

4 EIAR Methodology

4.1 Introduction

Environmental Impact Assessment (EIA) Directive 2011/92/EU on the assessment of the effects of certain public and private projects as amended by Directive 2014/52/EU (hereafter termed 'the amended EIA Directive') defines EIA as a process consisting of:

1. The preparation of an Environmental Impact Assessment Report (EIAR) by the developer;
2. The carrying out of consultations;
3. The examination by the competent authority of the EIAR, any supplementary information provided by the developer (where necessary) and relevant information received through consultations with the public, prescribed bodies and any affected Member States;
4. The reasoned conclusion of the competent authority on the significant effects of the project on the environment; and,
5. The integration of the competent authority's reasoned conclusion into any development consent decision.

This definition provides for a clear distinction between the process of EIA to be carried out by the competent authority and the preparation by the developer of an EIAR.

The Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports [Environmental Protection Agency (EPA), 2017], hereafter referred to as the EPA Draft Guidelines 2017 describe the EIAR as follows:

"The EIAR consists of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment. …The EIAR should be prepared at a stage in the design process where changes can still be made to avoid adverse effects. This often results in the modification of the project to avoid or reduce effects through redesign".

This chapter sets out the approach to this EIAR. For each assessment, a precautionary approach[2] has been applied whereby maximum design parameters based on realistic worst-case dimensions, orientations and components have been assessed. This approach ensures that the assessment will consider the greatest environmental impact (i.e. largest footprint, longest exposure, or highest dimensions depending on the topic). This approach is a resilient method where it may not be possible to identify the exact design parameters at this stage within the final design, thereby accommodating flexibility in design and construction whilst ensuring maximum extents and ranges are assessed in this EIAR.

The technical chapters of this EIAR provide further topic specific details of the methodologies applied in the preparation of this EIAR.

4.2 EIA Directive

The amended EIA Directive requires that the EIAR provides:

"A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as

[2] Principle adopted by the UN Conference on the Environment and Development (1992) states that in order to protect the environment, a precautionary approach should be widely applied, meaning that where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.(Definition from European Commission: (europa.eu))

natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge".

Article 3(1) states that the EIA shall:

"Identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the project on the following factors:

A. Population and human health;
B. Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
C. Land, soil, water and climate;
D. Material assets, cultural heritage and landscape; and
E. The interaction between the factors referred to in points (a) to (d)".

Article 5 states that an EIAR shall include at least:

1. "A description of the project comprising information of the site, design, size and other relevant features of the project;
2. A description of the likely significant effects of the project on the environment;
3. A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce, and if possible, offset likely significant adverse effects on the environment;
4. A description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
5. A non-technical summary of the information referred to in (a) to (d); and
6. Any additional information specified in annex iv relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected".

Annex IV requires;

"The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the project. The description should take into account the environmental protection objectives established at Union or member State level which are relevant to the project".

In addition, Annex IV requires:

"A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved".

4.3 EIA Screening

Screening is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory legislative threshold requirements or by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment.

Annex I to the amended EIA Directive 2014/52/EU requires as mandatory the preparation of an EIA for all projects listed therein. Projects listed in Annex II to the Directive are not automatically subjected to EIA. Member States can decide to subject them to an assessment on a case-by-

case basis or according to thresholds and/or criteria (for example size), location (sensitive ecological areas in particular) and potential impact (surface affected, duration).

The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) amended the Planning and Development Act 2000 and the Planning and Development Regulations 2001 in order to transpose into Irish Law the provisions of Directive 2014/52/EU.

In Ireland, Schedule 5 (Part 1 and Part 2) of the Planning and Development Regulations 2001, as amended, transposes Annex I and Annex II to amended EIA Directive 2014/52/EU. The Celtic Interconnector is not of a type described by either Part 1 or Part 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended.

Notwithstanding this, however, following pre-application consultation between EirGrid and the Irish Competent Authorities for the onshore element (An Bord Pleanála / ABP) and the offshore element (the Foreshore Unit of the Department of Housing, Local Government and Heritage) of the project, EirGrid has decided that EIARs will accompany the separate consent applications to assist the Irish Competent Authorities (An Bord Pleanála for the Ireland Onshore element, and the Minister for Housing, Local Government and Heritage for the Ireland Offshore element) in carrying out EIA for these project elements.

In contrast, key project elements within the French jurisdictional area are required under French implementing law to undergo EIA. As such, an EIAR has been prepared for the French onshore and French offshore project elements.

As noted previously in this section and elsewhere, the UK MMO has screened out the requirement for EIA in respect of that project element within the UK EEZ.

4.4 EIA Scoping

Scoping is the process of identifying the significant issues which should be addressed by a particular impact assessment as well as the means or methods of carrying out the assessment. Scoping of an EIAR is voluntary for a developer and, as outlined in the EPA Draft Guidelines 2017, scoping can also be an informal process.

The advancement and refinement of the proposed development has followed a systematic and iterative process of assessment and engagement.

