Shannon Technology and Energy Park (STEP) 220kV Grid Connection

Volume 2 - Environmental Impact Assessment Report

July 2024

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 1 - Introduction

July 2024

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Abbreviations

AA	Appropriate Assessment
AADT	Annual average daily traffic
ABP	An Bord Pleanála
AEP	Annual Exceedance Probability
AFA	Areas for Further Assessment
AGI	Above Ground Installation
AMS	Archaeological Management Solutions
AOD	Above ordnance datum
AQS	Air quality standards
BESS	Battery energy storage system
BPM	Best Practicable Means
BS	British Standard
BSI	British Standard Institution
CBC	Common Bird Census
CBGM	Cement Bound Granular Mixture
CCAC	Climate Change Advisory Council
CCGT	Combined Cycle Gas Turbines
CCRA	Climate change risk assessment
CDP	County Development Plan
CEMP	Construction Environmental Management Plan
CFRAM	National Catchment-based Flood Risk assessment and Management
CIEEM	Chartered Institute of Ecology and Environmental Management
CMIP5	Coupled Model Intercomparison Project Phase 5
COP	Conference of Parties
CPO	Compulsory Purchase Order
CRTN	Calculation of Road Traffic Noise
CRWMP	Construction Resource Waste Management Plan
CSH	Cultural Heritage Site
CSO	Central Statistics Office
CTMP	Construction Traffic Management Plan
DAHGI	Department of Arts, Heritage, Gaeltacht and the Islands
DAHRRGA	Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
DEHLG	Department of Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
DIER	Database of Irish Excavation Reports
DSM	Digital Surface Model
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EnCoW	Environmental Clerk of Works
END	Environmental Noise Directive
ENR	Environmental Noise Regulations

ESAS	European Seabird at Sea
ESB	Electrical Supply Board
ESBN	Electricity Supply Board Networks
ETS	EU Emission Trading System
EU ETS	European Union’s Emissions Trading Scheme
Evs	Electric Vehicles
EWC	European Waste Classification
FRA	Flood Risk Assessment
GDSDS	Greater Dublin Strategic Drainage Study
GHG	Greenhouse gas
GIS	Gas-insulated substation
GIS	Geographic Information System
GNI	Gas Networks Ireland
GSI	Geological Survey Ireland
ATC	Automatic Traffic Counts
HDPE	High Density Polyethylene
HDV	Heavy Duty Vehicles
HFCs	Hydrofluorocarbons
HGV	Heavy Goods Vehicles
HMP	Habitat Management Plan
IAI	Institute of Archaeologists of Ireland
IAQM	Institute of air quality management
ICE	Institution of Civil Engineers
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IRR	an Individual Risk Receptor
ISAP	Irish Stone Axe Project
ITM	Irish Transverse Mercator
KCC	Kerry County Council
KER	Key Ecological Receptors
km	Kilometer
kV	Kilovolt
kWh	kilowatt-hour
LCA	Landscape Character Area
LCIM	Line Cable Interface Mast
LDV	Light Duty Vehicles
LECP	Local Economic and Community Plan
LEVs	Low-Emission Vehicles
LGV	Light Goods Vehicles
LIA	Local Impact Area
LNG	Liquefied Natural Gas
LVIA	Landscape and Visual Impact Assessment
MSW	Municipal solid waste
m	Metre

$MtCO_2e$	Million tonnes of CO2 equivalent
MW	Mega Watt
m2	Square metre
TM	Traffic Management
m3	Cubic metre
PIC	Personal Injury Collisions
KCDP	Kerry County Council Development Plan
RSA	Road Safety Authority
JTC	Junction and Turning Counts
NToM	National Transport Model
NAF	National Adaptation Framework
NBDC	National Biodiversity Data Centre
NDC	National Determined Contribution
NDC	Nationwide Data collection
NDP	National Development Plan
NHA	Natural Heritage Areas
NIAH	National Inventory of Architectural Heritage
NIFM	National Indicative Fluvial Mapping
NLS	National Landscape Strategy
NMI	National Museum of Ireland
NMS	National Monuments Service
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Road Authority
NMU	Non-motorised User
NSL	Noise Sensitive Locations
NSO	National Strategic Outcomes
OD	Ordnance Datum
OPW	Office of Public Works
OS	Ordnance Survey
PAB	Planning Application Boundary
pcy	Per calendar year
PE	Polyethylene
PFCs	Perfluorocarbons
pNHA	Proposed Natural Heritage Areas
PoMs	Programmes of Measures
PPE	Personal Protective Equipment
ppv	Part Per volume
PSCS	Project Supervisor Construction Stage
PSDP	Project Supervisor for the Design Process
RBD	Irish River Basin District
RBD	River Basin Districts
RBMP	River Basin Management Planning
RBMP	River Basin Management Plan

RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RSES	Regional Spatial and Economic Strategy
SAC	Special Area of Conservation
SI	Statutory Instrument
SID	Strategic Infrastructure Developments
SMR	Sites and Monuments Record
SPA	Special Protected Area
SPA	Special Protection Area
SPL	Sound Pressure Levels
SRA	Southern Regional Assembly
SRTM	Shuttle Radar Topography Mission
STEP	Shannon Technology and Energy Park
SUDs	Sustainable Urban Drainage Systems
TAO	Transmission Asset Owner
TII	Transport Infrastructure Ireland
TMP	Traffic Management Plan
TSO	Transmission System Operator
UNCBD	United Nations Convention on Biological Diversity
UNFCCC	United Nations Framework Convention on Climate Change
WFD	Water Framework Directive
WIA	Wider Impact Area
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility
TTA	Traffic and Transport Assessment

Contents

1 Introduction

1.1 General

Mott MacDonald Ireland Limited (Mott MacDonald) has been appointed by Shannon LNG Limited to prepare and lodge a planning application for the development of two new substations and a grid connection. The grid connection is between the proposed Shannon Technology and Energy Park (STEP) Power Plant located between Tarbert and Ballylongford, Co. Kerry and the existing Line Cable Interface Mast (LCIM) adjacent to the existing 220kV substation at Kilpaddoge, County Kerry.

Shannon LNG Limited (the Applicant) was awarded a capacity contract on 28 March 2023, from EirGrid, to deliver an urgently needed 400 MW of electricity generation capacity by no later than 01 October 2026. Therefore, Shannon LNG Limited (SLNG) have submitted a planning application (19 April 2024) to An Bord Pleanála (ABP case reference PA08.319566) for the Shannon Technology and Energy Park (STEP) Power Plant. The STEP Power Plant will consist of a Combined Cycle Gas Turbine (CCGT) gas-powered power plant capable of 600 MW of electricity generation, 120 MWhr Battery Energy Storage System (BESS), Above Ground Installation (AGI), and associated plant, equipment and infrastructure.

The STEP Power Plant is necessary to deliver Ireland's Climate Action Plan 2024 and support Ireland's intermittent renewable generation and help to resolve a predicted generation capacity shortfall. It will facilitate all remaining oil and coal fired power stations to be decommissioned and to be replaced with the efficient, fast responding Power Plant which is necessary to back up intermittent renewables. The STEP Power Plant will generate power for sale to the market supplied via the 220kV connection.

In addition to the awarded capacity contract for the Power Plant, an application to connect to the national electrical transmission network was submitted to EirGrid in September 2020. A Connection Agreement for a 600 MW Maximum Export Connection (MEC) was subsequently executed on 14 April 2023.

Once the 600 MW MEC Connection Agreement with EirGrid was executed on the 14 April 2023, the Applicant started the detailed design, route planning and environmental assessment of this 220kV grid connection. Therefore, this grid connection was segregated from the main STEP Power Plant application, as a standalone SID application. This also aligns with other Power Plant Grid Connection Applications e.g Hunstown and Kilshane Energy[1].

The main objective of the proposed development is to connect the STEP Power Plant to the national grid.

As part of the planning application, Mott MacDonald has prepared an Environmental Impact Assessment Report (EIAR) for the STEP 220kV Grid Connection project, hereafter referred to as the 'proposed development'.

1.2 The Applicant

Shannon LNG Limited, trading as Shannon LNG, having its registered address at 32 Molesworth Street, Dublin 2, D02 Y512, is a subsidiary of New Fortress Energy LLC (NASDAQ: NFE). Shannon Holdings Limited, a subsidiary of New Fortress Energy (NFE) purchased the 243 hectare (ha) site (referred to as the Tarbert Ballylongford Landbank) in December 2021, on

[1] https://www.pleanala.ie/en-ie/case/311528, https://www.pleanala.ie/en-ie/case/314894

which part of the proposed development will be located (2 Gas Insulated Switchgear (GIS) substations).

NFE is a global energy transition company with operations in 10 countries and is now at the forefront of green Hydrogen developments.

1.3 Background to the STEP Power Plant Facility

The STEP Power Plant facility includes the following elements:

- Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19 April 2024 (ABP-PA08.319566)[2].
- Two 220kV substations and two 220kV underground cable circuits between the Shannon Technology and Energy Park (STEP) Power Plant and the existing line cable interface mast adjacent to the existing Kilpaddoge Substation (the subject of this EIAR and the 'proposed development').
- Gas Pipeline – The previously consented 26 km Shannon Natural Gas Pipeline (Planning Reference: PL08.GA0003), once constructed, will facilitate transport of the natural gas between the Site and the national gas network at Foynes. Shannon LNG Limited obtained consent in February 2009 for Natural Gas Pipeline under Section 182C (1) of the Planning and Development (Strategic Infrastructure) Act 2006, as amended.

1.4 Pre-application Consultation with An Bord Pleanála

A pre-application meeting was undertaken with An Bord Pleanála (ABP-318119-23) on 1 December 2023. A letter was issued to ABP on 29 April 2024 to close the pre-application process. The Board served notice on 16 May 2024 (ABP-318119-23), and concluded that: under section 182E of the Planning and Development Act 2000, as amended, the proposed development would be strategic infrastructure and that any application for approval must therefore be made directly to ABP under section 182A(1) of the Planning and Development Act 2000, as amended.

The Board's Notice of 16 May 2024, included a list of prescribed bodies which have been notified of the application for the proposed development, these prescribed bodies being:

- Department of Planning and Local Government and Heritage (DPLGH).
- Minister of Environment, Climate and Communications.
- Kerry County Council (Kerry Co. Co.).
- Clare County Council (Clare Co. Co.).
- Transport Infrastructure Ireland (TII) / National Transport.
- An Chomhairle Ealaion (Arts Council).
- Heritage Council.

[2] The STEP power plant application (ABP-PA08.319566) included a GIS substation. This substation was called Knockfinglas GIS. However, after ABP-PA08.319566 was submitted, detailed design and technical discussions were held with Eirgrid. To ensure compliance with Eirgrid technical requirements for grid connections, Knockfinglas GIS needed to be slightly moved from where it was proposed in ABP-PA08.319566. The relocation is only about 150m. The proposed development (i.e. this application) now reflects the move of Knockfinglas GIS. Therefore, this proposed developed includes for two GIS substations: An Eirgrid GIS substation called Glansillagh GIS and the Knockfinglas GIS.

For completeness, Knockfinglas GIS as proposed in ABP-PA08.319566 will not be built, it will be built as located in this application. In summary, ABP-PA08.319566 assesses the impact of Knockfinglas GIS but this application also assesses Knockfinglas GIS, but at a slightly different location. As Knockfinglas GIS will only be built as shown in this application, no impact is excepted to ABP-PA08.319566.

- Failte Ireland.
- An Taisce.
- Southern Regional Assembly (SRA).
- Uisce Éireann.
- Inland Fisheries Ireland (IFI).
- Waterways Ireland.
- Department of Agriculture, Food and Marine (DAFM).
- Department of Tourism, Culture, Arts, Gael, Sports and Media (DTCAGSM).
- Health Service Executive (HSE).
- Health and Safety Authority (HSA).
- Commission for Regulation of Utilities (CRU).
- Office of Public Works (OPW).
- Electricity Supply Board (ESB).
- EirGrid.

Following the submission of the planning application to ABP, a website, containing the application materials will also be available for the duration of the planning process.

1.5 Overview of the Proposed Development

The proposed development will provide a connection (two 220kV cables and fibre optic cables) between the proposed STEP Power Plant via two substations (1No. onsite EirGrid/ESBN Gas Insulated Switchgear (GIS) substation (named Glansillagh) and 1No. SLNG GIS substation (named Knockfinglas)), and a connection point (a Line Cable Interface Mast (LCIM)) in the vicinity of the existing ESBN/EirGrid Kilpaddoge 220kV substation. The LCIM is part of the Kilpaddoge – Tarbert 220kV Circuit, which is located approximately 5km east of the proposed STEP facility. A 50 MVAr reactor will also be installed adjacent to the EirGrid GIS substation. A fibre optic line will be laid alongside the 220kV cables.

The cable route originating at the substations, will then be routed adjacent to the STEP facility access road, public road and private lands. The cable will be installed on STEP-owned lands, ca. 2.2km will be installed under public roadway (L-1010) with the last section located off road in private lands (the total off road sections are ca. 2.8km). Kerry County Council, or their subcontractors, will install the ducting and joint bays along the L-1010. Kerry Co. Co. are undertaking a widening scheme of the L-1010 road which is to be completed prior to the start of the main construction elements but may overlap with the enabling works, and is considered in the cumulative assessment of this EIAR. Following the installation of ducts, the cables will be pulled through the full length of ducting.

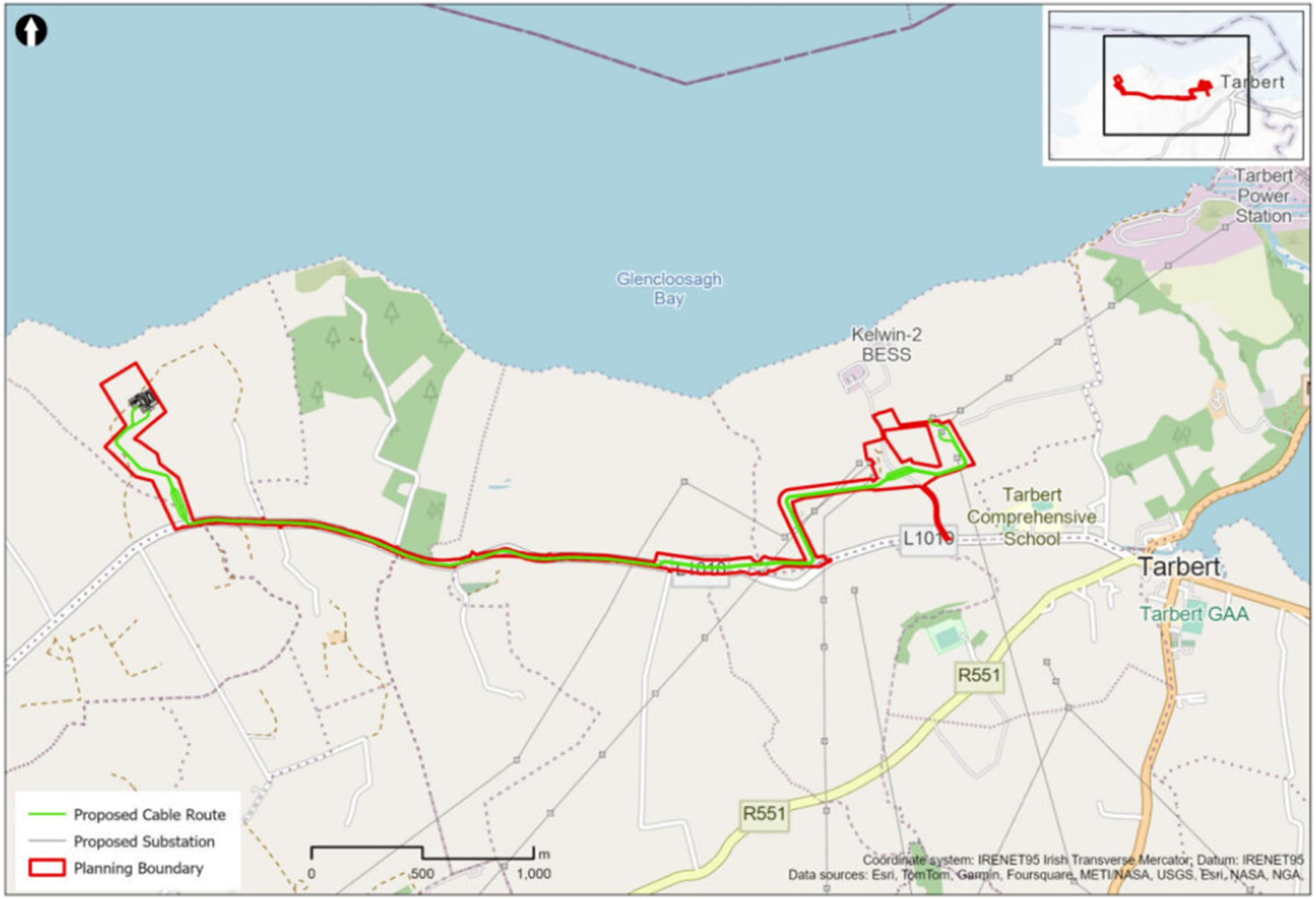
One of the underground cables will be jointed to the existing cable on the LCIM from where it will connect to the Tarbert substation via the existing overhead line. The other underground cable will connect to an existing underground cable route, via a joint bay, to feed into the Kilpaddoge substation. No works are proposed at the Kilpaddoge 220kV substation.

Upon completion of the works, the proposed onsite EirGrid/ESBN 220kV GIS Substation and the underground transmission cable will be handed over to EirGrid, who in conjunction with ESB Networks (ESBN), will carry out the final commissioning and energisation of the proposed substation and transmission line connections. Once energised, the proposed development will from part of the ESBN infrastructure (in their role as Transmission Asset Owner (TAO)), and EirGrid will be responsible for operating the system (in their role as Transmission System Operator (TSO). The SLNG 220kV GIS substation will remain in the ownership of Shannon LNG Limited.

The proposed development is therefore an expansion of EirGrid's high voltage transmission electricity grid. While initially at least the connection will be solely utilized to connect the Applicant's 600 MW natural gas fired power plant, this does not in any exclude, or deny access to, any future renewable project that wishes to use the connection. Once constructed, EirGrid will be free, and indeed obliged to under law, to offer connection to renewable projects. Indeed, once built, the proposed subject development will be the closest transmission connection point to the West coast offshore renewable projects that are currently under development. The proposed EirGrid 220kV GIS Substation, and the Applicant's foreshore area, represent an ideal location for these projects. The Applicant welcomes and supports the use of the connection for any future renewable connection.

Put simply, the proposed development facilities the future connection of renewables. Such future renewable connection will be subject to a separate EIAR.

Figure 1.1: Location of the Proposed Development



Source: Mott MacDonald

1.6 Project Need

The proposed development will provide a connection from the proposed STEP Power Plant to Ireland's electricity gird and will help to provide security of supply.

As detailed in ABP-PA08.319566, The main objectives of the STEP Power Plant are to:

1. Provide 600 MW of fast acting flexible thermal generation capacity to the Irish electricity market.
2. Provide a 120 MWh (1-hr) Battery Energy Storage System (BESS) to participate in the electricity ancillary services market.
3. To ensure that Shannon LNG's award of a capacity contract on 28 March 2023 from EirGrid to deliver 400 MW of electricity generation capacity is delivered at the Site by no later than 1st October 2026, or any subsequent date extension approved by the Regulator.
4. To support the provisions of recent national policies with respect to security of electricity supply, including the Climate Action Plan 2024, the National Energy Security Framework 2022, the government's Policy Statement on Security of Electricity Supply 2021 and the recently published 'Energy Security in Ireland to 2030' which all point to the need for a significant uplift in the delivery of flexible gas-fired power generation capacity to 2030.

1.7 Proposed Development Location

The proposed development is located in the north of County Kerry ca. 250m from the southern shore of the River Shannon estuary. The proposed development is located in a rural location approximately 50km from the city of Limerick.

The STEP substations will be located within the STEP Power Plant red line boundary located 4.5km from Tarbert and 3.5km from Ballylongford in Co. Kerry. The lands for the proposed substations are agricultural fields, with hedgerow boundaries, areas of scrubland and small drainage ditches.

The Site has been identified as a Strategic Development Location (Strategic Development Location H: Tarbert-Ballylongford landbank) in the Shannon Integrated Framework Plan 2013-2020 (SIFP), the Regional Spatial and Economic Strategy (RSES) for the Southern Region 2020, the Kerry CDP 2022-2028, and the Listowel Municipal District Local Area Plan 2020. The recently published, 08 July 2023, Shannon Estuary Economic Taskforce also supports the Site as suitable for energy developments.

The proposed grid connection is located within the following townlands: Ralappane, Kilcolgan Lower, Kilcolgan Upper, Carhoonakineely, Carhoonakilla, Cockhill, Carhoona, Coolnanoonagh Farranawana and Kilpaddoge.

1.8 Screening for Environmental Impact Assessment

Screening is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory classes of development and 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 European Union (EU) EIA Directive 2011/92/EU, as amended by EIA Directive 2014/52/EU (together, the 'EIA Directive') requires as mandatory the preparation of an EIA for all projects listed therein. Projects listed in Annex II to the EIA 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 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 EIA Directive 2014/52/EU.

Schedule 5 (Part 1 and Part 2) of the Planning and Development Regulations 2001, as amended, transposes Annex I and Annex II to the amended EIA Directive. The proposed development is not of a type described by the relevant classes detailed in either Part 1 or Part 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended.

Alone, the proposed development is not of a type described by the relevant classes detailed in either Part 1 or Part 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended. As outlined above, however, the proposed development, forms part of a wider project (the STEP Project) and, taken together, the STEP Project is of a class for which a mandatory EIA is prescribed. As the proposed development forms part of that project, an EIAR is submitted in respect of the proposed development.

1.9 Structure of this EIAR

This EIAR is contained within 4 volumes:

- Volume 1: Non-Technical Summary
- Volume 2: Main EIAR
- Volume 3: Appendices
- Volume 4: Photomontages

The structure of the main EIAR (Volume 2) is set out in Table 1.1 below:

Table 1.1: EIAR Structure

No.	Chapter Title	Description
	Volume 1 Non-Technical Summary	Provides an overview of the proposed development, the Environmental Impact Assessment (EIA) methodology and the assessment of environmental components. This includes receiving environmental conditions, potential impacts which may arise as a result of the proposed development and proposed mitigation measures for each component.
1	Introduction	Provides an overview of the purpose, structure and scope of the report
2	Alternatives considered	Sets out the need for the proposed development. Describes and evaluates the reasonable alternatives studied by the developer. Sets out the justification for the option chosen with consideration of the effects of the proposed development on the environment.
3	Stakeholder Engagement	Details the informal consultation undertaken with stakeholders and their feedback on the proposed development.
4	Methodology	Sets out the methodology undertaken in the EIAR.
5	Description of the Proposed Development	Describes the design, scale and size of the proposed development. Provides an overview of the location and wider setting of the proposed development.
6	Population and Human Health	Provides an assessment of the receiving environment in terms of population and human health and potential impact on humans as a result of the proposed development.
7	Land, Soils and Hydrogeology	Provides a review of the land, soils and hydrogeology receiving environment and assesses potential impacts on soil and hydrogeology and impacts in relation to land take. Recommends mitigation measures.
8	Surface Water and Flooding	Describes the receiving water environment, the potential impact of the proposed development on water quality and flooding; and recommends mitigation measures.

No.	Chapter Title	Description
9	Biodiversity	Describes the receiving environment in terms of existing species and habitats. Assesses potential impacts on biodiversity and proposes relevant mitigation measures.
10	Air	Provides an overview of the receiving air quality environment, describes the impacts on air quality related to the proposed development and recommends appropriate mitigation measures.
11	Climate Resilience	Describes the receiving climatic environment, the vulnerability of the proposed development to climate change and recommends resilience measures with regard to the proposed development.
12	Climate - Carbon	This chapter of the EIAR identifies, describes and presents an assessment of the eventual significant effects of the proposed development on climate. The assessment examines the potential impacts during the construction and operational phases of the proposed development.
13	Noise and Vibration	Provides an assessment of the receiving noise environment and outlines sensitive receptors vulnerable to potential noise impacts that may arise as a result of the proposed development.
14	The Landscape	Describes the receiving landscape and visual environment, potential impacts to the landscape character and viewpoints and recommends mitigation measures.
15	Archaeology, Architectural and Cultural Heritage	Provides an assessment of the proposed development, considering potential impacts to cultural heritage assets, such as architectural and archaeological heritage, and proposes mitigation measures.
16	Material Assets	Describes existing services, waste and infrastructural service requirements by the proposed development. Describes potential impacts to utilities as a result of the proposed development.
17	Roads and Traffic	Outlines the receiving traffic environment and describes potential impacts on local roads that may arise due to construction and operational traffic.
18	Major Accidents and Disasters	Identifies and assesses the likelihood and potential impacts to the environment and population arising from the vulnerability of the proposed development to risks of major accidents and / or natural disasters.
19	Interactions of the foregoing	Provides an overview of potential interactions among environmental factors and their cumulative impact as a result of the proposed development.
20	Summary of Mitigation and Monitoring	Sets out the mitigation and monitoring measures proposed throughout the various chapters for ease of reference.

1.10 Supporting Documentation

A number of documents have also been prepared to accompany the planning application, as follows:

- Construction Environmental Management Plan including:
  - Construction Traffic Management Plan
  - Construction Resource Waste Management Plan

1.11 Competency of the Team

Mott MacDonald is a multidisciplinary consultancy with over 30 years' experience of undertaking complex and challenging environmental impact assessment reports (EIARs) in accordance with the requirements of the EIA Directive for a wide range of projects. These include some of the world's largest infrastructure, engineering and development projects.

Mott MacDonald is a corporate member of the Institute of Environmental Management and Assessment and hold its EIA Quality Mark. The Quality Mark Scheme allows organisations that lead the co-ordination of statutory EIAs in the UK and Ireland to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA

Quality Mark is a voluntary scheme, with organisations free to choose whether they are ready to operate to its seven EIA Commitments.

This EIAR was prepared by Mott MacDonald with expert technical contributions provided by a number of subconsultants to inform this EIAR. Appendix 1.1 lists the details of all contributors to the EIAR.

1.12 Difficulties encountered during the preparation of this EIAR

There were no significant difficulties encountered during the preparation of this EIAR and any limitations or difficulties encountered are detailed in the relevant technical chapters.

Shannon Technology and Energy Park (STEP) 220kV Grid Connection

Chapter 2 - Alternatives Considered

July 2024

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Contents

Figures

2 Alternatives Considered

2.1 Introduction

The Revised EIA Directive 2014/52/EU[1] requires an EIA to contain "A description of the reasonable alternative (in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects." This chapter presents the alternatives that were considered by the developer during the design process.

There will be an onsite EirGrid/ESBN 220 kV GIS substation and a SLNG 220 kV GIS substation which will both be located adjacent to the STEP Power Plant. A grid connection is also required to connect the power plant to the national grid.

2.2 Existing Environment

2.2.1 Grid Connection and Operational Requirements

The proposed development is a high voltage 220 kV electrical connection to send power from the Applicant's proposed 600 MW power plant [ABP ref PA08.319566] to the national electricity grid. The 220 kV connection is a "contestable" connection. This simply means that the Applicant will build the connection for EirGrid, but once it has been built, the cable circuits and EirGrid 220kV GIS substation will become part of the electricity transmission system and ownership will be transferred from the Applicant to EirGrid for ongoing operation, and ESB for maintenance. This is a common practice for developer led connections in Ireland as under the law only EirGrid and ESB can operate and maintain the transmission system in Ireland.

For further context, the STEP Power plant has a capacity of up to 600 MW. Once operational it will be one of the largest power plants in the State. The Grid Operator (EirGrid) has advised the Applicant that it needs the connection route to be very secure and reliable, as any sudden loss of the connection could cause national problems. EirGrid have reviewed the design and proposed route and are satisfied with the proposal.

In September 2020 the Applicant requested a grid connection from EirGrid for its 600 MW power plant [ABP ref PA08.319566]. On the 14th of April 2023 the Applicant executed the 600 MW 220 kV grid connection agreement with EirGrid.

To ensure the Applicant's power plant was connected to the transmission system in a manner complying with EirGrid's connection policies and standards, EirGrid instructed, within the connection agreement itself, that the connection point on the transmission system be via a loop in connection into the Kilpaddoge – Tarbert 220kV circuit, at the existing 220kV Line Cable Interface Mast (LCIM).

Put simply, as the Applicant was not free to specify a connection point, no alternative connection point could be assessed. However, the route to the connection point was assessed.

2.2.2 EirGrid Existing Utilities and Road Network

Refer to planning drawings: 229100682-MMD-04-XX-DR-E-0017, 229100682-MMD-04-XX-DR-E-0018, and 229100682-MMD-04-XX-DR-E-0301.

[1] The requirement of alternatives was introduced under Council Directive 97/11/EC

Five separate existing overhead lines, and six separate existing underground cables can be seen on these drawings. The presence of this infrastructure has limited the options available to the Applicant.

The Applicant has consulted with the local community in relation to the proposed development. The local community has advised the Applicant of its concern about any additional new overhead lines and strongly emphasised its preference for only underground cables.

Between the Piermount Junction and the Kilpaddoge substation access road there are existing 20kV, 33kV, 110kV and 220kV circuits already installed under the L1010. These existing cables constrain the available space within the road at that location and installation of the new 220kV double circuit within the road is not feasible. Additionally, initial design has determined that these circuits are at thermal limits and the introduction of additional circuits in close proximity to these existing circuits will result in these limits being exceeded.

Therefore, the new circuits must be located in a position with a sufficiently large separation from the existing circuits to avoid derating of the existing circuits. The net result is that installation between the Piermount Junction and the Kilpaddoge substation access road within the confines of the L1010 is not feasible resulting in off-road installation for this section.

2.3 Do Nothing

The “Do-Nothing” alternative is inaction. From an environmental effects perspective, this means no change. This cannot be considered a feasible alternative given that a grid connection is required to enable the STEP power plant to operate.

Under a Do-Nothing scenario there will not be a suitable connection from the new low carbon and flexible STEP Power Plant to the grid. If the connection cannot be built, then the STEP power plant would not be built. This would then be contrary to Ireland’s Climate Action Plan target of delivering up to 2 GW of additional new gas fired power plants to back up increasing amounts of intermittent renewable power generation.

Additionally, the absence of the low carbon and high efficiency STEP Power Plant, the system operator will be obliged to turn on less efficient higher carbon generators. The absence of the STEP power plant would exacerbate security of supply concerns, as discussed in the Government Policy Statement on Security of Electricity Supply (30th November 2021), resulting in significant adverse effects on population.

2.4 Alternatives Considered

2.4.1 Substation Technology

2.4.1.1 Description

There are two types of substations on the transmission system: Air Insulated Switchgear (AIS) substations and Gas Insulated Switchgear substations (GIS). AIS substations are insulated by air and GIS substations are insulated using sulphur hexafluoride (SF6).

An AIS substation uses atmospheric air as the phase to ground insulation for the switchgear within the electrical substation. An advantage of AIS substations is that they allow for future expansion. The equipment for an AIS substation is easily sourced and has a short lead-time. The main disadvantage of an AIS substation is the footprint required and they require sensitive locating in a rural environment.

A GIS substation uses SF6 to provide the phase to ground insulation for the switchgear. The main advantage of a GIS substation is the smaller footprint and it also results in a smaller visual impact on the landscape. The main disadvantage if the reduction in scope for future expansion. GIS substations are generally indoor, as is the case for the proposed development.

Table 2.1 outlines the differences and advantages/disadvantages of each alternative option.

Table 2.1: Substation Type

	AIS Substation	GIS Substation
Population and human health	More visually intrusive due to outdoor equipment and larger footprint. As this would be outdoors, associated noise may be greater.	More favourable as the colour scheme is such that the building blends into the landscape and has a smaller footprint. Equipment housed indoors so less noise generated at receptors.
Land, soils and hydrogeology	Larger effect on soils due to larger footprint.	More favourable due to the smaller landtake required.
Surface water and flooding	Not a differentiating factor.	Not a differentiating factor.
Biodiversity	Due to the larger footprint, slightly larger effect on vegetation.	Smaller footprint and therefore less effects on vegetation.
Air	Larger footprint required and therefore slightly more dust would be generated.	Smaller footprint and therefore slightly less dust generated.
Climate	Not a differentiation factor.	Not a differentiation factor.
Noise and vibration	As this would be outdoors, associated noise may be greater.	Equipment housed indoors so less noise generated at receptors.
The Landscape	More visually intrusive due to outdoor equipment and larger footprint.	More favourable as the colour scheme is such that the building blends into the landscape and has a smaller footprint.
Archaeology, Architectural and Cultural Heritage	Larger footprint and therefore more potential for effects on archaeology.	Smaller footprint and therefore less potential for effects on archaeology.
Material assets	electrical equipment is located outdoors in all-weather environments.	A GIS substation offer more protection to the electrical equipment than an AIS station, thereby increasing operational life and reducing maintenance costs;
Road and Traffic	Not a differentiating factor.	Not a differentiating factor.

2.4.1.2 Assessment

A GIS was selected over an AIS substation at this location due to the following reasons:

- The site is on the west of Ireland and exposed to a marine environment with a saline atmosphere. A GIS substation at this location and with its enclosed equipment, offers more protection to the electrical equipment than an AIS station, thereby increasing operational life and reducing maintenance costs;
- A GIS substation, with its enclosed equipment and reduced footprint is less visually intrusive than an AIS station; and
- The footprint of an GIS is about 50% less than an AIS substation which is more favourable environmentally.

2.4.2 Substation locations

2.4.2.1 Description

The 220 kV grid connection will require two substations at the STEP Power Plant site and a 5.0 km underground grid connection.

An initial location proposed for the substations, which was originally located on the access road, approximately 250m to the southwest of the proposed STEP Power Plant (see Figure 2.1).

An alternative location was subsequently proposed following a review of visual effects, directly adjacent to the STEP Power Plant (see Figure 2.1). This is the proposed location of the substations.

Both sites are currently areas of grassland fields and scrub land with hedgerows separating the field boundaries.