As part of EirGrid's Development Framework, described in Volume 2A *Planning Report* of this consent application and Chapter 1 of Volume 3C2 *Alternatives Considered* of this EIAR, the collation and assessment of environmental data were essentially linked to the refinement of the project, including inputs from key stakeholders and engagement with the general public, as outlined in Volume 2B and Chapter 1 of Volume 3C2 *Alternatives Considered* (onshore) and Chapter 7 of Volume 3D2 *Alternatives Considered* (offshore).

Throughout the preparation of the EIARs, the design of the proposed development has been revised and refined to take account of the findings of studies and surveys and from public consultation and stakeholder feedback which have brought the design from initial design to the proposed design. This has also included ongoing consultation and engagement with the various Competent Authorities and other Prescribed Bodies.

Informal scoping of these documents was carried out by a team of environmental specialists working in close collaboration with design engineers, and EirGrid / RTE as joint project promoters, as part of an iterative design and consultation process, which also considered the potential for alternative approaches and techniques. Where appropriate these alternatives became part of the proposed design.

This scoping has continued throughout the environmental appraisal process and the overall project design and scope of work has been amended appropriately in light of any key issues identified or new information gathered from consultation or as a result of design changes which have subsequently been addressed in this EIAR. This is addressed in more detail in the Consideration of Alternatives within each Volume of the EIARs.

4.5 EIAR Methodology

4.5.1 Regulations and Guidelines

Volume 3C2 of this EIAR has been prepared in line with the Planning and Development Act, 2000 S.I. No. 30/2000, as amended, and associated Regulations having regard to the following guidelines.

- The EPA Draft Guidelines 2017;
- Environmental Protection Agency (EPA) Advice Notes for Preparing Environmental Impact Statements (Draft 2015);
- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment; and
- European Commission Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU), 2017.

Further specific reference documents are cited within the technical chapters of this EIAR, as appropriate.

4.5.2 Baseline Environment

The baseline environment describes the current state of environmental characteristics, detailing the condition, sensitivity and significance of relevant environmental factors which are likely to be significantly affected by the proposals.

The amended EIA Directive also requires consideration of the likely future receiving environment in the absence of the project, refer to Section 4.5.9 *Do-Nothing Effects*:

“A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge”.

4.5.3 Temporal and Spatial Scope

The duration of effects will be described for each technical chapter of this EIAR.

Spatial (or geographical) scope refers to the area over which the EIAR considers effects. The environmental sensitivity of the surrounding geographical areas and the establishment of source-pathway-receptor linkages (i.e. the zones of influence) will determine the extent of the area to be assessed as part of the EIAR. This is defined in each of the technical chapters of the EIAR.

4.5.4 Identification of Potential Receptors

A receptor is defined in the EPA Draft Guidelines 2017 as *“any element in the environment which is subject to impacts”.*

The environmental effect will depend on the spatial relationship between the source and the receptor with some receptors being more sensitive than others to particular environmental effects. Topic specific receptors will be identified in each technical chapter.

4.5.5 Identification of Likely Significant Impacts

Where appropriate and unless otherwise stated, the evaluation of impacts on the environment has been evaluated according to the criteria outlined in Table 4.1 *Description of Effects* and as referenced in the EPA Draft Guidelines 2017.

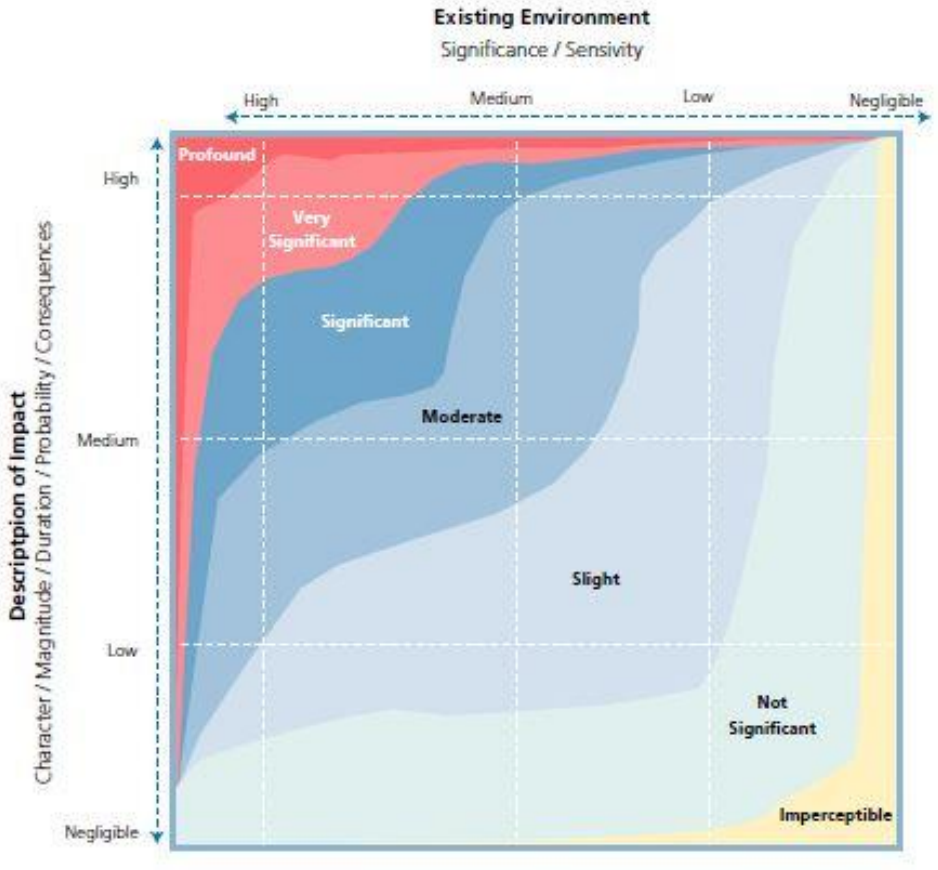
Table 4.1: Description of Effects

Category	Description of Effects
Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative/adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Describing the Significance of Effects 'Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see Determining Significance below.).	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.