Figure 2.1: Substation Location

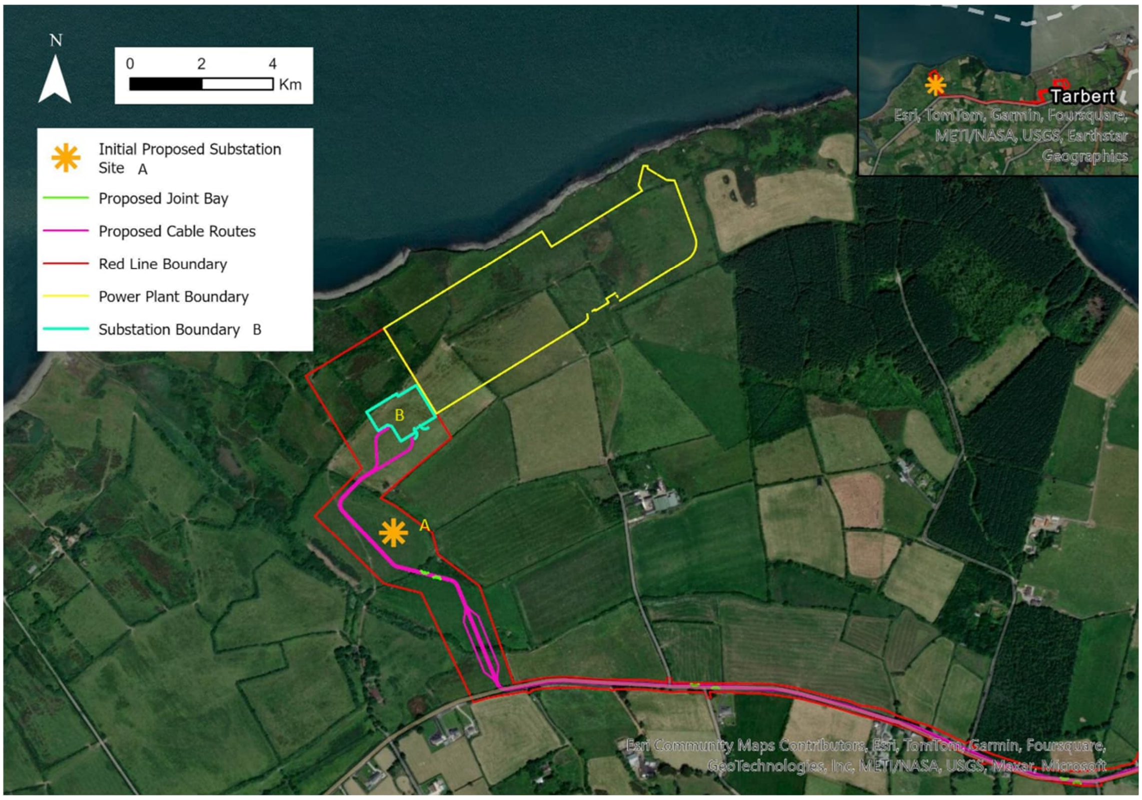


Table 2.2 outlines the advantages and disadvantages considered for each alternative option.

Table 2.2: Substation Location

	Option A	Option B
Population and human health	From a visual perspective, this location is more visible. This location is also closer to receptors.	Option B includes a screening effect for residents along the L-1010 and the increased distance will lower potential noise effects on receptors.
Land, soils and hydrogeology	Not a differentiating factor	Not a differentiating factor
Surface water and flooding	Not a differentiating factor	Not a differentiating factor

	Option A	Option B
Biodiversity	Not a differentiating factor	Not a differentiating factor
Air	Not a differentiating factor	Not a differentiating factor
Climate	Not a differentiating factor	Not a differentiating factor
Noise and vibration	Option A is closer to receptors	Option B is more distant from receptors, thus minimising effects
The Landscape	From a visual perspective, this location is more visible.	Option B includes a screening effect for residents along the L-1010 as described above.
Archaeology, Architectural and Cultural Heritage	Not a differentiating factor	Not a differentiating factor
Material assets	Not a differentiating factor	Not a differentiating factor
Road and Traffic	Not a differentiating factor	Not a differentiating factor

2.4.2.2 Assessment

The original site (Option A) was located to the south west of the power plant and adjacent to the access road. Following a review of the visual effects from the L-1010 it was considered that an alternative site should be considered. The alternative site is directly adjacent to the STEP Power Plant.The location of the substations is at +20 m OD and adjacent to the main turbine halls. This low position was deliberately selected to avail of the screening effect of the elevated terrain (+25 m OD) between the residences along the Coast Road L-1010 (VP7, VP8, VP9, VP10 and VP13 which are presented in Volume 4 Photomontages). This mitigates visual impact of the substations on these residences. The benefit of this mitigation is clearly visible from (VP7, VP8, VP9, VP10 and VP13). Refer to Chapter 14 Landscape for further details on this.

2.4.3 Consideration of Overhead Lines and Underground Cables

2.4.3.1 Description

Overhead line is the conventional technical option for high voltage power transmission. It is a well-established method of transmitting electrical energy over long distances. Overhead lines operate at different voltage levels.

Underground cables are typically installed in plastic ducts within a trench. The cables are delivered to site on large drums. A joint bay is installed periodically underground to allow for the joining of the cables from one drum to another. Two additional ducts, within the same trench, would generally also be installed to facilitate the installation of fibre optic communication wires.

Table 2.3 outlines the advantages and disadvantages of the alternative options.

Table 2.3: Overhead Line and Underground Cables

	Overhead Line	Underground Cable
Population and human health	There are perceived negative effects associated with visual amenity, effects on the landscape, health and tourism which affect public acceptance of overhead lines.	As the cable is buried, there are no effects on visual amenity or landscape.
Land, soils and hydrogeology	The effect on soils would be less than an underground cable during construction.	During construction there would be a larger effect on soils, however, the cable trench is reinstated following construction.

	Overhead Line	Underground Cable
Surface water and flooding	Effects on surface waters would be less as the overhead line would span river crossings.	Depending on the crossing technology used, there is potential for effects, for example using open cut trenching, however these effects can be mitigated.
Biodiversity	There is a risk of collision for birds in the area by overhead lines and there is a Special Protection Area for birds to the north of the site.	There is no risk of collision as a result of underground cables.
Air	Not a differentiating factor.	Not a differentiating factor.
Climate	Not a differentiating factor.	Not a differentiating factor.
Noise and vibration	Not a differentiating factor.	Not a differentiating factor.
The Landscape	There are perceived negative effects associated with visual amenity and effects on the landscape,	As the cable is buried, there are no effects on visual amenity or landscape.
Archaeology, Architectural and Cultural Heritage	Due to less ground disturbance, effects on archaeology could be less, however, overhead lines have the potential for affecting the setting of heritage sites.	There is a larger area of ground disturbed for underground cables which could potentially affect buried heritage. However, mitigation would lower these effects.
Material assets	Not a differentiating factor.	Not a differentiating factor.
Road and Traffic	The construction of overhead lines would required a larger number of site accesses as they are generally constructed in greenfield areas.	The construction of underground cables would require access to joint bays in greenfield areas, but access is readily accessible when constructed in-road.

In addition to the discussion in Table 2.3, refer to planning drawing 229100682-MMD-04-XX-DR-E-0017 and 229100682-MMD-04-XX-DR-E-0018. Five separate existing overhead lines within the development area can be seen on these drawings.

The Applicant has consulted with the local community numerous times in relation to this proposed development. The local community has consistently advised the Applicant of its concern about any additional new overhead lines which would add to the existing congestion and strongly emphasised to the Applicant its preference for only underground cables.

2.4.3.2 Assessment

The preferred option was determined as underground cables based on the following:

- Consultation with local community
- Visual amenity
- Public acceptance
- No bird collision risk

2.4.4 Location of underground cable within L-1010.

2.4.4.1 Description

The design intent is to avoid overhead line and to route the majority of the grid connection from the proposed on-site substations underground and along the L-1010 to minimise effects on greenfield land and reduce visual impact, thereby limiting the scope of alternative design. Also, due to the relatively short extent of the grid connection, the scope for alternative designs was limited.

Refer to planning 229100682-MMD-04-XX-DR-E-0301. It can be seen that from the Piermount Junction and the Kilpaddoge substation access road there are existing 20kV, 33kV, and 220kV circuits already installed under the L1010. These existing cables constrains the available space within the road at that location and installation of the new 220kV double circuit within the road is not feasible.

Additionally, technical design has determined that these circuits are at thermal limits and the introduction of additional circuits in close proximity to these existing circuits will result in these limits being exceeded. Therefore, the new circuits must be located in a position with a sufficiently large separation from the existing circuits to avoid derating of the existing circuits. The net result is that installation between the Piermount Junction and the Kilpaddoge substation access road is not feasible resulting in off-road installation for this section.

Additionally technical assumptions and thermal rating calculations for the circuit system, and consideration to nearby circuits where these run in parallel with the proposed route, also limited the scope for alternative designs.

Table 2.4 outlines the advantages and disadvantages of off-road and in-road underground cabling for the section of the cabling along the L-1010.

Table 2.4: Off-road and In-road Cabling

	Off-road	**In-road**
Population and human health	Off-road cabling will affect landowners along the route, including disruption to agricultural practices and affecting land directly during construction. Permanent access would be required to joint bays.	There would be disruption to locals during the construction phase, however, traffic management would minimise effects. Access to joint bays would be along the existing road and so would not require additional access tracks.
Land, soils and hydrogeology	A larger amount of greenfield land would be excavated for the trench; however, this would be reinstated.	Excavation would be within the road corridor, not affecting soils or land.
Surface water and flooding	Watercourse crossings would be required.	It is likely that most roads would have sufficient cover to encompass the cable thus minimising new watercourse crossings.
Biodiversity	Greenfield construction would require the removal of trees, hedgerows and terrestrial habitats. Watercourse crossings would be required.	Works within the road corridor would minimise effects on biodiversity compared with greenfield construction. It is likely that watercourse crossings could be avoided if sufficient cover is present within the road.
Air	Not a differentiating factor.	Not a differentiating factor.
Climate	Soil stores high quantities of carbon which would be released during greenfield construction.	Soil removal would be limited as the construction would be within the road corridor.
Noise and vibration	There would potentially be less noise and vibration effects associated with greenfield lands due to the distance from receptors.	Noise and limited vibration effects would result in effects on residences adjacent to the road however, any effects would be be temporary during construction.
The Landscape	The removal of hedgerows and trees would have a slight effect on the landscape as full replanting would not be possible across the cable trench crossing points, so there	In-road construction would have limited landscape and visual effects (only occurring during construction).

	Off-road	In-road
	would be breaks in hedgerows/treelines.	
Archaeology, Architectural and Cultural Heritage	Greenfield construction has a higher potential for unearthing of archaeology.	In-road construction would have limited effects on archaeology.
Material assets	Effects on utilities would be limited.	There would be a larger number of utilities along the road corridor which would require avoidance/relocation during construction. Nearby circuits where these run in parallel with the proposed route had to be taken into account.
Road and Traffic	Permanent access tracks would be required to joint bays.	Additional access would not be required as the joint bays would be within he road corridor.

2.4.4.2 *Assessment*

In terms of effects on the environment, in-road works are generally preferable as the removal of vegetation and effects on archaeology are limited, noise effects are temporary and can be mitigated, there are no landscape effects. However, in this case, it was not possible to put the full length of the cable under the L-1010 road as there was existing utility congestion identified by the designers, within the final 0.83km of the road carriageway.

Due to congestion with existing utilities on the final 0.83 km section of the L-1010, the cables will be routed off-road, to the north of the L-1010. The route is proposed to be installed north of the L1010 as there is residential development on the south side of the road.

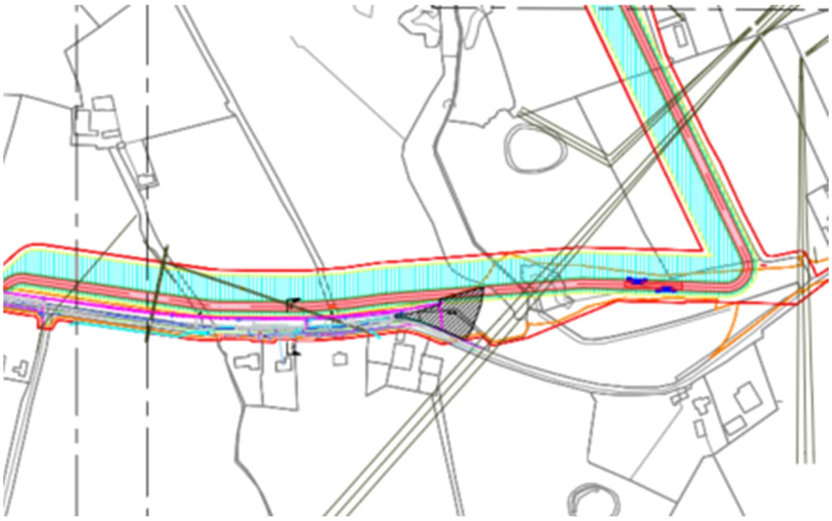
The offroad section north of the L1010 to the Kilpaddoge access road HDD crossing runs initially in a field parallel to a private roadway, but which has an existing public right of way. This road is sufficient to allow access by all necessary vehicles to the circuits installed in the adjacent field. The route eventually turns east toward the Kilpaddoge access road. The alignment here has been chosen to avoid the zone of notification of ring forts in the area, as well to keep outside of the 10m exclusion zone to overhead line towers. ESB are understood to already have access rights to these fields for the purposes of maintaining the OHL and extending this access is possible.

This section of route is considered to be the most practicable option as it:

- avoids utility congestion in the L1010,
- avoids existing residential development, and
- suitable access is available to the route along its length.

The installation throughout this section would be at the standard depth of burial for farmland.

Figure 2.2: Off road section of cable route options from the proposed STEP to Kilpaddoge 220 kV Substation



2.4.5 Connection Options

As noted in Section 2.3, on the 14th of April 2023 the Applicant executed the 600 MW 220 kV grid connection agreement with EirGrid. Within the connection agreement, EirGrid explicitly specified to the Applicant the exact connection point on EirGrid's network that it would only allow connection. This is because EirGrid needs to ensure large power plants are connected to the grid in a safe and reliable location.

In summary, EirGrid specified a loop in connection into the Kilpaddoge – Tarbert 220kV circuit, at the existing 220kV Line Cable Interface Mast (LCIM). Put simply, as the Applicant was not free to specify a connection point, no alternative connection options could be assessed.

It should also be noted that the lands in the area of the underground cable route are congested with multiple existing underground cable routes in the area leading into the 220kV Kilpaddoge Substation, as shown in planning drawing 229100682-MMD-04-XX-DR-E-0017 and 229100682-MMD-04-XX-DR-E-0018.

2.4.6 Ralappane Stream Crossing Options

2.4.6.1 Description

As the underground cabling exits the Shannon Technology and Energy Park (STEP) Power Plant and the cable route approaches the L-1010 along the STEP facility access road, there is a requirement to cross the Ralappane Stream. Ralappane Stream is an EPA mapped river waterbody within the red line boundary of the STEP Power Plant and is named Ralappane_010.

The Ralappane_010 Stream has a low summer base flow and flows in a north-west direction towards the coast close to, but beyond, the western boundary of the Site and through a key coastal wetland area, which is part of both the Lower River Shannon SAC and the Ballylongford pNHA, before discharging to the Shannon Estuary on the southwest side of Knockfinglas Point via a modified channel.

Options which have been considered include:

- Open Cut Trench – A dry area is created by damming the stream using the installation of an impermeable barrier blocking the river. Water is removed from the works area and held in settlement tanks to remove sediment prior to discharge back to the watercourse downstream of the dam area. Trenching is then undertaken and the ducting installed, the trench is then backfilled and the dam removed.

- Pre-cast Concrete Bridge Crossing – Cabling can be attached to the new precast concrete bridge that is to be installed on the access track as part of the STEP Power Plant, which will traverse the stream. The cabling would be enclosed within a protective casing and fixed to the side or underneath the bridge.
- HDD Crossing – This method involves the creation of launch and reception pits at the start and the end of the HDD crossing. An initial pilot hole is drilled, prior to the drilling of multiple to allow the cable ducting to be pulled through the holes underneath the stream. Cabling can be fitted following the installation of the ducting.

The cables will be used to send power from our proposed 600 MW power plant on the Shannon Landbank. Our highly efficient and flexible power plant is urgently needed to secure Ireland's grid connection. It will also bring jobs and investment to the North Kerry region.

For completeness, the 220 kV connection is a "contestable" connection with EirGrid. This simply means that SLNG will build the cable and the fibre optic line for EirGrid, but once it has been built, the cable and fibre optic line will be transferred to EirGrid for ongoing operation and ESB for maintenance. This is standard practice for all developer connections in Ireland as under the law only EirGrid and ESB can operate and maintain power cable in Ireland. Once the cable is transferred to EirGrid and ESB, the wayleaves will be transferred to EirGrid and ESB.

Table 2.5 outlines the advantages and disadvantages of the crossing method for the Ralappane Stream.

Table 2.5: Stream Crossing Methods

	Open Cut	Bridge Attachment	HDD
Population and human health	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.
Land, soils and hydrogeology	Potential to generate silt	Scaffolding could generate limited silt	Pits would require removal of topsoil
Surface water and flooding	Potential for silts to be generated and temporary effects to the riverbank.	Limited effects due to scaffolding instream.	Potential for failure and break out and may not be technically feasible.
Biodiversity	Potential turbidity which could affect fish.	No effects	Potential turbidity which could affect fish if failure occurs and break out of the stream bed.
Air	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.
Climate	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.
Noise and vibration	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.
The Landscape	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.
Archaeology, Architectural and Cultural Heritage	Potential for underwater archaeology.	No effects	Potential for underwater archaeology.
Material assets	Safer connection than bridge connection.	The STEP Power plant has a capacity of up to 600 MW. Given its scale, it will be one of the largest power plants in the State once operational. As such the Grid Operator (EirGrid) will want to ensure the connection is very secure and reliable, as any sudden unforeseen loss of the connection 600 MW of	Safer connection than bridge connection.

	Open Cut	Bridge Attachment	HDD
		power would have national significance. Given this, EirGrid would not accept a proposal where the connection was attached to bridge that was owned, operated and maintained by a third party (i.e. the Applicant.)	
Road and Traffic	Not a differentiating factor.	Not a differentiating factor.	Not a differentiating factor.

2.4.6.2 Assessment

- Open Cut Trench - Open cut water crossings have the potential to generate silt and suspended solids which can cause pollution within the stream. This method can be considered disruptive to the flow path of the stream and there is a risk of the release of silt and suspended solids to the stream. The barrier within the stream also creates localised changes to water depth, velocities and sediment erosion/deposition regimes. The riverbank will be disrupted as the trenching is undertaken with excavation works removing vegetation and materials, however mitigation methods can reduce effects.
- Precast Concrete Bridge Crossing – A new pre-cast concrete bridge over the Ralappane stream will be installed as part of the access track for the STEP Power Plant. Cased cabling will be attached to the bridge. Scaffolding will be required to attach the cable to the bridge with the potential to affect the stream with flow disruption and debris from concrete drilling. These effects will be temporary in nature.
- HDD –the ducting will be installed underneath the stream and will not come into direct contact with the stream. An advantage of this water crossing method is that a number of cable ducts can be installed to meet the preferred requirement of the underground cabling. HDD compounds are required at the entry/exit points of the HDD drilling equipment and require areas to be cleared of vegetation. Without suitable planning and appropriate mitigation measures during HDD there are potential environmental risks of ground water pollution and leakage of drilling fluids to the watercourse.

The preferred method for the crossing of the Ralappane stream is via open cut method due to technical reasons with regard to the suitability of HDD and this is the method assessed in the EIAR – this is also the worst case which is assessed in the EIAR. Provided that the mitigation measures prescribed within the EIAR are implemented, there is a very low risk of pollutants being released during the works. The Ralappane stream has a low summer base flow and the works will be carried out between July and September inclusive and in agreement with Inland Fisheries Ireland.

A HDD crossing will not be suitable at the crossing location and there is uncertainty with regard to the viability of attaching the cables to the bridge in terms of acceptance by the Regulator. Therefore, an open cut method is considered as the preferred option.

2.4.7 Surface Water Drainage

2.4.7.1 Description

Two alternate options were reviewed with regard to the surface water drainage of the proposed development.

- A standard sustainable drainage system (SuDS) which would discharge at the greenfield rate, incorporating a proprietary flow control device. Flows would be attenuated using modular storage tanks. Storm water would flow through silt traps and hydrocarbon interceptors prior to discharge to the Ralappane stream (Option A).
- Interception of stormwater from the substation and compound area which would flow through hydrocarbon interceptors and be conveyed through the STEP Power Plant site to the fire water retention tank from where flows would be discharged via the STEP Power Plant outfall pipe to the Shannon Estuary (Option B).

Table 2.6 outlines the advantages and disadvantages for the surface water drainage.

Table 2.6: Surface Water Drainage

	Option A	Option B
Population and human health	Not a differentiating factor.	Not a differentiating factor.
Land, soils and hydrogeology	Not a differentiating factor.	Not a differentiating factor.
Surface water and flooding	With mitigation, no effects likely.	With mitigation, no effects likely but greater attenuation in the estuary.
Biodiversity	With mitigation, no effects likely.	The installation of a trenched water outfall across the shoreline into the Shannon estuary will result in negligible loss of habitats relative to the total area of the habitats and will not result in significant effects. This has been assessed as part of the STEP Power Plant Application.
Air	Not a differentiating factor.	Not a differentiating factor.
Climate	Not a differentiating factor.	Not a differentiating factor.
Noise and vibration	Not a differentiating factor.	Not a differentiating factor.
The Landscape	Not a differentiating factor.	Not a differentiating factor.
Archaeology, Architectural and Cultural Heritage	Potential for underwater archaeology.	Potential for underwater archaeology. Geophysical Survey undertaken in Feb 2024, nothing of significance found. This has been assessed as part of the STEP Power Application.
Material assets	New infrastructure required.	The Power Plant infrastructure would be used for this option.
Road and Traffic	Not a differentiating factor.	Not a differentiating factor.

2.4.7.2 Assessment

The storm water drainage system proposed as part of the STEP Power Plant application will intercept flows from a catch basin to the northeast of the substation compound site.

Benefits from the connection of the drainage system to the STEP Power Plant drainage system include:

- Utilising the STEP power plant storm water drainage system eliminates the need to create a new storm water system. This eliminates the need of an additional stormwater discharge location to Ralappane stream and/or the estuary foreshore;
- The storm water will flow into the STEP firewater retention pond which has an automatic shut off system in the event of fire; and

- After the firewater retention pond, the storm water will flow into a sub tidal storm water outfall pipe in the estuary. This subtidal location allows storm water to be discharged to the estuary directly as opposed to Ralappane stream which has much less attenuation.

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 3 – Stakeholder Engagement

July 2024

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3 Stakeholder Engagement

3.1 Stakeholder Engagement

Consultation with relevant statutory and non-statutory bodies forms an important part of the EIA process. Even though, there is no express provision made under the planning legislation to enter into public participation prior to the submission of the application for development consent for an SID application. Public participation under the EIA Directive is not triggered until the formal application for development consent is submitted i.e., submission of the EIAR to ABP.

The consultations with the relevant bodies during the pre-applications for the Proposed Development process were carried out to ensure a robust EIAR was submitted. The 2022 EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports confirms that 'Consultation is a key element of each stage of the EIA process'. The requirement for consultation is included in the definition of EIA in the Directive.'

Scoping and consultation for the EIA was carried out by the Applicant and focused on meetings, discussions and / or correspondence with the following bodies refer to Table 3.1.

The Applicant has also consulted with the local community in relation to the proposed development. The local community has advised the Applicant of its concern about any additional new overhead lines and strongly emphasised its preference for only underground cables.

The consultation took the form of a letter to the consultees which included details of the proposed development and inviting the consultee to comment on the proposal. Any issues raised by the consultee's are addressed in the relevant chapters of this EIAR.

Feedback from consultation is included in Table 3.1.

Table 3.1: Consultation Responses

Consultee	Date of Letter	Feedback/Comments	Addressed in EIAR
An Bord Pleanála	28 September /2023	Pre-Application meeting held with ABP 1st December 2023. Determined to constitute SID (ABP - 318119 – 23) by ABP on 16th May 2024 .	
Member of the local community from Kilcolgan, Tarbert and Ballylongdsord.	Townhall meetings in Listowel Arms Hotel on the 8 November 2023 and 15 May 2024	Due to the presence of five separate existing overhead lines in the area the local community has advised the Applicant of its concern about any additional new overhead lines and strongly emphasised its preference for only underground cables.	Overhead lines were eliminated from the design.
Environmental Protection Agency	8 May 2024	Response received from EPA 08 May 2024. No meeting requested by EPA	NA
DHLGH (DAU)	8 May 2024	Response received from DAU on 13 June 2024: Response from National Monuments Service: A CHIA was to be prepared as part of the overall development; That the proposed development site is located within a wider area of known archaeological settlement and activity, all subject to statutory protection That the proposed development is in close proximity to Recorded Monuments; That as part of the CHIA the NMS advised targeted geophysical survey or prospection and archaeological test excavation and monitoring of all GI works associated with the project; That the results of advance works should inform the EIA Chapter for Cultural Heritage; That previous archaeological investingations and surveys have shown the proposed development site to be a significant archaeological landscape; That the proposed development is in the environs of underwater cultural heritage;	AMS subsequently undertook further consultation (phone call on 21 June 2024) with the NMS archaeologist responsible for SID project assessment to agree the scope of advance works - specifically geophysical surveys to support the EIAR and a commitment to undertake early advance works archaeological testing post-consent. Furthermore, it was verbally agreed that the NMS advised Underwater Archaeological Impact Assessment works were more appropriate to the scope of works for the proposed STEP Power Plant project. It was agreed to scope the survey and discuss the proposal further with NMS. However, in undertaking the geophysical survey scoping it became evident that because of landowner access issues and with timing issues (sileage cutting) it was not feasible or practical to undertake the proposed survey in time to support the submission of The EIAR, This determination was conveyed again to NMS (phone call on 03 July 2024) and it was verbally agreed to postpone the geophysical survey and other advance works to post-consent stage.

Consultee	Date of Letter	Feedback/Comments	Addressed in EIAR
		That there should always be a presumption in favour of avoiding developmental impacts on archaeological heritage in the project design; That a project archaeologist should be part of the underwater cultural heritage aspects of the design; That the CHIA should incorporate all complimentary archaeological surveys and assessments; That an Underwater Archaeological Impact Assessment should be undertaken as advance works; That comprehensive buildings archaeology assessments of extant assets be undertaken as advance works; That screening of all advance works (including GI) be agreed in advance with NMS and that archaeological monitoring is advised; That archaeological testing be carried out under Section 26 archaeological licence and that a Section 3 Dive/Survey licence be in place. Response from National Parks and Wildlife Service: **Nature Conservation** Mitigation to be specified for the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Bat and otter surveys recommended and in particular Lesser Horseshoe Bat. The potential for Penny Royal occurring within the site to be assessed.	 Mitigation is included to minimise effects on the SAC and SPA. Bat and otter surveys have been undertaken at the site and the results are detailed in Chapter 9 Biodiversity. July and August 2023 and March 2024 field surveys did not identify or locate this Penny Royal or suitable pond habitat for it to occur.
Kerry County Council	8 May 2024	A response was received on 6 June 2024 from Kerry County Council: The following best practice considerations should be taken into account: • Crossing of watercourses, including the Ralappane Stream, should have regard to the requirements of Inland Fisheries Ireland and flood risk management principles. In addition,	Chapter 8 Surface Water and Flooding details the works required to cross the Ralappane stream and includes a requirement to consult with Inland Fisheries Ireland.

Consultee	Date of Letter	Feedback/Comments	Addressed in EIAR
		care should be given to protect riparian vegetation.	
		• Fine Sediment Control proposals should have regard to S1.3.6 of Volume 6 of the Kerry CDP 2022-2028	Fine sediment controls are detailed in Chapter 8 Surface Water and Flooding
		• The requirements of the Water Framework Directive should be taken into account.	Chapter 8 Surface Water and Flooding includes a Water Framework Directive assessment.
		• Selection of site compound locations should be informed by ecological survey. Areas of particular ecological / environmental sensitivity or in close proximity to sensitive watercourses, should be avoided.	Compound locations were informed by environmental sensitivities.
		• Any required accommodation works should be subject to environmental assessment	Noted
		• 'Soil and stone' generated from the proposal should be disposed of authorised places of disposal. Procedures / protocols should be put in place so as to ensure excavated material is not used to fill wetlands, or other lands of ecological value or semi-natural areas which may support protected species – unless the necessary consents have first been obtained	Excess soils and stone will be removed under licence and in accordance with the Waste Management Act 1996, as amended.
		• Invasive species protocols should be provided for, as part of the proposal. As part of this, 'Ireland's invasive alien species soil and stone pathway action plan 2023 – 2027' should be taken into account.	Chapter 16 Material Assets includes for the CEMP and CRWMP to take into account the recommendations set out in the plan.
		• Proposals including construction related lighting should have regard to the 'Lesser Horseshoe Bat Species Action Plan 2022-2026'. As part of this, the connectivity of lesser horseshoe bat populations in Kerry and Clare should not be adversely impacted	Chapter 9 Biodiversity outlines that any lighting (temporary flood lighting etc.) within compounds and construction area is to be turned off outside working hours to reduce impact on commuting and foraging bats species.
		Should an NIS be required, any mitigation measures contained therein should be presented in a clear and specific manner, compatible with the recommendations of S3.2.4 of the following EC Commission Notice 2021/C 437/01 guidance	A NIS has been prepared and mitigation measures are clearly presented in accordance with the EC guidance.

Consultee	Date of Letter	Feedback/Comments	Addressed in EIAR
		document 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'	
Kerry County Council	8 May 2024	A response was received from Kerry County Council on 6 June 2024: The proposed route appears to pass through the zone of notification around one recorded monument, as defined in the Record of Monuments & Places, and listed as Ke003 010 ringfort and souterrain. The EIAR should address this and suggest appropriate mitigation Pre-development testing has previously been carried out within the Shannon Technology & Energy Park site and has identified numerous areas of archaeological interest. Where the proposed route is located in proximity to any of these identified features/areas appropriate mitigation will be required Given the scale of the project and the number and range of archaeological features that have previously been identified during archaeological testing/excavation both within the Shannon Technology & Energy Park site and the ESB site at Kilpaddoge, pre-development archaeological testing of the route, where it runs through greenfield and/or previously undisturbed or untested areas, will be required.	See response to DLGH (National Monuments Service) above with regard to pre-development testing. Written (email) consultation with the Kerry County Council Archaeologist in relation to the 'missing' excavation reports in Kilpaddoge townland was undertaken on 14 June 2024, and to enquire about a potential site (CH82; Figure 15.7b) which overlapped with previous archaeological testing undertaken by Kerry County Council in 2020 (Connelly 2020). The County Archaeologist confirmed he did not have copies of the relevant reports but had visited the excavations in progress. He confirmed also that no evidence for CH82 was identified during his testing works on the L-1010 road in 2020. The author contacted (by email) the licenced archaeologist responsible for the six 'missing' excavation reports by email on 14 June 2024 and again on 03 July 2024. Summary detail was provided to the author by email on 04 July 2024, and the relevant detail is incorporated into this EIAR Chapter.
HSA-Health and Safety Authority	8 May 2024	Response received from HSA 8 May 2024. No meeting requested by HSA	NA
EirGrid	8 May 2024	Response received from EirGrid 10 May 2024. No meeting requested by EirGrid. the connection is a "contestable" connection. This simply means that the Applicant will build the	EirGrid have reviewed the design and proposed route and are satisfied with the proposal.

Consultee	Date of Letter	Feedback/Comments	Addressed in EIAR
		connection for EirGrid, but once it has been built, the cable will be transferred from the Applicant to EirGrid for ongoing operation, and ESB for maintenance. Consultation with regard to the design has been undertaken with EriGrid and ESB. The design, having been produced in accordance with all relevant EirGrid Functional Specifications, was submitted to EirGrid and ESBN for their review and acceptance. All comments raised were responded to and the design amended where appropriate. During design review EirGrid advised the Applicant that it needs the connection route to be very secure and reliable, as any sudden loss of the connection could cause national problems.	
Department of the Environment Climate and Communications	8 May 2024	Response received from DECC 8 May 2024. No meeting requested by DECC	NA
CRU-Commission for Regulation of Utilities	8 May 2024	Response received from CRU 8 May 2024. A meeting was held with CRU on 14 May 2024 with regards to a project update.	NA
IFI-Inland Fisheries Ireland	8 May 2024	No response received to date.	NA
ESB	8 May 2024	Response received from ESB 16 May 2024 . No meeting requested by ESB Consultation with regard to the design has been undertaken with EriGrid and ESB. The design, having been produced in accordance with all relevant EirGrid Functional Specifications, was submitted to EirGrid and ESBN for their review and acceptance. All comments raised were responded to and the design amended where appropriate.	NA
KCC Fire Department	8 May 2024	No specific response from the fire department received.	NA

The Applicant, entered into a pre-application consultation process with An Bord Pleanála (ABP) ("The Board") under Section 37B of the PDA 2000 (as amended) ("PDA 2000") on 28th Septmber 2023 (ABP Reference ABP - 318119 – 23) and held a pre-application meeting with ABP on 1st December 2023. The Board's Notice of 15th November 2023, as referred to in Section 1.4.1 above, included a list of prescribed bodies which have been notified of the application for the Proposed Development, these prescribed bodies being:

- Department of Planning and Local Government and Heritage (DPLGH).
- Minister of Environment, Climate and Communications.
- Kerry County Council (Kerry Co. Co.).
- Clare County Council (Clare Co. Co.).
- Transport Infrastructure Ireland (TII) / National Transport.
- An Chomhairle Ealaion (Arts Council).
- Heritage Council.
- Failte Ireland.
- An Taisce.
- Southern Regional Assembly (SRA).
- Uisce Éireann.
- Inland Fisheries Ireland (IFI).
- Waterways Ireland.
- Department of Agriculture, Food and Marine (DAFM).
- Environmental Protection Agency (EPA)
- Department of Tourism, Culture, Arts, Gael, Sports and Media (DTCAGSM).
- Health Service Executive (HSE).
- Health and Safety Authority (HSA).
- Commission for Regulation of Utilities (CRU).
- Office of Public Works
- Electricity Supply Board (ESB).
- EirGrid.

MOTT MACDONALD

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 4 - Methodology

July 2024

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Contents

4 Methodology

4.1 Introduction

The Environmental Impact Assessment (EIA) Directive on the assessment of the effects of certain public and private projects on the environment (Directive 2011/92/EU as amended by Directive 2014/52/EU, together the EIA Directive) ensures a high level of protection to the environment and human health, through the use of minimum requirements for undertaking an EIA. The EIA Directive defines EIA as a process that consists of:

- The preparation of an environmental impact assessment report by the developer;
- The carrying out of consultations;
- The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer, and any relevant information received through the consultations;
- The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination and, where appropriate, its own supplementary examination; and
- The integration of the competent authority's reasoned conclusion into any of the decisions.

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 Environmental Impact Assessment Report (EIAR).

The Guidelines on the information to be contained in Environmental Impact Assessment Reports [Environmental Protection Agency (EPA), 2022], hereafter referred to as the EPA Guidelines 2022, describe the EIAR as:

"The EIAR presents the results of a systematic analysis and assessment of the significant effects of a proposed project on the receiving environment. …The EIAR should be prepared at a stage in the design process when changes can still be made to avoid significant 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 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

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;
e. the interaction between the factors referred to in points (a) to (d)".

Article 5 states that an EIAR shall include at least:

2. "a description of the project comprising information of the site, design, size and other relevant features of the project;
3. a description of the likely significant effects of the project on the environment;
4. 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;
5. 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;
6. a non-technical summary of the information referred to in (a) to (d); and
7. 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 EIAR Methodology

The methodology used in preparing an EIAR is in accordance with EIA Directive 2011/92/EU on the assessment of the effect of certain public and private projects on the environment (codification), as amended by EIA Directive 2014/52/EU (the EIA Directive) and the EPA's EIAR Guidelines.

The EIAR also has regard to the European Commission, Environmental Impact Assessment of Impacts, Guidance on the preparation of the Environmental Impact Assessment Report, (European Commission 2017).