Category	Description of Effects
– so that the CA can take a view of the balance of risk over advantage when making a decision.	**Unlikely Effects** The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting less than a day
	Temporary Effects Effects lasting less than a year
	Short-term Effects Effects lasting one to seven years.
	Medium-term Effects Effects lasting seven to fifteen years
	Long-term Effects Effects lasting fifteen to sixty years
	Permanent Effects Effects lasting over sixty years
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Describing the Types of Effects	**Indirect Effects (a.k.a. Secondary Effects)** Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do-Nothing Effects' The environment as it would be in the future should the subject project not be carried out.
	`Worst case' Effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects When the full consequences of a change in the environment cannot be described.
	Irreversible Effects When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

The significance of a potential impact is defined by the sensitivity of the receiving environment and the character of the predicted impact as shown in Figure 4.1. In some cases, magnitude or significance cannot be quantified with certainty, and in these cases professional judgement remains the most effective way to identify the significance of an impact. Where significant adverse effects are likely, mitigation to offset those impacts is required.

Figure 4.1: Impact Assessment Methodology



Source: EPA Draft Guidelines 2017

4.5.6 Mitigation and Monitoring

Embedded mitigation refers to those measures that have been incorporated into the design of the proposals. There are four established strategies for the additional mitigation of effects; avoidance, prevention, reduction and offsetting.

Additional mitigation measures and monitoring that have been proposed / implemented for each environmental topic are set out in the technical chapters in this EIAR.

4.5.7 Residual Impacts

Residual impacts that remain from the predicted impacts of the proposals once additional mitigation has been implemented are set out in the technical chapters in this EIAR.

4.5.8 Decommissioning

The operational life of the equipment and apparatus of the Celtic Interconnector is expected to be 40 years. Thereafter, it is assumed that the equipment will be decommissioned and replaced with new equipment.

The HVAC and HVDC cables will either be left in place or will be removed for recycling in accordance with the relevant waste management regulations in place when decommissioning takes place.

The activities associated with the decommissioning phase will be similar to those associated with the construction phase. Decommissioning impacts are however assessed for each technical chapter of this EIAR.

4.5.9 Do-Nothing Effects

As outlined in the EPA Draft Guidelines 2017 the description of Do-Nothing effects relates to '*the environment as it would be in the future should the subject project not be carried out'*.

In the context of the Celtic Interconnector Project, non-implementation would mean foregoing its benefits and slowing down the development of renewable energy required to combat climate change. Alternative development could occur at the proposed site of the converter station compound within IDA owned lands at Ballyadam in County Cork, given that the site is zoned for industrial (employment related) use in the current Cork County Development Plan 2014.

The Do-nothing scenario is however considered for each technical chapter of this EIAR.

4.5.10 Cumulative Effects

Cumulative effects take account of the addition of many minor or significant effects to create larger, more significant effects.

As outlined in the EPA Draft Guidelines 2017, while a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or significant), result in a cumulative impact that is collectively significant. A single effect which may, on its own, have a significant effect, may also have a reduced and insignificant impact when combined with other effects.

Having regard for relevant guidance in other jurisdictions (The Planning Inspectorate for England and Wales, 2019[3]), a tiered approach has been taken to the identification of other projects, where the level of information likely to be available decreases from tier 1 to tier 3, as detailed below and in Table 4.2.

1. Tier 1:
   a. Developments that are under construction.
   b. Permitted applications, not yet implemented.
   c. Submitted applications, not yet determined.
2. Tier 2
   a. Development identified in Cork County Development Plan 2014 and the Draft Cork County Development Plan 2022 - 2028 and associated Local Area Plans (LAP's).
3. Tier 3
   a. Development identified in other framework plans and programmes for future development consents / approvals, where such development is likely to occur.

[3] Advice-note-17V4.pdf (planninginspectorate.gov.uk)

For each technical topic, the nature and scale of the other development has been evaluated and the potential for temporal overlap within the topic-specific zone of influence (ZoI) has been assessed, having regard to the potential for significant cumulative effects.

4.5.10.1 Intra-Project Effects

Intra-Project effects refer to the combined impacts of the Ireland onshore proposed development and other elements of the Celtic Interconnector project within the shared ZoI.

All activities associated with the construction and operation and decommissioning of the Celtic Interconnector were assessed for the likely significant cumulative effects within the topic specific ZoI. Where likely significant cumulative effects are identified, discussion is provided on the contribution of the Celtic Interconnector (as a whole) to that cumulative effect.