4.3.1 Methodology used for EIAR chapters

4.3.2 Receiving Environment

The receiving 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:

"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".

4.3.3 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.

4.3.4 Identification of Potential Receptors

A receptor is defined in the EPA Guidelines 2022 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 have been identified in each technical chapter.

4.3.5 Determining Significance of Effects

The significance of an impact is defined by the sensitivity of the receiving environment and the description (i.e. magnitude/probability/duration) of the predicted impact. Table 4.1 details how effects are described and the matrix that is used in this EIAR for evaluating the significance of environmental effects. This is also presented 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 effect. Where this has been necessary, it has been highlighted within the text. Where significant adverse effects are likely, mitigation to reduce those impacts is required.

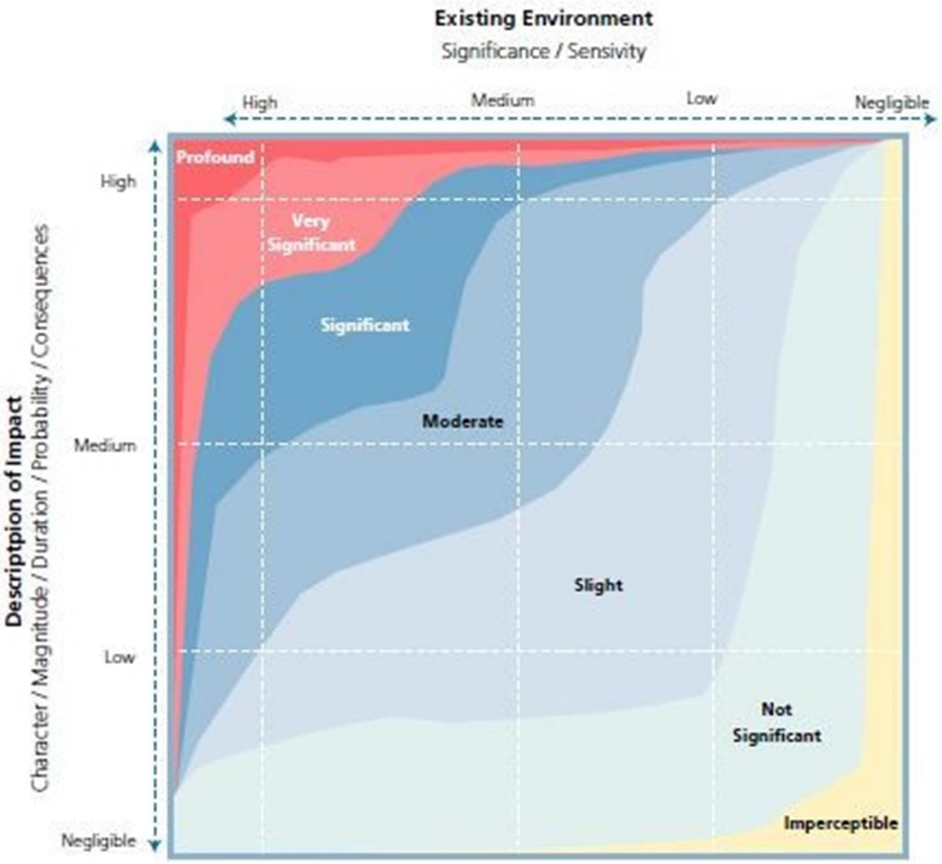
Table 4.1: Description of Effects

Quality of Effects	Positive Effects - A change which improves the quality of the environment, by increasing species diversity; or the improving reproductive capacity of an ecosystem; or be 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)
Significance of Effects	Imperceptible – an effect capable of measurement but without significant consequences

Table 4.1: Description of Effects

	Not significant – an effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight – an effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate – an effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant – 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 – an effect which obliterates sensitive characteristics
Extent and Context of Effects	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 extend, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	Likely effects – the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely effects – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency of Effects	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)

Figure 4.1: Determining the Significance of Impact



Source: EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022)

4.3.6 Mitigation and Monitoring Measures

There are four established strategies for the mitigation of effects - avoidance, prevention, reduction and offsetting. The efficacy of each is related to the stage in the design process at which environmental considerations are taken into account.

Mitigation measures that have been defined for each environmental topic are set out in the technical chapters comprising this EIAR. These mitigation measures relate to the construction, operation, maintenance and decommissioning phases of the project. Mitigations, as proposed, are representative of best practice guidance in the respective specialist technical fields.

The proposed mitigation and monitoring measures will be implemented by means of targeted management plans. A Construction and Environmental Management Plan (including a Construction Traffic Management Plan (CTMP) and Construction Resource Waste Management Plan (CRWMP)) is included as part of this application for consent, which are live documents and will be updated by the developer and any Contractors appointed during the various project phases.

Monitoring provides assurance that proposed systems are operating as intended. This allows adjustments of operations to be made to ensure continued compliance with consent conditions.

4.3.7 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.

4.3.8 Decommissioning

The SLNG substation has a predicated design life of 25 years the decommissioning effects are similar to those of construction assuming that materials are removed for disposal and the site is restored. It is not intended to decommission the proposed EirGrid substations and electricity infrastructure as they will form part of the national electricity grid infrastructure, however, over time elements of the proposed development, for example, cables, may need to be replaced. The activities associated with the decommissioning phase will be similar to those associated with the construction phase. Decommissioning effects are assessed in each technical chapter.

4.3.9 Do Nothing Effects

As outlined in the EPA Guidelines 2022, 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”*.

The Do Nothing scenario is considered in each technical chapter of this EIAR.

4.3.10 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 Guidelines 2022, 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.

Intra-Project Effects

In the case of the proposed development, there is potential for intra-project effects with the overall STEP project and there are also ‘other developments’ which may act cumulatively. Both intra-project and ‘other developments’ are considered in each technical assessment.

The STEP facility includes plans for the following:

- STEP Power Plant - Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19 April 2024 (ABP-PA08.319566).
- Shannon Gas Pipeline – planning permission exists (Ref: PL08.GA0003) for the development of a 26km natural gas pipeline which will facilitate connection from the STEP facility to the GNI transmission network at Leahy’s, west of Foynes, Co. Limerick.
- Strategic Gas Reserve Facility – (ABP-319717) comprising a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works.
- Data Centre Campus – as part of the Masterplan, a data centre campus is proposed to the west of the STEP site.

Other Developments

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. A planning search for applications was conducted in 12 July 2024 (including An Bord Pleanála, Kerry County Council websites). Table 4.2 presents planned developments, from the past five years, along the proposed UGC routes, focusing on developments not associated with extensions, demolition and construction of dwellings and farm buildings, installation of solar panels on roofs etc.as these projects would not have the potential for significant environmental effects.

The environmental assessments presented in this report have had regard to these planned developments in the context of potential for cumulative effects. Each specialist reviewed the projects in Table 4.2 with regard to their potential for significant effects, relevant to their discipline, and these assessments are presented in each technical chapter. In relation to the potential for cumulative effects, prior to commencement of construction and during the construction phase, engagement with the local communities along the proposed route will continue. Where there is potential for works to be carried out at the same time appropriate mitigation measures have been described and will be implemented within the parameters assessed in this EIAR. This includes the scheduling of works and regular liaison meetings to ensure that plans are coordinated, and effects are minimised.

4.3.11 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 Project must be described.

All activities associated with the construction, operation and decommissioning of the proposed development are wholly within Ireland and there is no potential for transboundary effects and as such are not considered further in this EIAR.

4.3.12 Interactions between Environmental Factors

Interactions between effects may arise from the reaction between effects of the proposed development on different aspects of the environment which may exacerbate the magnitude of those effects. These are presented in Chapter 19.

4.4 References

Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Advice Notes for Preparing Environmental Impact Statements (EPA, Draft September 2015).

Table 4.2: Planning Search

Applications within RLB/adjacent to the L-1010

Ref	Location	Developer	Decision date / grant	Description	Distance	Notes
18878	Kilpaddoge, Tarbert, Co. Kerry	Shannon Clean Tech Ltd	23.09.2019	For a 10 year permission to construct a battery energy storage system (bess) facility on a total site area of up to 0.6ha that will provide gird balancing services to the Irish electrical grid. Third Party Appeal to Appeal to ABP (305739-19). ABP granted permission.	~1km	ePlan - Online Planning Details

Applications within Kerry County Council administrative boundary – radius of 10km

Reference	Address	Developer	Grant Date	Description	Distance	Notes
19115	Kilpaddoge, Tarbert, Co. Kerry	Glencloosagh Energy Limited	07.02.2020	For a 10 year permission for a grid stabilisation facility comprising of: the construction up to 4 no. rotating stabilisers, 5 no. battery storage containers, 1 no. control room, 2	1km	ePlan - Online Planning Details
ABP 304807-19	Townlands of Aghanagran Middle, Aghanagran Lower, Ballyline West, Tullahennell South, Ballylongford, Co. Kerry	The Ballylongford Wind Farm Group	06.01.2020	Construction of a Windfarm consisting of up to 6 Wind Turbines. Previously refused by Kerry County Council (19381)	7km	304807 | An Bord Pleanála (pleanala.ie)
VA03.307798	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	EirGrid Plc	04.06.2021	Installation of 400kV electricity transmission cables, extension to the existing Kilpaddoge Electrical Substation and associated works, between the existing Moneypoint 400kV Electrical Substation in the townland of Carrowdoita South County Clare and existing Kilpaddoge 220/110kV Electrical Substation in the townland of Kilpaddoge County Kerry. The development includes work in the foreshore.	1km	307798 | An Bord Pleanála (pleanala.ie)

Applications within Kerry County Council administrative boundary – radius of 10km

20850	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	Kilpaddoge Green Engergy Ltd.	12.11.2020	For changes to the previously permitted peaker power plant development (planning ref. 13/138). It is proposed to change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.	1km	ePlan - Online Planning Details
21/549		Donal Muprhy Glencloosagh Energy Limited	Granted: 20/08/2021	10 year planning permission for a high intertia synchronous compensator compound containing electrical equipment containers including a 220 kV high voltage gas insulated switchgear (GIS) substation compound containing a GIS substation building, a battery storage compound containing 5 no. battery storage containers, enclosed in steel containers, associated elements comprising various underground cables and ducts, and all necessary works. The planning application is on lands where grid stabilisation facility was previously permitted under planning register no 19/115.	1km	ePlan - Online Planning Details
21/305 and ABP 310521	Kilpaddoge Tarbert Co. Kerry Kilpaddogue Tarbert	Ontower Ireland Limited	Granted: 29/11/2021	Retain an existing telecommunications support structure (previously granted under Reg. Ref. 11/969 and ABP Ref. PL08.240232) together with associated ground equipment, security fencing and access track at Kilpaddoge, Tarbert, Co. Kerry.	1km	ePlan - Online Planning Details
20/438 and ABP appeal Ref. 308643	Meelcon, Carhoona, Farranawana, Tarbert,Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co Kerry,	Ballylongford Windfarm Group	Granted: 21/06/2021	Amendment to previous granted permission which related to change in connection grid route for wind farm. A NIS was submitted with this application. The revised route will entail the construction of approximately 12.1km of 38kV underground electric cable connecting the existing permitted windfarm (19/381) to the 38Kva/110Kva substation at Kilpaddoge, Tarbert, County Kerry. The underground cables will be located along the public roads R-551, R552 and L-1010 and along 2 sections of private property. The development will also consist of the connection of the permitted windfarm (19/381), via existing permitted underground electricity cable.	~1km	ePlan - Online Planning Details
19/381 and ABP appeal Ref. PL08.304807	Aghanagran Middle And Lower, Ballyline West And Tullahennel South, Ballylongford Co Kerry	The Ballylongford Windfarm Group	Granted: 06/01/2020	Construction of a windfarm consisting of up to 6No. Wind Turbines	7km	ePlan - Online Planning Details

Applications within Kerry County Council administrative boundary – radius of 10km

	Aghanagran Middle And Lower Etc.					ePlan - Online Planning Details ePlan - Online Planning Details
18/392	Tarbert Island Tarbert Co Kerry Tarbert Island	SSE Renewables (Ireland) Ltd	Granted: 18/02/2019	10-year permission to construct a battery storage facility within a total site area of up to 2.278ha, to include 50 no. self-contained battery container units with associated HVAC cooling units, 13 converter and 13 step up transformer container units, associated compound cabling and ducting, a grid transformer, a single storey substation / control building with welfare facilities, a cable route grid connection to the existing ESB substation building	2km	ePlan - Online Planning Details
ABP-302681-18	Tullamore, Drombeg , and Coolkeragh, Listowel, Co. Kerry	Terra Solar Ii Ltd	22.05.2019	Planning permission with a duration of 10 years for a solar PV farm with an operational lifespan of 35 years to export up to 50MW of electricity to the national grid. Previously refused by Kerry County Council.	10km	
1825	Beal East, Ballybunion, Co. Kerry	Dan Ahern (Portfinch Ltd.)	19.01.2019	Solar PV farm consisting of a solar PV array of approximately 12.5 ha of solar panels within a total red line boundary of 14.16 ha.	12km	ePlan - Online Planning Details
ABP-304807-19 (19381)	Aghanagran Middle and Lower, Ballyline West and Tullahennel South, Ballylongford, Co Kerry	The Ballylongford Windfarm Group	06.01.2020	10-year planning permission for the construction of a wind farm consisting of up to 6 wind turbines. Previously refused by Kerry County Council.	6km	304807 | An Bord Pleanála (pleanala.ie)
ABP-308643-20 (20438)	Meelcon, Carhoona, Farranawana, Tarbert,Doonard Upper and Lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare South, Gurteenavallig, Co Kerry	The Ballylongford Windfarm Group	21.06.2021	Amend a previously granted permission (Ref 19381, Ref: 304807- 19) which relates to a change in the grid connection route for the permitted wind farm. The revised route will entail the construction of approximately 12.1km of 38kV underground electric cable connecting the existing permitted windfarm (19/381) to the 38kva/110kva substation at Kilpaddoge, Tarbert. Refused by Kerry County Council on the 28.10.2020.	~1km	308643 | An Bord Pleanála (pleanala.ie)

Applications within Kerry County Council administrative boundary – radius of 10km

ABP-309156-21	Townlands of Ballyline West, Coolkeragh, Dromalivaun and Tullamore, Co. Kerry	Shronowen Wind Farm Ltd.	27/09/2022	For a 10-year permission for 12 wind turbines, substation, grid connection and ancillary site works.	8km	309156 | An Bord Pleanála (pleanala.ie)
ABP 308643 (20438)	Meelcon, Carhoona, Farranawana,Tarbert,Doonad upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co Kerry	Ballylongford Windfarm Group	21/6/2021	Amendment to previous granted permission which related to change in connection grid route for wind farm.	~1km	308643 | An Bord Pleanála (pleanala.ie)
ABP 318540	Tarbert Island, Tarbert, Co. Kerry. (www.ssetarbertnextgen.com)	SSE Generation Ireland Ltd	Case is due to be decided by 05/06/2024	10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works	3km	318540 | An Bord Pleanála (pleanala.ie)
23284	Ballymacasy, Coolnagraigue, Ballyline East, Ballyline West, Leanamore And Dromalivaun, Co Kerry	Harmony Solar Kerry Ltd	17/10/2023	Apply for a 10 year permission and 40 year operation for a solar farm of 146.6 hectares, on 3 no. land parcels consisting as described herin: west parcel (ballymacasy, ballyline east and ballyline west townlands) c 58.48 hectares, central parcel (coolnagraigue townland) c. 53.8 hectares and east parcel (leanamore and dromalivaun townlands) c 34.32 hectares, a route corridor for an under ground internal electrical cable connecting the west and central parcels to the east parcel consisting of c 3772 meters in length.	5km	ePlan - Online Planning Details
ABP 318912 / 23431	Tullamore, Listowel, Co. Kerry	Gaofar Limited	Appeal withdrawn, approved by KCC 18/12/2023	Substation and associated works to reduce quantum of solar panels required for solar farm. An NIS accompanies this application.	10km	318912 | An Bord Pleanála (pleanala.ie)
2360050	Townlands Of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh, And Tullamore, Co. Kerry	Gaofar Limited	Decision Date:23/01/2024	A new grid connection route connecting the permitted Ballylongford windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanala ref- PL08.304807) at Aghanagran Middle And Lower, Ballyline West And Tullahennel South, Ballylongford, to the proposed 38kVsubstation (Kerry County Council planning ref 23/431) at Tullamore, Listowel, Co Kerry. The route will entail the installation of approximately 7.3km of 38kv	6km	Final grant has not been issues yet, still open to appeal.

Applications within Kerry County Council administrative boundary – radius of 10km

				underground electric cable passing through townlands of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh, and Tullamore in County, Kerry The proposed grid route is proposed to be via underground cables located along the public roads : L10028, R552, and L-1009, and private property. The new grid route is a change a previously granted permission for a 12.1km grid connection route (Kerry County Council planning ref 20/438) (An Bord Pleanala ref- PL08308643) from the permitted wind farm to the 38kva /110kva substation at Kilpaddoge, Tarbert. The proposal includes alterations to the permitted windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanala ref- PL08.304807), the permitted 38 kV substation at the wind farm is to be relocated and redesigned. The altered substation proposal will be located in a new substation compound that includes a control building, and all associated electrical plant and apparatus, fencing, and an access track within the townland of Aghanagran Lower. The proposed substation at the windfarm will be connected to the windfarm via underground cabling from Turbine T4.		ePlan - Online Planning Details
ABP 315838	Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	SSE Generation Ireland Ltd	Under construction	Application received under Section 4 of the Development (Emergency Electricity Generation) Act 2022 (the Act) for a designated development (construction of a temporary, 5 year, 150MW emergency generation plant – limited to a maximum of 500 operational hours per annum) located at Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	3km	Emergency Electricity Generation 315838 | An Bord Pleanála (pleanala.ie)
CCC 2450143 ABP 319961	Ballykett, Tullabrack East, Tullabrack West, Tullabrack and Gower South, Kilrush, Co. Clare.	Ballykettt Green Energy Ltd.	Case is due to be decided by 22/10/2024	Four turbine wind farm, electrical substation, grid connection to Tullabrack 110kV substation, met mast and all associated infrastructure. The planning application is accompanied by an Environmental Impact Assessment (EIAR) and a Natura Impact Statement (NIS)	10km	319961 | An Bord Pleanála (pleanala.ie)

Foreshore Licences/ Maritime Usage Licence

Reference	Developer	Location	Grant Date	Description	Distance
LIC230008	ESB	Moneypoint Generating Station, Co. Clare	Lodged Nov 2023	ESB intends to undertake a survey campaign at the Moneypoint Generating Station site to inform the engineering design of the proposed Moneypoint Hub Project. The marine surveys will include geophysical, geotechnical, environmental, and met ocean surveys.	4km

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 5 - Description of the Proposed Development

July 2024

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5 Description of the Proposed Development

5.1 The Proposed Development

The proposed development consists of two 220kV substations and two 220kV underground cable circuits between the Shannon Technology and Energy Park (STEP) Power Plant and the existing line cable interface mast adjacent to the existing Kilpaddoge Substation, which in turn feeds into the electricity network. The proposed development will be known as the Shannon Technology and Energy Park 220kV Grid Connection.

The proposed development will include:

- Approximately 5km of two 220kV underground cables (ca. 2.2km within the L-1010 and ca. 2.8km off road in greenfield land).
- Two 220kV Gas Insulated Switchgear (GIS) substations, including two-storey GIS buildings and associated transmission infrastructure.
- A 50MVAr shunt reactor including all ancillary equipment.
- Buried optical fibre within the cable ducts from the proposed Glansillagh GIS substation to the Line Cable Interface Mast (LCIM) at Kilpaddoge

The cable route originating at the substations, will then be routed adjacent to the STEP facility access road, public road and private lands. The cable will be installed on STEP-owned lands, ca. 2.2km will be installed under public roadway (L-1010) with the last section located off road in private lands (the total off road sections are ca. 2.8km), as shown in Figure 5.1.

The cable route terminates at a Line Cable Interface Mast in proximity to Kilpaddoge substation. One of the underground cables will be jointed into an existing cable on the existing LCIM and the other underground cable will connect to an existing underground cable route, via a joint bay, to feed into the Kilpaddoge substation.

The proposed substations will comprise an EirGrid/ESBN 220kV substation, named Glansillagh 220kV substation, and one SLNG 220kV GIS substation, named Knockfinglas 220kV substation, located adjacent to each other and adjacent to the STEP Power Plant, as shown in Figure 5.1.

The proposed substations and reactor will be located directly to the west of the proposed STEP Power Plant, approximately 250m south of Shannon Estuary and approximately 400m north of the nearest public road, the L-1010. The proposed substations are located within the planning application boundary of the STEP Power Plant project.

Figure 5.1: Proposed Development for the Shannon LNG Grid Connection Project

Source: Mott MacDonald

Kerry County Council has obtained Part 8 planning for the widening of the L-1010. The road widening works will include the ducting and joint bay installation for the 220kV cables under the L-1010 and will be undertaken by Kerry County Council, or their subcontractors, in advance of the proposed development. These works will be fully funded by the Applicant by means of a special development contribution under section 48(2)(c) of the Planning and Development Act 2000 to cover the full cost of the upgrade works including the ducting and joint bay installation.

5.2 Overview of the Receiving Environment

The proposed development is located in County Kerry, south of the Shannon Estuary, west of Tarbert.

The substations associated with the proposed development will be located adjacent to the proposed power plant facility, approximately 4.5km to the west of Tarbert and approximately 3.5km to the east of Ballylongford. The proposed development occupies part of the following townlands; Ralappane, Kilcolgan Lower, Kilcolgan Upper, Carhoonakineely, Carhoonakilla, Cockhill, Carhoona, Coolnanoonagh, Farranawana and Kilpaddoge.

At the westerly point of the proposed development, the Lower River Shannon Special Area of Conservation (SAC) is approximately 150m to the north and west of the proposed substation/cable route. The River Shannon and River Fergus Estuaries Special Protection Area (SPA) is approximately 500m to the north and west and Ballylongford Bay proposed Natural Heritage Area (pNHA) is approximately 400m to the west of the proposed substation/cable route. At the easterly point of the proposed development, where the connection to the existing network is proposed, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are approximately 400m from the proposed development.

The proposed substations are to be located in agricultural pastural lands which comprise primarily of improved agricultural grassland, dry calcareous and neutral grassland, scrub, hedgerows and drainage ditches and depositing/lowland rivers immediately to the southwest and northwest of the proposed substation site.

The proposed underground cable route will cross the Ralappane Stream which discharges into the Shannon Estuary and is fed by smaller drainage ditches along its course. The Ralappane Stream drains directly to the Shannon Estuary via a tidal wetland area to the west of the STEP Power Plant site.

The topography of the land along the proposed development cable route is generally undulating and there are some occupied properties, along and adjacent to the L-1010 carriageway. Tarbert Comprehensive School is located along the L-1010. There is a ferry which runs from Tarbert to Killimer in Co. Clare, this is located to the east of the proposed development.

5.3 GIS Substations

The proposed 220kV substations are approximately 50m by 18.5m. The proposed layout is shown in Figure 5.2. Access to the site will be via the STEP Power Plant site access road from the junction of the L-1010 to the site, detailed under the STEP Power Plant Planning Application ABP-PA08.319566.

As set out in the drawing number 229100682-MMD-04-XX-DR-E-0100, the key components of the each of the two proposed 220kV substations and compounds comprise:

- 220kV GIS building
- Lightning Protection Rods
- Lighting Poles
- Interface kiosks (1 No.)

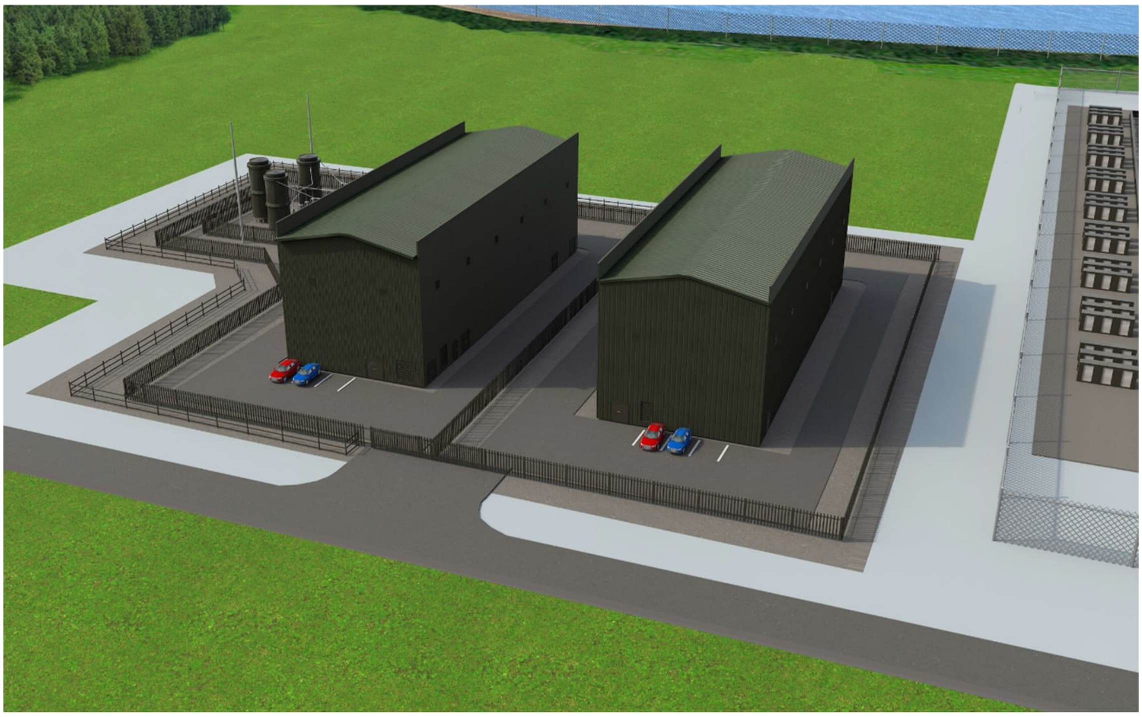
- Property Fence/gates
- Palisade Fence/gates
- Distribution System Operator (DSO) Compound

The EirGrid/ESBN Substation includes external Air Insulated Switchgear (AIS) equipment comprising:

- Cable Sealing End
- Surge Arrestors
- Shunt Reactors
- Current Transformers
- Lightning Masts
- Lighting Poles

The external electrical equipment will not exceed 10m in height with the exception of the lightning protection monopoles which are approximately 18.5m in height.

Figure 5.2: 220kV Gas Insulated Switchgear (GIS) substations and construction compound following landscaping



Each 220kV GIS building will comprise a two-storey over partial basement structure. It will house the new gas insulated switchgear, comprising Sulphur Hexafluoride (SF_6) insulated circuit breakers, disconnectors and other high voltage equipment. Auxiliary services equipment, such as control and telecoms equipment, low voltage switchgear, an emergency diesel generator, and batteries. Welfare facilities (i.e. toilets, sinks, messroom, workshop.) will also be located within the EirGrid/ESBN substation building. The underground cables will connect with the substation via the partial basement, which will be designed to prevent any water ingress.

A below ground earth grid will be installed in a grid arrangement approximately 600-750 mm below the finished surface. The earth grid will consist of bare stranded copper conductor with an outside diameter of approximately $95mm^2$. The purpose of the earth grid is to ensure personnel and public safety during electrical faults that may occur on the transmission grid.

Fencing around the entire EirGrid/ESBN substation compound, with the exception of the site entrances/gates, will comprise of external 1.4m high post-and-rail property fencing and internal 2.6m high galvanised steel palisade security fencing with black powder coat. Fencing around the SLNG substation compound will comprise a 2.6m high galvanised steel palisade fence with black powder coat.

Directional light fittings have been incorporated within the plan in order to minimise light pollution in the surrounding area. Lighting contours can be seen in drawing 229100682-MMD-03-XX-DR-E-0213.

The locations of outdoor equipment are detailed within planning drawing 229100682-MMD-04-XX-DR-E-0100.

The dimensions of the proposed structures on the GIS substation and compound site are summarised in Table 5.1.

Table 5.1: Approximate Dimensions of GIS Substation Building and Overground Structures

Structure	Number of Structures	Length (m)	Width (m)	Height (m)
EirGrid/ESBN 220kV Substation Building – Glansillagh	1	49	18.5	17.0
SLNG 220kV Substation Building - Knockfinglas	1	50	18.5	17.0
Lightning Rods (6 per building)	12	n/a	n/a	2
Lightning Masts	2	n/a	n/a	18.5
Shunt Reactor	3	3.4	3.4	10
Cable Sealing End (with associated steelwork)	3	n/a	n/a	6.2
Post Insulators (with associated steelwork)	6	n/a	n/a	6.2
Surge Arrestors (with associated steelwork)	6	n/a	n/a	6.2
Lighting poles	4	n/a	n/a	2.5
DSO compound	1	5	5	2.6 (fence)
Property Fence	1	n/a	n/a	1.4
Palisade Fence	1	n/a	n/a	2.6

Source: Mott MacDonald

The building will comprise a typical industrial form, with a structural steel frame clad with profiled metallic sheet wall and roof cladding. Internal walling of masonry will be adopted, except where specific load carrying requirements necessitate the use of reinforced concrete walls.

Industrial claddings will be factory finished according to EirGrid specification and will match the STEP Power Plant. The roof will be shallow pitched and constructed of profiled metal decking on purlins spanning between rafters. The buildings will have access gantries and walkways for access to equipment. These will be constructed of stainless/galvanised steel open grating type flooring supported on steel beams and columns.

External doors and escape doors will generally comprise metal flush doors and mild steel frames. Fire doors will comply with *BS 476-22:1987 - Fire tests on building materials and structures*.

The ultimate choice of finish and colour of the metal cladding coating will be made considering the specified service life, resistance to degradation under long term exposure to climatic conditions and will comply with the requirements of the statutory approval, if granted. A typical 220kV GIS Substation Building is shown in Figure 5.3.

Figure 5.3: Typical 220kV GIS Substation Building

Source: Mott MacDonald

5.3.1 Operation and Maintenance

During the operational phase, the Glansillagh 220kV substation will be monitored/operated by EirGrid. Operations at the substation will involve six to eight visits per month by ESB personnel, a quarterly inspection site visit and maintenance visits when required. The Knockfinglas substation will be operated and maintained by the Shannon LNG Limited and will be subject to the STEP Power Plant Industrial Emissions (IE) licence.

The EirGrid/ESBN substation and SLNG substation will be serviced with a low voltage electrical supply from a connection to the existing 400V overhead line adjacent to the site. This connection is exempt for planning purposes and will be subject to agreement with ESBN. An emergency diesel generator (less than 400 KVA) will also be provided to supply back up power for the ancillary electrical services in each substation, and will be used in rare cases, such as the loss of main power. The generator will be located in a dedicated room within each GIS building with appropriate fire rating, ventilation and bunding.

5.4 Underground Cables

The proposed underground cable development will comprise two 220kV electricity cables and fibre optic cables to facilitate the connection of electricity generated at the power plant facility to the national grid.

Connection will be via two 220kV underground cables (UGC) approximately 5km in length passing adjacent to the site access road, the L-1010 and then through agricultural lands to a feed in loop adjacent to the existing Kilpaddoge Substation.

Access to the UGC will be via the access road to the STEP Power Plant facility, detailed under ABP-PA08.319566. Access to the greenfield lands to the east will be via existing private tracks.

Access to the joint bays to the west of the LCIM and at the LCIM is required by EirGrid and stone access tracks will be provided.

The underground cable route also includes ancillary works such as, clearance of laydown areas, use of a temporary compound adjacent to the proposed substations, and three temporary laydown areas. The location of these is shown on drawings 229100682-MMD-04-XX-DR-E-0011 to 229100682-MMD-04-XX-DR-E-0018. The proposed development will incorporate the following:

- There are 14no. joint bays proposed (to accommodate both 220kV cable circuits), with communication chambers and link boxes;
- Water and utility crossings, including Horizontal Directional Drilling (HDD) at crossing of the Kilpaddoge substation access road);
- Temporary construction compounds including associated site works and ancillary staff facilities and parking; and
- All associated and ancillary above and below ground site development works, including works comprising or relating to permanent and temporary construction and roadworks and excavation including HDD of substation access road and vegetation clearance.

The UGC will be installed in a flat formation. The assessments included in this EIAR is based on a flat formation which has a wider trench width.

5.5 Description of the Construction Phase

5.5.1 Construction Phase Activities - Substations

General construction phase activities associated with the substation are set out below.

The site preparation works will be undertaken as part of the STEP Power Plant project (described under Planning Application ABP-PA08.319566) and will include:

- Demarcation of construction works areas, clearance, and site levelling to prepare the works area. As the substations are to be located on an area set aside for the STEP Power Plant laydown area, the site levelling works will be completed as part of the STEP Power Plant enabling works.
- Topsoil will be stripped using excavators. The topsoil will be stockpiled within the demarcated boundary. The grounds will be built up to a finished ground level of 18-20 metres above ordnance datum.
- Stone for compound surfacing will be graded into place using excavator.

The main civil works for constructing the new GIS buildings will include:

- Foundations works
- Structural steelwork erection
- Cladding and building finishing works
- Permanent water supply and drainage works
- Miscellaneous civil works: paving, landscaping, permanent fencing and completion of works.

Foundation Works

Foundation construction will commence after the completion of STEP Power Plant site clearance and grading. The foundation installation will involve excavation, form work, steel reinforcement, and concrete placement. Foundations will be designed in accordance with the appropriate and relevant EirGrid Technical Specifications. Excavated material will either be reused on-site or disposed of off-site in accordance with applicable requirements under the Waste Management Act 1996, as amended and associated regulations.

When the foundations have been set, the copper earth mat will be installed into the soil in and around the foundation and will cover the entire substation compound. The earth mat installation and permitted operating limits will be designed in accordance with the appropriate and relevant EirGrid Technical Specifications.

Structural Steelwork Erection

Following the installation of the foundation and earth mat, construction activities will shift to the erection of structural steelwork. The GIS Building will be a steel portal two storey building over partial basement constructed in accordance with EirGrid technical specification. The ground floor level will include service rooms, loading bay, generator room, relay room, battery room and access to the cable basement area. The first-floor area of the building will be constructed to accommodate the 220kV switchgear assembly and a storeroom.

Cladding and Building Finishing Works

Cladding and building finishing works and the installation of building services, e.g. drainage, internal circulation road, will be undertaken once the structural frame and steel support structures are completed.

A fire detection and alarm system will be specified during the detail design of the substation in compliance with EirGrid requirements. A Fire Safety certificate application to Kerry County Council will be made in advance of construction in accordance with the standard approach for the construction of substations.

Miscellaneous Civil Works: Paving, Landscaping, Permanent Fencing and Completion of Works

Fencing around the entire substation compound, with the exception of the site entrances, will comprise a 2.6m high palisade security fencing, as shown on Drawing No. 229100682-MMD-04-XX-DR-E-0305. The proposed EirGrid/ESBN GIS substation will also have a 1.4m high concrete post-and-rail property fence along the perimeter of the substation site. The installation of these fences will comprise root mounted posts (posts driven into ground). There will be negligible ground borne vibration due to relatively small diameter of these posts. This would negate the requirement for pad footings below each post.