Given the level of information available to inform the assessment, other elements of the Celtic Interconnector project are Tier 1. Information on the cumulative impacts of the Celtic interconnector project (as a whole) is provided in the cumulative effects sections of Volume 3C2.

4.5.10.2 Other Developments

Subject to consents being granted, it is anticipated that the construction phase of the Celtic Interconnector will commence in Q4 2022, with construction complete in 2026.

Table 4.2 includes a non-exhaustive list of other existing and / or approved development and other known planned development considered in this EIAR.

Other existing operational developments have been assessed as part of the baseline evaluation in this EIAR. EirGrid has engaged, and will continue to engage, with the proponents of the other developments detailed throughout the development of the Celtic Interconnector project to ensure a co-ordinated approach to the minimisation of environmental impacts.

4.5.11 Transboundary Effects

Certain environmental effects of a proposed development have the potential to cross state boundaries and have a ‘transboundary effect’.

The need to consider transboundary impacts has been enshrined in the United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, adopted in 1991 (the Espoo Convention). The Espoo Convention has been ratified by the European Union, Ireland and the United Kingdom of Great Britain and Northern Ireland. Under the amended EIA Directive, the likely significant transboundary effects of a proposed development must be described.

All activities associated with the construction, operation and decommissioning of the proposed development were assessed for the likely significant transboundary effects and these are detailed in Volume 3C2.

4.5.12 Interactions between Environmental Factors

Interactions between effects may arise from the reaction between effects of the Celtic Interconnector on different aspects of the environment which may exacerbate the magnitude of those effects. These are presented in Volume 3C2.

Table 4.2: Cumulative Effects (Other Developments)

Development	Tier	Reference (planning/ other)	Location	Summary of Details
Youghal to Midleton Greenway	1a	Part 8 Planning[4]	The Greenway will be largely developed along the disused railway line between Youghal and Midleton	At the time of writing this EIAR the Greenway was under construction with vegetation clearance having been carried out in places. The Greenway will be a shared-use path for walkers and cyclists for leisure and visitor use and will incorporate landscaping, signage and associated amenities and all ancillary works. The Greenway will be in operation during the construction phase of the Celtic Interconnector. The proposed HVDC cable route will cross the Greenway at a number of points along the route. Engagement with Cork County Council will continue to ensure that impacts are minimised.
Youghal Eco Boardwalk	1	Youghal Eco Boardwalk[5]	The wooden boardwalk will be developed between the western section of the car park at Claycastle Beach and the Youghal Quality Hotel at Redbarn. The footprint is entirely on the Summerfield / Redbarn sand shoreline (and shingle strandline).	At the time of writing this EIAR the Boardwalk was under construction. The Boardwalk will be in operation during the construction phase of the Celtic Interconnector. The proposed submarine cable route will traverse to the east of the boardwalk. Engagement with Cork County Council will continue to ensure that impacts are minimised.
Proposed new 110kV substation and associated works	1	VC04.309585	North-eastern of overall IDA owned lands at Ballyadam	ESB Networks (ESBN) propose to construct a 110kV substation compound adjacent to (the east of) the proposed converter station compound at Ballyadam. The proposed substation is not associated in any way with the proposed development of the Celtic Interconnector project. Prior to commencement of construction and during the construction phase engagement between EirGrid and ESBN will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Various on IDA Lands at Ballyadam	3	Not Applicable	IDA owned lands at Ballyadam	Although there were no definitive projects or plans at the time of writing this EIAR, other than the proposed ESBN substation detailed above, land-use zoning and IDA ownership renders it possible that other developments within the wider Ballyadam site will be developed and that these may have cumulative effects. In facilitating future development, the IDA is also likely to develop internal access roads and utility connections for the wider Ballyadam site.

[4] Closed Part 8 Development Consultation | Cork County (corkcoco.ie)

[5] Youghal Eco-Boardwalk Extension Works Get Underway | Cork County (corkcoco.ie)

Development	Tier	Reference (planning/ other)	Location	Summary of Details
				As the nature of these projects and plans are not known, the associated cumulative impacts cannot be assessed. The proposed converter station compound, and associated infrastructure including drainage and access have however been developed independently of these other potential future proposals. The design of which can readily connect into such proposals in the future without affecting the conclusions of this EIAR. Engagement with the IDA will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
N25 Carrigtwohill to Midleton scheme	2	N25 Carrigtwohill to Midleton scheme[6]	South and south west of the proposed converter station site at Ballyadam. Includes a proposed new interchange to the south/south west of the converter station site at Ballyadam	The Cork Roads Design Office (RDO) in liaison with Transport Infrastructure Ireland (TII) is currently planning the upgrading of the part of the existing N25 between Carrigtwohill and Midleton, including that portion which adjoins the proposed converter station site. This road project will involve the expansion of the existing road corridor to dual carriageway. A number of potential options affecting the wider IDA landholding at Ballyadam are currently being considered by the RDO, including the provision of a full dumb-bell interchange at Ballyadam, with associated slip roads, on the southern portion of the overall landholding. The options are available to view on the N25 Brochure published by Cork County Council's Roads Design Office (RDO) in October 2020. Similar to the Celtic Interconnector Project, this project is also included in Project Ireland 2040 and the National Development Plan 2018-2027. There is potential for an overlap in construction for the period of 2024-2026. Access to the proposed converter station compound, has been developed independent of this potential future development. The design can however readily connect into such proposals in the future without affecting the conclusions of this EIAR. Prior to commencement of construction and during the construction phase, engagement with the RDO and TII will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Urban Expansion Project	2	Part 8 planning is expected to be lodged in Q2 2021 for a	Between Midleton and Carrigtwohill	The urban expansion of the area to the northwest of the IDA owned site (which includes the proposed converter station) is planned to facilitate housing development.