Electrical Installation of GIS plant will be delivered to the substation compound and unloaded within the GIS building loading bay. The gantry crane located within the hoisting area will lift the GIS plant to the first storey of the building and position it appropriately within the GIS Equipment Room. The plant will then be bolted together in place. Following the installation of plant within the GIS building, wiring and cabling of GIS plant and associated protection and control cabinets will be undertaken to the specifications and standards set out by the manufacturer.

5.5.1.1 Outline Construction Schedule and Timing of Works - Substations

Subject to the grant of statutory approval, it is expected that construction will commence in October 2026, following the enabling works, earthworks and site preparation works for the STEP Power Plant which are anticipated to start in January 2026 as per STEP Power Plant Planning Application (ABP-PA08.319566). These dates are indicative and subject to change.

The overall duration of the construction phase is expected to be approximately 27 months for both the substations and underground cables.

For the substations, construction activities will gradually phase out from pre-construction to predominantly civil activities followed by commissioning and testing of the substation and equipment. It is expected that the number of construction workers required throughout the duration of the construction phase will peak at approximately 60 persons for the substation, and up to three crews of 5 to 8 persons for the cable system. Some of the activities noted in Table 5.3 will be carried out in parallel.

The majority of the construction activities are not dependant on outages on the existing transmission system.

Table 5.2: Indicative Construction Programme - Substations

Construction Phase	Activity	Approximate Timeline
Site Preparation (GIS Substation)	Preliminary site Drainage Works Site Preparation and Groundworks Drainage Permanent Fencing Installation Ducting for cable circuits to Demand Customer from substation to transition pit	18 Weeks
GIS Substations (civils)	Civil construction of new GIS Substation Building Compound levelling and finishing surface	34 weeks
GIS Substations (electrical)	Electrical Installation Pre-commissioning	32 weeks
Substation Energisation	Final commissioning and energisation	12 weeks

5.5.2 Construction Phase Activities - Underground cabling

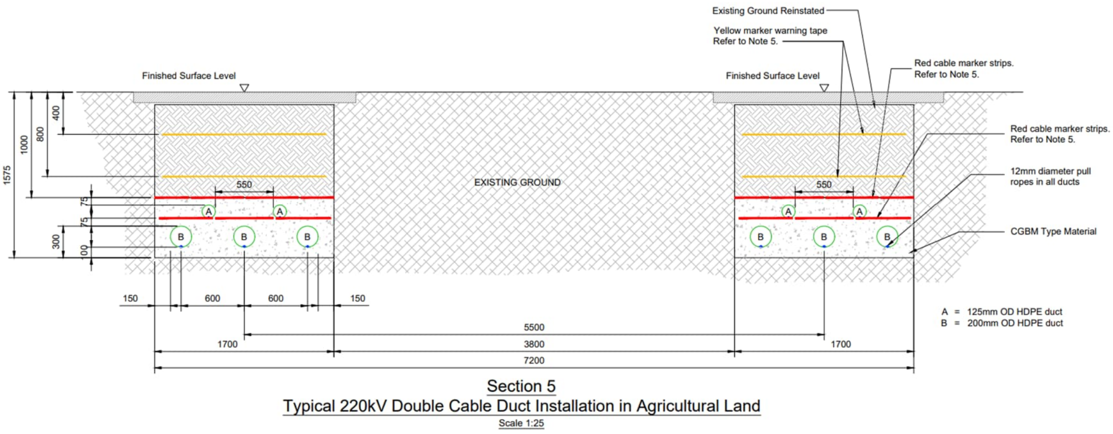
The following sections describe the proposed construction phase activities associated with the installation of the two proposed underground cables.

Following the consenting of the proposed development, should this be the case by ABP, there will be a process of pre-construction detailed design and micro-siting of the grid infrastructure. This will occur within the parameters and assessments of the approved development; any micro-siting which extends outside such parameters, for example outside the red line application area, will be subject to post-consent modification in accordance with the provisions of statutory legislation, as required. Throughout the design and assessment process, all reasonable and practically achievable measures have been taken to minimise and avoid impacts.

5.5.2.1 Trenching and Ducting

The standard trench dimensions for a single 220kV cable circuit in agricultural lands in flat formation is a width of 1.7m and depth of 1.575m with a centre-to-centre spacing of 5.5m, to allow for standard formation proposed for location within trenching for greenfield routes. Refer to Figure 5.4.

Figure 5.4: Double Trench Cross Section within Agricultural Lands



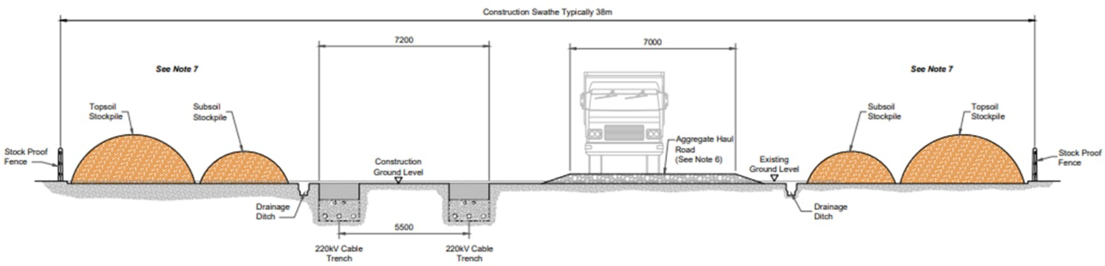
Following excavation of the trench and bedding material, Cement Bound Granular Material (CBGM) will be laid, the ducts put in place, protection strips laid on top and the trench will be backfilled.

The duct installation will progress sequentially starting at one joint bay and moving towards the next joint bay along the route. The construction area will move in tandem with the progress of the duct installation, with only the relevant portion of the section cordoned off while under construction.

If there are excavations required where there are existing utilities, hand digging and the use of smaller excavators may also be required.

For cross-country sections, a temporary working strip of approximately 38m in width is proposed (Figure 5.5).

Figure 5.5: 220kV Cable Trench in Flat Formation Typical Construction Swathe in Private Lands



The working strip is required for the following reasons:

- To facilitate the storage of topsoil which must be removed from:
  - The footprint of the temporary construction access track (typically up to 5m in width).
  - The footprint of the cable trench.
  - A buffer strip between the temporary access track and the trench (for safety).
  - Subsoil storage area.
  - Materials storage areas.

- To facilitate the laying of the temporary construction access track alongside the cable trench to allow for the movement of construction equipment and materials along the section of the route on the farmland.
- To facilitate the excavation of the cable trench and the installation of the cable ducting.
- To facilitate the storage of distinct layers of subsoils excavated from the cable trench in segregated piles for later reinstatement to the original soil profile.

Approximately 30-50 m of trenching and ducting is completed in a day, dependent on conditions and location. Figure 5.6 illustrates a trench within agricultural lands.

Figure 5.6: Typical underground cable construction in agricultural lands

5.5.2.2 Cable Installation and Jointing

The cables will be brought to site on cable drums which will then be placed into position. Once the drum is set up, a winch system at the remote joint bay location(s), including pulling cable, will be attached to the nose of the cable and rollers will be used to guide the cable end towards the duct. The cables will then be pulled into the duct with lubrication being applied to the cable and duct throughout the process in order to control pulling tensions.

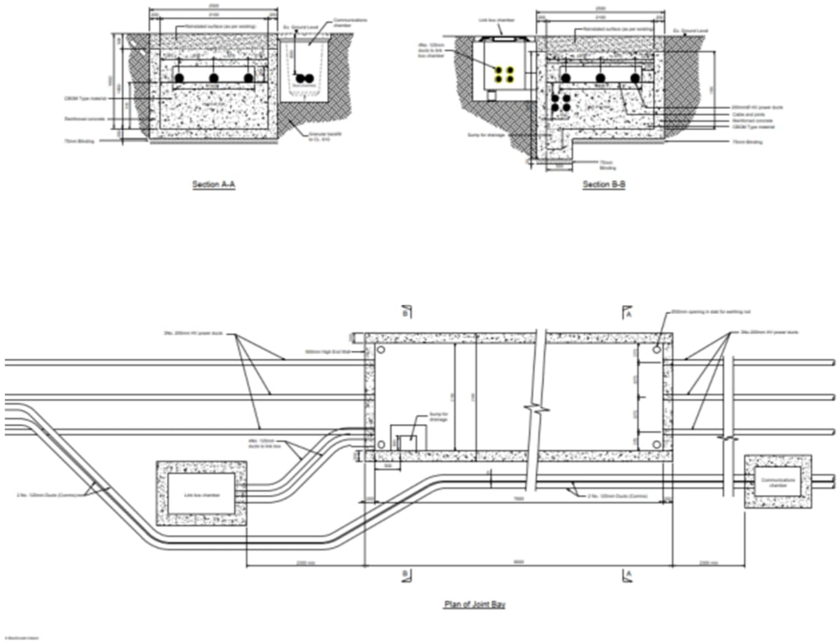
A bend radius of typically 20m or greater is used to navigate changes in direction for the cable route. The bend radius can be reduced to 6m to navigate very tight corners however as this introduces increased pulling tensions when installing the cable, it is used sparingly and only where required.

As detailed previously, joint bays will be required to be installed along the cable route to join consecutive lengths of cable and to facilitate cable pulling.

The width of the joint bays and the nature of the road network in the area means that partial road closures and diversions may be required in some areas along the route during cable installation. However, all reasonable and practically achievable measures, such as moving of equipment and placing temporary covers over the joint bays to allow essential access for vehicles, will be implemented to facilitate local access requirements for emergency services, residential and commercial purposes. Chapter 17 Roads and Traffic details proposed traffic management measures. Specific traffic management requirements and localised arrangements will be developed by the appointed contractor(s) and will be agreed in advance of implementation with the appropriate local authority.

Joint bays generally consist of precast concrete walls and base located below ground with typical approximate dimensions of 8m length x 2.5m width x 2.3m depth for 220kV joint bays. The length of the joint bays may be longer subject to the requirements of the cable manufacturer. Sand or lean mix concrete will be used as required as a blinding layer to the underside of the chamber. The ducts will be installed to each end of the chamber, then proven, cleaned and sealed. Figure 5.7 illustrates an indicative joint bay, Figure 5.8 illustrates a pre-cast joint bay and Figure 5.9 illustrates the cable pulling set up.

Figure 5.7: Indicative Joint Bay



Source: Mott MacDonald

Figure 5.8: Pre-cast Joint Bay prior to Cable Installation

Figure 5.9: Typical Set-Up of HV Cable Pulling Procedure

5.5.2.3 Cable Crossing

Underground cabling crossings on the Kilpaddoge substation access road are proposed to be crossed by HDD. Crossing underneath overhead power lines will require mitigation during the construction phase ensuring that a suitable distance from the cabling is maintained by construction equipment and staff, and staff welfare and safety is maintained.

5.5.2.4 Water crossings

There will be a crossing at the Ralappane Stream which will be an open cut crossing.

Kerry County Council will construct a second crossing of the Ralappane stream and a crossing of the Farranawana stream under their Part 8 consent for the L-1010 road widening works.

Open Cut Crossings

Open cut water crossings have the potential to generate silt and suspended solids. In order to reduce the risk of discharging sediment it is proposed to carry out all of these works in a dry works area.

The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. Techniques include the use of inflatable dams, frame dams or, in smaller watercourses, sandbags (double-bagged and underfilled; containing only clean washed sand).

Water pumped from the dry works area will be treated using settlement tanks to remove sediment prior to discharge back to the watercourse. In consultation with Inland Fisheries Ireland (IFI), greater filtration of silt may be achieved prior to discharge, through proposed use of silt de-watering bags which trap silt and expel only clean water and can be left to biodegrade on riverbanks as a habitat enhancement measure.

Water will be conveyed over the isolated section of channel by pumping or the use of a temporary diversion. Where sufficient capacity is available, and there is no risk of excessive scour, the diversion will be within the footprint of the existing channel.

The existence of a temporary impermeable barrier within the channel, will have a direct impact on the cross section of the channel and is expected to give rise to localised changes in water depth, velocities and sediment erosion / deposition.

Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.

Open cut trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie) and works will not take place at least during yellow, orange and red weather warnings. The Contractor's Environmental Clerk of Works (EnCOW) will monitor this daily and will provide reports for audit.

Unless otherwise agreed with IFI, any element of the works requiring instream works will be restricted to the fisheries open season (i.e. between July and September inclusive). Where trenching (instream) works are proposed, electrofishing may be required to remove fish under licence from IFI. Method statements will be developed in agreement with IFI for the works.

The following will be ensured.

- Use of flume pipes (as appropriate) to allow continual flow.
- Use of closed buckets for backhoe dredgers and use of silt screens.
- Daily field monitoring of turbidity to maintain increases below 10 Nephelometric Turbidity Units (NTU's) in any 24-hour period.

Further measures in relation to water quality are discussed in Chapter 8.

5.5.2.5 Connection to Kilpaddoge and Tarbert Substations

The two underground cables will connect to the national transmission network via two separate connections.

The connection to the Tarbert substation is via a LCIM, as shown in Figure 5.10.

Figure 5.10: Line Cable Interface Mast

Source: Mott MacDonald

One of the underground cables will be jointed into the conductor on the existing LCIM, from where it will connect to the Tarbert substation via the existing overhead line.

The second underground cable will connect to an existing underground cable at the LCIM, via a joint bay, to feed into the Kilpaddoge substation.

The connection of the underground cables to the existing cable and conductor will require an outage.

From the Kilpaddoge and Tarbert substations there will be connection to the wider existing grid network.

5.5.2.6 Indicative Construction Programme – Underground Cabling

Table 5.3: Indicative Construction Programme – Underground Cabling

Construction Phase	Activity	Approximate Timeline
Civil Works		
	Pre-construction	12 weeks
	Trenching and ducting works and temporary reinstatement	30 weeks
Total		42 weeks
Electrical Works		
	Pre-construction works	4 weeks

Construction Phase	Activity	Approximate Timeline
	HV cable joint bay re-excavation	3 weeks
	Proving of ducting/HV cable jointing	2 weeks
	HV cable jointing	28 weeks
	HV cable commissioning (sheath test, cross bonding and HV/AC testing)	4 weeks
	Permanent re-instatement of joint bays (Civils contractor)	3 weeks
Total		44 weeks

5.5.3 Temporary Construction Compounds

A main temporary laydown area will be located adjacent to the proposed substations, beside the main STEP Power Plant. Three smaller temporary laydown areas are also proposed, one south of the main temporary compound and adjacent to the access road and two to the east of the proposed development in proximity to the LCIM.

Temporary facilities will be provided at the main compound which will include construction phase car parking, welfare facilities and laydown areas as necessary. Any discharges from temporary welfare facilities will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility.

5.5.4 Construction Traffic

It is expected that an average of approximately 16 Heavy Goods Vehicle (HGV) movements per day will be required during the site preparation and civil construction phase of the proposed substation. This is expected to reduce during the electrical installation and commissioning phase of the substation.

For the cable route installation, an average of approximately 48 HGV movements per day will be required during the civil construction of the cable route. Once the civil works are completed, the electrical installation is expected to require a maximum of 12 HGV movements per day.

The number of construction workers required during the construction phase is expected to peak at approximately 60 persons for the substation construction, and 5 – 8 persons per crew working on the cable route. It is expected that up to three crews may be working on the cable route at a time.

Table 5.4: Average Daily Peak HGV Movements

Construction Activity	HGV Movements (Civil)
Substation construction	16
Underground Cabling	48

5.5.5 Construction Waste

As the substation is to be constructed on a platform prepared as part of the STEP Power Plant Development, the only excavation will be the column required for the installation of foundations, drainage and the shallow cable basement. In total, the approximate volume of excavated material which will not be reinstated for the two substations is 4,600m^3 (3700m^3 for substation foundations, 700m^3 for drainage).

Following the excavation for the ducting, the existing soil will be reinstated with the exception of the volume required for the duct banks which will be filled with Cement Bound Granular Mixture

(CBGM) encasing High Density Polyethylene (HDPE) ducting, and the volumes required for the joint bays, link boxes and communications chambers. In total, the approximate volume of excavated material which will not be reinstated for the cable route is 9,355m^3. Topsoil and subsoil excess will remain within the agricultural properties, as required by the individual landowners. Any surplus material will be removed off-site by a licenced contractor and in compliance with the Waste Management Act, 1996 (as amended), and associated regulations.

5.5.6 Construction Working Hours

Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays.

It is proposed to stagger the various shift starting and ending times within the construction complex (for example civil employees 07:30 – 18:00, or 07:45 – 17:45). This small stagger in shift start and ending times could lessen the impact of traffic peaking, refer to Chapter 17 (Roads and Traffic).

Construction works outside these hours will only take place in exceptional circumstances (i.e., for specific engineering works e.g., concrete pours etc.). It is likely that a number of continuous construction phase works will also be required outside these hours on a limited number of occasions. These works will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities, in particular regarding the control of noise and traffic.

5.5.7 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) will be prepared and implemented during the construction phase in consultation with the Kerry County Council based on the CEMP which accompanies this application. The CEMP will remain a ‘live’ document which will be reviewed regularly and revised as necessary to ensure that the measures implemented are effective.

The primary objective of the CEMP is to safeguard the environment, site personnel and nearby sensitive receptors, i.e. occupiers of residential and commercial properties, from site activity which may cause harm or nuisance. As such, the CEMP sets out a project framework to ensure key mitigation measures and conditions set out as part of the planning consent process are translated into measurable actions and are appropriately implemented during the construction phase of the proposed development. As part of this framework, transparent and effective monitoring of the receiving environment during construction will be used to inform and manage on-going activities on site and to demonstrate effectiveness of the measures outlined therein.