[6] https://www.corkrdo.ie/major-schemes/n25-carrigtohill-midleton-transport-infrastructure-improvement-scheme/?utm_source=rss&utm_medium=rss&utm_campaign=n25-carrigtohill-midleton-transport-infrastructure-improvement-scheme

Development	Tier	Reference (planning/ other)	Location	Summary of Details
		services corridor for approximately 2,500 houses.		As well as residential development, the proposals will include cycling / pedestrian facilities, a new school campus and road upgrades. Prior to commencement of construction and during the construction phase, engagement with Cork County Council will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Waste water infrastructure (pump stations and network)	2	Pending Q1 2021	Between Midleton and Carrigtwohill	Irish Water (IW) has a growth project to construct new waste water infrastructure (pump stations and network) to connect Midleton and Carrigtwohill by Q4 2023. The proposed route is between Carrigane road and the Ballyadam bridge area, and this will overlap the proposed Celtic Interconnector HVDC cable route in places. Prior to commencement of construction and during the construction phase, engagement with IW will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Midleton Flood Relief Scheme	2	Midleton Flood Relief Scheme[7]	Midleton, including Water Rock and Ballinacurra.	This project is currently at options appraisal stage. A planning application is due to be submitted towards the end of 2021 and construction is due to commence in 2023. Prior to commencement of construction and during the construction phase engagement with Cork County Council and the Office of Public works (OPW) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised..
CP901 Kilbarry-Knockraha	1	Section 5 Exempted Development	Knockraha substation, adjacent to the proposed development	Renewal and refurbishment of the Kilbarry-Knockraha 110 kV overhead transmission line. The majority of the works associated with this project will be carried out outside the ZoI of the Celtic Interconnector project. As the proponents of both projects EirGrid will ensure that where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Ballyadam 110 kV Substation	2	Not Applicable	Ballyadam, adjacent to the proposed development	The Electricity Supply Board (ESB) proposes to construct a new 110 kV substation immediately to the east of the proposed converter station compound, within the IDA-owned Ballyadam site.

[7] Flood Relief Schemes | Cork County (corkcoco.ie)

Development	Tier	Reference (planning/ other)	Location	Summary of Details
				Prior to commencement of construction and during the construction phase engagement with the ESB will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Statkraft (Lightsource) Solar Farm	1	Cork County Council 175370 An Bord Pleanála PL04 .300434	Ballyvatta and Clash, Knockraha, Leamlara, Co. Cork	This project relates to a solar farm to be constructed approximately 2km north east of Knockraha substation. Lightsource BP was granted consent, on appeal to An Bord Pleanála on 19 July 2018. The solar farm project was acquired by Statkraft Ireland in 2020. Prior to commencement of construction and during the construction phase engagement with the proponents will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Inis Ealga Marine Energy Park	2	Inis Ealga Marine Energy Park[8]	Offshore; approximately 54km in width stretching from Dungarvan, Co. Waterford to Cork Harbour, Co. Cork	This project relates to an offshore floating wind energy project off the coast of Cork which is at an early stage of development. There is an intersection between the submarine cable route of the Celtic Interconnector and the indicative installation corridor identified for the Inis Ealga Marine Park. Micro-siting of the anchors associated with the Inis Ealga Marine Energy Park would be required to avoid the proposed Celtic Interconnector. The onshore transmission connection proposals are not yet available.
Planning Applications	1	Various	Adjacent to the proposed development	A search of current and decided Strategic Infrastructure Development Applications, and Current Strategic Housing Development applications to An Bord Pleanála was carried out in May 2021. No relevant applications, other than the proposed ESBN substation development detailed above, were identified within the ZoI of the proposed development. A search of planning applications to Cork County Council was carried out in May 2021. The search did reveal a number of non-EIA planning applications related to dwellings and farm buildings along the proposed cables routes. Typically, these applications relate to extensions, demolition and construction of dwellings and installation of solar panels on roofs. The following applications are also noted:

[8] DP Energy – Inis Ealga

Development	Tier	Reference (planning/ other)	Location	Summary of Details
				• Planning reference 214465 in the townland of Killeena, Knockraha, approximately 160m east of the proposed construction compound at Knockraha relates to 1. Demolition of storage building, derelict buildings along with agricultural building, 2. Construction of following: A. Agricultural building for the storage of straw, agricultural machinery and ancillary dry goods, B. Agricultural building for straw bedded livestock housing and associated livestock crush facilities, C. Unroofed slatted slurry tank and unroofed manure store along with associated site works. • Planning reference 195608 in the townland of Garranes, and adjacent to section AC03-AC04 of the proposed HVAC cable route, relates to a proposed change of use from an existing dwelling to respite / residential accommodation. • Planning reference 155995 in the townland of Carrigogna, and adjacent to section DC01-DC02 of the proposed HVDC cable route, relates to the retirement of an existing 38 kV station to include; demolition of existing control building, removal of existing transformers, 1 no. mast and 2 no. electrical poles Prior to commencement of construction and during the construction phase engagement with the local communities along the proposed routes will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented, within the parameters assessed in this EIAR, including the scheduling of works and regular liaison meetings to ensure that plans are co-ordinated and impacts are minimised. No large scale developments were identified in proximity to the proposals as a result of the search, other than those identified previously.

Appendices

1. EIAR Competencies

Volume	Chapter	Chapter Heading	Competent Expert (Main Author/Peer Reviewer)
Volume 3C1	All	All	Volume 3C1 of the EIAR was prepared by: **Donna Hassett** (Mott MacDonald), Bsc. HDip, has over 21 years' experience carrying out environmental assessments. Donna manages statutory approval processes for large scale infrastructure developments in Ireland and internationally through consenting processes including EIA scoping and EIA screening, environmental constraints and route/site options analysis, EIARs and Planning and Environmental Considerations Reports (PECR). She also has a background in waste management and contaminated land assessment. Donna has prepared and peer reviewed numerous chapters of EIARs and has coordinated and delivered many environmental assessment reports and consent applications for transmission and power generation projects. She has also peer reviewed two EIARs/EISs and consent applications for electricity transmission interconnector projects. Donna has presented as an expert witness at the An Bord Pleanála oral hearings and is the lead consents co-ordinator for the Irish onshore (land) elements of the Celtic interconnector project. She authored the onshore Step 3 and Step 4 Reports which are referenced in the Alternatives Considered chapter of Volume 3C2.
Volume 3C1	All	All	Volume 3C1 of the EIAR was checked and approved by: **Gemma McCarthy** (Mott MacDonald), has 29 years of post-graduate experience across electrical transmission, distribution and public infrastructure projects, delivering roles in design, testing/commissioning and project management of major transmission projects in Ireland. Her experience spans the project life cycle, from concept design through feasibility assessment and study through outline, planning design, statutory consent, condition assessment, construction supervision, testing/commissioning through to QA of asset maintenance for substations, cables and overhead lines. She manages a team within Mott MacDonald Ireland's energy portfolio which delivers client engineering services to EirGrid, feasibility studies for new substations, HV cables and overhead lines, broader assessments such as the *Assessment of the Impacts of Climate Change on the Irish Transmission System*, statutory planning consents and specification development among others. **Tom Keane** (Mott MacDonald), BE, Chartered Engineer, Member of the Institute of Engineering and Technology, has 29 years' post graduate experience in the transmission and distribution industry working in various roles including as project manager, project director, lead designer and site resident engineer for many major transmission infrastructure projects in Ireland, and overseas. Tom has either project managed and / or lead the substation and cable design aspects of numerous consent applications for major electrical transmission projects.
Volume 3C2	1	Alternatives Considered	**Donna Hassett** (Mott MacDonald) as above
Volume 3C2	2	Description of the Onshore Development	**Donna Hassett** (Mott MacDonald) as above **Derek Monaghan** (Mott MacDonald), Principal Engineer/Project Manager for construction projects (International and domestic) across several sectors for Mott MacDonald. Over 20 years' experience in the construction industry in Ireland, UK, Norway, United Arab Emirates and America. Experience of bringing projects throughout the projects life cycles from concept through to detailed design, site supervision and asset management. Have worked for both Consultant and Contractor and have experience numerous sectors including rail, highways, bridge, water, education, sports, health, residential, conservation, commercial, hotel, defence, and airports. **Denis McCormack** (Mott MacDonald), Principal Engineer and Chartered Electrical Engineer with over 20 years' experience in the Transmission and Distribution sector. Denis has fulfilled various project roles including Lead Design Engineer, Project Manager, Owners Engineer and Team Leader. His project portfolio includes HV underground cable schemes, HV transmission lines, HV substations and HV submarine cable schemes. Denis has been a key contributor to several recent EirGrid projects. In the recent

Volume	Chapter	Chapter Heading	Competent Expert (Main Author/Peer Reviewer)
			past, he has provided design support to National Grid in the UK and he is also familiar with Australian design codes having worked on various projects for Transgrid in his early career.
Volume 3C2	3	Onshore Construction Phase Activities	**Donna Hassett** (Mott MacDonald) as above **Derek Monaghan** (Mott MacDonald) as above, **Denis McCormack** (Mott MacDonald) as above,
Volume 3C2	4	Population and Human Health	**Donna Hassett** (Mott MacDonald) as above **Dr. William H. Bailey** (Exponent) specialises in applying state-of-the-art assessment methods to environmental health issues. His training and experience include laboratory and epidemiologic research, health risk assessment, and comprehensive exposure analysis. Dr. Bailey has investigated exposures to alternating current and direct current electric and magnetic fields from overhead power lines and submarine cables across North America and has served as an advisor to numerous state, provincial, and federal agencies as well as multiple international health and scientific organisations.
Volume 3C2	5	Air Quality and Climate	**Christopher Mills** is Mott MacDonald's Air Quality discipline lead. He has 13 years' experience undertaking and leading air quality assessments on major road infrastructure projects globally including in Ireland. He is a member of the Institute of Air Quality Management (MIAQM) and the Institute of Environmental Sciences (MIES) and he holds a degree in Environmental Science and a Masters in Air Pollution Management and Control. Recently, Christopher has been the technical lead for the air quality assessment of a number of major highway schemes in England and represented them at their respective Oral Hearings. Within Ireland, Chris has been the technical lead on a number of power projects, and is responsible for the production of relevant assessments for required EIA's and PPC Licence applications. Chris was the technical lead for the air quality assessment for the Celtic Interconnector project. **Alex Greenwood** is an MSc qualified Chartered Environmentalist specialising in carbon management and assessment, a Member of the Institute of Environmental Management & Assessment (IEMA) with over 12 years' environmental assessment experience. She has multi-sector experience, including working on major transport and power sector projects. Alex has considerable experience of delivering and reviewing climate mitigation assessments, as well as in data management and assessment for carbon footprinting and managing carbon reduction. Alex was the technical lead for the climate assessment for the Celtic Interconnector project.
Volume 3C2	6	Land, Soils and Hydrogeology	**Dr Aidan Foley** (Principal hydrogeologist, Mott MacDonald), has twenty years' experience in groundwater science, specialising in karst aquifers, hydrochemistry, contaminant transport, groundwater/surface water interaction, geomorphology, catchment management and hydrogeological risk assessment and EIA, including the provision of expert witness services. Aidan has been the technical lead on the hydrogeological studies of the karst limestone hydrogeology at the Ballyadam converter station site, contributed to understanding and managing geotechnical risks associated with karst, and extended these inputs to the wider post-landfall cable route. Aidan has represented York City Council in Public Inquiry, sits on the English Environment Tribunal, and has acted as an expert witness in several contaminated land court cases. **Alex Crow** (Senior hydrogeologist), is a Chartered Geologist with ten years' experience working primarily on the application of hydrogeology to engineering major infrastructure projects, and water resources. He has conducted many EIA studies including for major linear infrastructure projects such as the ongoing HS2 high speed railway and the Lincoln to Ancaster water transfer pipeline developments. He specialises in engineering hydrogeology and embedded and bespoke mitigation requirements for infrastructure such as the Celtic Interconnector project.
Volume 3C2	7	Surface Water, including Flood Risk	**Donna Hassett** (Mott MacDonald) as above **Aidan Foley** (Mott MacDonald), as above

Volume	Chapter	Chapter Heading	Competent Expert (Main Author/Peer Reviewer)
			David Murphy (Mott MacDonald) (CEng MIEI) is a Chartered Civil Engineer with 15 years' post-graduate experience in the engineering design and management of water and wastewater utility projects in addition to the civil aspects of multi-discipline projects (buildings, highways, rail, power generation and transmission). He is experienced in leading design teams through all project stages from concept stage, through consenting processes, to detailed design and construction. David's project experience includes detailed design of storm and foul water drainage networks, pumping stations, attenuation, SuDS and on-site treatment, along with design of civil ancillaries such as ground works and landscaping, access roads, fencing, and utilities. David also has hydraulic modelling experience using various industry standard drainage design software (incl. MicroDrainage and InfoWorks). **Laurence Cload** (Mott MacDonald) (MEng, MICE) is a Chartered Civil Engineer with over 20 years' experience of assessing flood risk to structures throughout the UK, Ireland and overseas. He has managed and design small and multi-million pound coastal and river flood defence schemes assessing projects for a variety of sectors including local authorities, environmental agencies, highways, railways and power distribution. Laurence is experienced in 1D and 2D hydraulic modelling and the application of model results to detailed design and has presented expert witness evidence in the hydraulic design of flood alleviation schemes.
Volume 3C2	8	Biodiversity	**Dr Erin Johnston** (Senior Ecologist, Mott MacDonald). Erin is an Ecologist with eight years of post-graduate experience including three years in malacological research and four years in Ecological consultancy. She has prepared Ecological Impact Assessments, and Appropriate Assessments Screening Reports (Habitat Regulations Assessment Report) for a variety of projects. Erin has experience carrying out field surveys for protected gastropods, along with vegetation, extended phase 1 habitat surveys, and targeted invasive species surveys. Other protected species surveys Erin has experience of include smooth newt, crayfish, badger, otter, marsh fritillary and bats. **Roger Macnaughton** (Principal Ecologist. Mott MacDonald). Roger is a qualified and experienced environmental consultant specialising in ecology. He has over eighteen year's professional experience in the environmental consultancy sector and an additional seven years of primarily research-based experience in freshwater and marine ecology. He specialises in the delivery of Ecological Impact Assessment (EcIA) and Appropriate Assessment (AA) for a broad range of projects potentially affecting; terrestrial, freshwater and marine ecology. His project related experience to date includes; two 400kV overhead lines, five 110kV overhead lines, overhead line up-rates, electricity substations, underground power cables, 35 terrestrial wind farms, two marine wind farms and five solar farms.
Volume 3C2	9	Landscape	**Richard Barker** (Landscape and Visual Specialist, MacroWorks) MLA. PG Dip Forestry. BA Env. MILI has 22 years of experience working as a land use planner and Landscape Architect with the last 16 years specifically dedicated to landscape and visual impact assessment of commercial and infrastructure development projects. Much of Richard's experience relates to renewable energy having personally assessed over 100 wind energy projects and a similar number of solar projects. He also has a broad range of experience assessing other forms of water, road and electrical linear infrastructure projects many of which were classified as Strategic Infrastructure Development (SID). Consequently, Richard has presented expert witness evidence at more than a dozen An Bord Pleanála Oral Hearings.
Volume 3C2	10	Archaeology and Cultural Heritage	**Teresa Bolger** (Cultural Heritage, Rubicon Heritage) MSc MPhil MIAI has over 20 years' experience as a licence-eligible archaeologist, directing and managing a range of both urban and rural archaeological projects in the consultancy sector, dealing with high profile clients such as the Transport Infrastructure Ireland, Grangegorman Development Agency and EirGrid. Teresa is Consultancy Manager with Rubicon Heritage Services overseeing the delivery of all pre-planning archaeological services including desk-based assessments, archaeological impact assessments, constraints studies, options appraisals, EIAR screening and archaeology/cultural heritage chapters as well as general design team services (including acting as Project Archaeologist).

Volume	Chapter	Chapter Heading	Competent Expert (Main Author/Peer Reviewer)
			Teresa has amassed a significant archaeological publication record and is closely involved in all current publication projects within the company. She is particularly interested in the archaeology of the early medieval period, especially interdisciplinary approaches including contemporary historical sources and has contributed targeted historical research to many projects. In addition, Teresa has served on the board of the Institute of Archaeologists of Ireland (IAI) from 2006-2012 and on the council of the Discovery Programme from 2009–2014. Currently she represents IAI on the Fingal Heritage Forum. Teresa has contributed to, prepared (as lead author) and peer-reviewed numerous impact assessment reports and EIAR chapters for many types of infrastructural projects including linear infrastructure projects and those relating to power generation. She has also acted a Project Archaeologist on behalf of public sector clients. Teresa is the primary author for the Archaeology and Cultural Heritage Chapter and previously authored constraints studies for both the potential convertor station sites and terrestrial cable route.
Volume 3C2	11	Material Assets: Roads and Traffic	**John Dooley** (Mott MacDonald) (BA, FCILT, IEng MICE, MCIHT) is a Chartered professional and Projects Director for Mott MacDonald's Integrated Division, an experienced transportation planner/engineer and technical lecturer with more than 30 years' experience. John has led several high profile projects with responsibility for assessment of transport matters associated with power transmission lines, wind farms, power stations and associated infrastructure in the UK and overseas. He has provided dedicated traffic, transport and related advice for more than 50 power and energy projects internationally; covering a variety of aspects including principal author or peer reviewer roles with EIAR Chapters, ESIA Chapters, Road Safety Assessments, Construction Traffic Management Plans, Access & Logistics Studies and other measures to assist discharge of Planning Conditions. John has served at several public / legal hearings; including attendance at the Court of Session, Edinburgh as a lead transport witness, providing submission for the Public Inquiry covering Traffic and Transport and Access in support of the RWE Innogy Hemswell Wind Farm project and providing lead in-person evidence (representing Scottish Power Energy Networks) relating to traffic and transport at Extraordinary Council Committee Meeting held after South West Scotland Connections power transmission project was refused approval; the decision was subsequently overturned.
Volume 3C2	12	Material Assets: Built Services and Waste Management	**Donna Hassett** (Mott MacDonald) as above
Volume 3C2	13	Noise and Vibration	**Andrew Monk-Steel** (Principal Acoustic Engineer, Mott MacDonald), MSc BEng(Hons), Chartered Engineer, Member of the Institute of Acoustics has over 20 years' postgraduate experience in research and development in the field of noise and vibration within the automotive and rail industries, and the assessment of the environmental noise and vibration impacts particularly with regard to transportation, industrial, buildings and power and energy projects. Richard Perkins (Technical Director – Acoustics, Mott MacDonald), BEng(Hons) Chartered Engineer, Honorary Fellow of the Institute of Acoustics has over 25 years' experience in multi-disciplinary acoustics, noise & vibration consultancy. He has been the lead Acoustician on many high-profile transportation, buildings, industrial noise and environmental projects in the UK and abroad. He is an experienced Expert Witness at Public Inquiries and Development Consent Order hearings and was from 2003-2012 a technical advisor to the UK Government on Environmental and Neighbourhood Noise. Richard is member of two standing committees of the British Standards Institution (EH1/3 Noise and MCE16 Gas Turbine Noise).
Volume 3C2	14	Major Accidents and/or Disasters	**Denis McCormack** (Mott MacDonald), as above **Aidan Foley** (Mott MacDonald), as above

Volume	Chapter	Chapter Heading	Competent Expert (Main Author/Peer Reviewer)
			Laurence Cload (Mott MacDonald), as above
			Derek Monaghan (Mott MacDonald), as above
			John Dooley (Mott MacDonald), as above