The Contractor will have the responsibility for the compliance of the CEMP with the requirements of the Planning Authority. A technically competent contractor will be appointed by the Developer with responsibility for the construction of the proposed development. A contractual obligation will be included within the tendering processes and implemented on appointment to ensure that the proposed works are developed in compliance with planning conditions and the requirements of the CEMP, and the methods, monitoring and mitigation included in this report.

As a responsible developer, monitoring of the contractor(s) performance on a regular basis and will be undertaken and the following compliance checks throughout the duration of the construction period:

- Review contractor documents against the requirements of the CEMP;
- Undertake regular audits;
- Continuously check records;

- Set up a contractor reporting structure; and
- Conduct regular meetings where Environmental Health and Safety is an agenda item.

It is proposed that records of the implementation of the measures identified in the CEMP will be provided if required to the Planning Authority at a time scale to be agreed with the Council.

A copy of the CEMP accompanies this planning application. This will remain a 'live' document which will be reviewed regularly and revised as necessary and, assuming Approval is given by ABP, all conditions of the approval will be included in the CEMP by the appointed Contractor.

Traffic Management Plan

Prior to commencement of the development, the Contractor appointed by the Developer to undertake the works will prepare a Construction Traffic Management Plan (based on the CTMP included with this application) which will be developed and implemented to mitigate any potential construction traffic impacts on the local road network and will be agreed with Kerry County Council. All construction activities, including construction traffic, will be managed through the site CEMP.

A CTMP is contained within the CEMP which forms part of this application. This will remain a 'live' document which will be reviewed regularly and revised as necessary to ensure that the measures implemented are effective. This CTMP will be agreed with Kerry Co. Co. prior to commencement of works and shall apply to all traffic to and from the Site including those works carried out by the Contractor and any subcontractors, as well as have regard to traffic associated with works associated with the STEP Power Plant and the gas export pipeline. The plan will include measures to direct construction traffic (including Site access), as much as practicable, along the upgraded road from Tarbert to the site rather than along the road from Ballylongford to the site.

Construction Resource Waste Management Plan

Prior to commencement of the development, the Contractor appointed by the Developer to undertake the works will further develop a Construction Resource Waste Management Plan (as part of the overall CEMP) which will provide for the segregation of all construction wastes into recyclable, biodegradable and residual wastes to facilitate optimum levels of re-use, recovery, and recycling operations.

A CRWMP is contained within the CEMP which forms part of this application. This will remain a 'live' document which will be reviewed regularly and revised as necessary to ensure that the measures implemented are effective. The plan has been prepared in accordance with waste management guidance and principles as outlined in *Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects* (EPA, 2021) and *Design Out Waste: A design team guide to waste reduction in construction and demolition projects* (EPA, 2015).

All operations at the site will be managed and programmed in such a manner as to prevent/minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery) in line with the Waste Hierarchy where technically and economically feasible. The CRWMP will also deal with any litter arising during the construction phase of the development.

Waste sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment. All employees will be made aware of the obligations under the Plan.

The CRWMP will be available for inspection at the site of the proposed substation at all reasonable times for examination by the Planning Authority.

5.6 Operation and Maintenance Phase

Permanent water supply and drainage works

Water Supply

A new potable water supply is required for proposed welfare facilities (toilet and wash hand basin) within the GIS buildings. The potable water demand will be relatively low as the proposed substations will normally be ‘unmanned’ and operated remotely.

It is conservatively estimated that the peak potable water demand for each GIS building will be 330 l/week. This is a conservative estimate based on the following assumptions:

- Site will normally be ‘unmanned’ but a 4 person operation and maintenance crew will visit the site once per week;
- Only one toilet on site, no urinals;
- Automatic flushing mechanism in place for the toilet which operates twice per day;
- Taps incorporate automatic shut-off mechanism; and
- Peaking factor of 1.25 applies as per Uisce Éireann requirements.

The potable water supply for the GIS buildings is proposed to be sourced from the existing public watermain system via a new connection to the watermain which is proposed to supply the STEP Power Plant facility. The Applicant has submitted a pre-connection agreement application to Uisce Éireann for this supply (see Appendix 5.1).

In addition it is proposed that both substations are provided with a hydrant for firefighting purposes.

Foul Water Drainage

During construction, portable chemical toilets will be provided for the duration of the works and all waste material will be removed from site and disposed of to an appropriately licensed facility. Once the new GIS buildings are operational, domestic type wastewater will be produced by the onsite welfare facilities (toilet, wash hand basin and mess room sink).

It is proposed that wastewater will be discharged by gravity sewer to a sealed foul water holding tank located adjacent to the entrance of the Glansillagh substation compound. The holding tank is proposed to have a capacity of approximately $8m^3$ to allow for an emptying frequency of once every six months. The holding tank will be monitored by a high-level alarm which will alert the site operators when the when the tank capacity is approaching full. The proposed foul water drainage layout is shown on drawing No. 229100682-MMD-04-XX-DR-0101.

Storm Water Drainage - GIS Buildings and Substation

A new storm water drainage system is required to collect and manage runoff from hardstanding areas, building roofs, internal access roads and landscaped surfaces within the substation compounds.

Storm water will be collected via a catch basin in the northeastern corner of the compound and will be conveyed to the fire water retention tank. All storm water will pass through an attenuation system including a silt trap and Class 1 hydrocarbon interceptors prior to discharge. The storm water will be discharged from the fire water retention tank to the Shannon Estuary via an outfall pipe (constructed as part of the STEP Power Plant project) located 5m beyond the low water mark and in a water depth of ca. 2.4m.

Upon completion of the works, the proposed onsite EirGrid/ESBN 220kV GIS Substation and the underground transmission cable will be handed over to EirGrid, who in conjunction with ESB Networks (ESBN), will carry out the final commissioning and energisation of the proposed substation and transmission line connections.

Once energised, the EirGrid/ESBN substation and 220kV grid connection will from part of the ESBN infrastructure (in their role as Transmission Asset Owner (TAO)), and EirGrid will be responsible for operating the system (in their role as Transmission System Operator (TSO)). The SLNG 220kV GIS substation will continue to be owned and operated by Shannon LNG Limited.

Gas handling on-site is primarily limited to the construction and decommissioning phases of a substation development. Specialised gas handling and maintenance procedures and training are incorporated into ESB management systems. Maintenance of Sulphur Hexafluoride (SF_6) containing equipment will be undertaken by ESB in accordance with these operating procedures. Alternatively, a specialist switchgear provider (such as the original equipment provider) may be employed by ESB, to undertake maintenance of SF_6 containing equipment. The electrical switchgear equipment will also be equipped with a pressure or density monitoring device which will detect any loss of SF_6. Maintenance of SF_6 containing equipment for the SLNG substation will be undertaken by a specialist provider.

The cable route will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs.

5.7 Decommissioning Phase

Subject to the granting of statutory approval, the EirGrid/ESBN substation and grid connections will form part of the national electrical grid infrastructure. The design life of the substation is approximately 40 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

The SLNG substation is expected to have a design life of 25 years. Where decommissioning takes place, all above-ground components associated with the substation will be disassembled and removed from the site and effects are likely to be similar or of a lesser magnitude than the construction effects. As part of the STEP Power Plant, it is expected that it would be a condition of the IE Licence for the SLNG substation that a closure and residuals management plan, including a detailed decommissioning plan, be submitted to the EPA for their approval.

It is not intended to decommission the proposed electricity cabling. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

Decommissioning activities will include, as a minimum:

- All wastes at the facility at time of closure will be collected and recycled or disposed of by an authorised waste contractor, as appropriate.
- Utilities will be drained of all potential pollutants such as lubricating oils or sealed to prevent leakage if being moved offsite or reused elsewhere.
- All raw materials, oils, fuels, etc. onsite at the time of closure will be returned to the supplier, or collected and recycled or disposed of by an authorised waste contractor, as appropriate.
- All buildings and equipment will be decontaminated, decommissioned and demolished in accordance with a phased demolition plan, and either sold for reuse or recycled, or disposed

of by an authorised waste contractor, as appropriate. In general, specialist equipment, pipelines and storage tanks will be sold for reuse, where possible, or disposed of offsite.
- All hazardous and non-hazardous process substances to be removed.
- All roads and hardstanding areas to be removed and recycled or disposed of by an authorised waste contractor, as appropriate.
- Landscaped will be reinstated in accordance with a landscape reinstatement plan.
- On completion of safe decommissioning of equipment, the potable water, fire water and electrical power supplies could be disconnected, and removed or abandoned in place.

5.8 Health and Safety in Design

5.8.1 Project Supervisor Design Process (PSDP)

ECC Group are the Project Supervisor Design Process (PSDP) for the project. By law, the PSDP is required to coordinate the activities of designers involved in the project to ensure that the design works that can be constructed, used, maintained and demolished safely. Designers involved in the project will design out risks where possible in their designs. Designers will record the decisions they make to mitigate risks in their design. These risk assessments identify those risks that could not be mitigated so that the people responsible for constructing, using, maintaining and demolishing the works can be informed of those risks.

Each PSDP will prepare a Preliminary Safety and Health Plan for the respective Contractor which will include in the background information issued to the Tenderers when the construction project goes to tender. This is to inform the tendering Contractors of the risks present on the site which are associated with the construction of the works.

On completion of the works, the PSDP will compile the Safety File. The Safety File will be a comprehensive record of the completed scheme and will serve as a reference point for the future operation and maintenance of the works and any future upgrading works.

The following is an example of the contents of a typical safety file:

- Construction (As-built) Drawings and photographs
- Design Criteria
- Specifications and Method Statements
- Demolition Restrictions
- Details of Equipment
- Details of Maintenance Facilities
- Operating & Maintenance Manuals
- Certificates from suppliers, manufacturers, specialist subcontractors, Material Safety Data Sheets, etc.
- Details of location and nature of utilities and services encountered and diverted
- Details of residual risks in the use and maintenance of the works.

5.8.2 Project Supervisor Construction Stage (PSCS)

The Project Supervisor Construction Stage (PSCS) will be responsible for developing the construction stage Safety and Health Plan, coordinating the work of Contractors and providing the PSDP with information required in the Safety File.

The requirements of the Safety, Health and Welfare at Work (Construction) Regulations, 2006, as amended will be implemented and complied with in full during the construction phase of the development.

Shannon Technology and Energy Park (STEP) 220kV Grid Connection

Chapter 6 - Population and Human Health

July 2024

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Tables

6 Population and Human Health

6.1 Introduction

This Environmental Impact Assessment Report (EIAR) considers the likely significant effects of the proposed Shannon Technology and Energy Park (STEP) 220kV Grid Connection project (hereafter referred to as the 'proposed development') on population and human health. This includes consideration of the potential for both adverse and beneficial effects, during construction and operation, with regards to residential properties, community resources, local businesses, employment, tourism, and human health.

Chapter 5 contains a detailed description of the proposed development. This chapter should be read in conjunction with the following:

- Chapter 7: Land, Soils and Hydrogeology
- Chapter 8: Surface Water and Flooding
- Chapter 10: Air
- Chapter 13: Noise and Vibration
- Chapter 14: The Landscape
- Chapter 15: Archaeology, Architectural and Cultural Heritage
- Chapter 16: Material Assets
- Chapter 17: Roads and Traffic.
- Chapter 18: Major Accidents and Disasters

6.2 Policy and Guidance

The following legislation and policy are relevant to the proposed development.

6.2.1 Legislation

Under the EU's Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU), development projects in the EU must be assessed for their impact on the environment. The Directive states that EIA must assess the direct and indirect significant impact of a project based on a range of environmental factors, including population and human health.

6.2.2 Policies

The following national, regional, and local equality, planning policy and strategy documents have a bearing on this assessment.

6.2.2.1 National policy

Project Ireland 2040

Project Ireland 2040 comprises two key documents: the National Planning Framework[1] (NPF) and the National Development Plan[2] (NDP). The NPF sets out the Government's economic, environmental, and social planning policies for Ireland. It provides a framework detailing how key national priorities will be addressed through the planning system, including sustaining and developing vibrant, climate resilient communities. The NDP sets out the Government's investment strategy to achieve Project Ireland 2040's objectives.

Section 1.3 of the NPF sets out Ireland's National Strategic Outcomes (NSOs). NSOs relevant to the proposed development and the population and human health assessment include:

- NSO 3: strengthened rural economies and communities
- NSO 5: a strong economy supported by enterprise, innovation and skills
- NSO 8: transition to a climate-neutral and climate resilient society
- NSO 9: sustainable management of water, waste and other environmental resources

Section 3.4 of the NPF sets out core planning and place-making principles for the Southern Region, including integrating the planning, management, and development of rural and local communities for regional benefit, as well as harnessing the potential of the region in renewable energy terms across the technological spectrum.

Rural Ireland contributes significantly to the country's energy needs, however there is a need to plan for the transition to low carbon economy. Section 5 of the NPF sets out requirements for diversifying rural places in Ireland, noting that "*in meeting the challenge of transitioning to a low-carbon economy, the location of future national renewable energy generation will, …, need to be accommodated on large tracts of land that are located in a rural setting…*". Section 9 of the NPF highlights Ireland's environmental and sustainability goals, which includes resource efficiency and transition to a low carbon energy future.

Policies relevant to the proposed development and the population and human health assessment include:

- National Policy Objective 23: "*Facilitate the development of the rural economy through supporting a sustainable and economically efficient … energy and extractive industries, …, while at the same time maintaining noting the importance of maintaining and protecting the natural landscape and built heritage which are vital to rural tourism*".
- National Policy Objective 26: "*Support the objectives of public health policy including Healthy Ireland and the National Physical Activity Plan, through integrating such policies, where appropriate and at the applicable scale, with planning policy".*
- National Policy Objective 52: "*The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the requirements of all relevant environmental legislation and the sustainable management of our natural capital".*

Our Rural Future, Rural Development Policy 2021-2025[3]

Our Rural Future provides a framework for the development of rural Ireland over the 2021-2025 period. The Government's vision is for a thriving rural Ireland, and Our Rural Future aims to 'enhance the wellbeing and quality of life of people living in rural areas, and build resilient and sustainable rural communities and economies through integrated investment, support and

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[1] Government of Ireland (2019): 'Project Ireland 2040 - National Planning Framework'. Available at: gov.ie - Project Ireland 2040 National Planning Framework (www.gov.ie)

[2] Government of Ireland (2021): 'Project Ireland 2040 – National Development Plan 2021-2030'. Available at: gov.ie - Government launches the renewed National Development Plan 2021-2030 (www.gov.ie)

[3] Government of Ireland (2021): Our Rural Future: Rural Development Policy 2021-2025'. Available at: gov.ie - Our Rural Future: Rural Development Policy 2021-2025 (www.gov.ie)

services'. Key deliverables noted in the document include to: 'support health and wellbeing of rural communities' and 'supporting a Just Transition to a climate neutral economy'.

Healthy Ireland, A Framework for Improved Health and Wellbeing 2019-2025[4]

Healthy Ireland is a broad framework of actions being undertaken by government departments, public sector organisations, businesses and communities to improve health and wellbeing and reduce the risks posed to future generations. The vision for Healthy Ireland is 'a healthy Ireland, where everyone can enjoy physical and mental health to their full potential, where wellbeing is valued and supported at every level of society and is everyone's responsibility'.

Healthy Ireland's central goals are to:

- increase the proportion of people who are healthy at all stages of life;
- reduce health inequalities;
- protect the public from threats to health and wellbeing; and
- create an environment where every individual and sector can play their part in achieving a healthy Ireland.

6.2.2.2 Regional Policy

Regional Spatial and Economic Strategy (RSES) 2020-2032[5]

The RSES sets out a strategic development framework to address challenges and opportunities facing the Southern Regional Assembly (SRA) area over the 2020 to 2032 period. It provides a high-level development framework for the region that supports the implementation of the NPF and other Government economic policies and aspirations.

Well-being and improving quality of life are core themes in the RSES. Led by the need to transformative change, one of the key means the Strategy looks to improve regional quality of life is through sustainable, planned and infrastructure-led development (Regional Policy Objective (RPO) 175).

6.2.2.3 Local Policy

County Kerry Development Pan 2022-2028[6]

The adopted Kerry County Council Development Plan (hereafter referred to as the 'Development Plan') guides the development of the county over the 2022-2028 plan period. Main goals of the Development Plan include 'the growth of a sustainable and strong economy', 'the transition to a low carbon and climate resilient society', to 'create attractive vibrant company settlements that provide a high quality of life for citizens' and to 'strengthen the fabric of rural areas and villages and support the communities who live there.

The Tarbert to Ballylongford strategic landbank, within which the Proposed Development sits, has been identified within the Development Plan as land zoned for industrial related

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[4] Government of Ireland (2019): Healthy Ireland Framework 2019-2026. Available at: gov.ie - Healthy Ireland Framework 2019-2025 (www.gov.ie)

[5] Government of Ireland (2021): Southern Regional Assembly. Available at: Southern Regional Assembly (southernassembly.ie)

[6] Kerry County Council (2022): Kerry County Development Plan 2022-2028. Available at: County Development Plan | (c) Kerry County Cuncil (kerrycoco.ie)

development and employment creation opportunities – recognising its potential as an energy hub[7]. Relevant objectives within the Development Plan include:

- KCDP 9-61: support the maintenance of a vibrant and healthy agricultural sector based on the principles of sustainable development whilst in the same way engaging in alternative employment in or close to rural areas to sustain rural communities; and
- KCDP 11-31: improve and maintain good air quality and support measures to prevent harmful effects on human health and the environment in our urban and rural areas.

Strategic Integrated Framework Plan for the Shannon Estuary 2013-2020[8]

The Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary was published in November 2013 (Clare Co. Council, Kerry Co. Council, Limerick City and Co. Councils, Shannon Development and Shannon Foynes Port Company, 2013). While the SIFP is not a statutory plan itself, the SIFP has since been incorporated into the Clare CDP 2023-2029 Volume 9 and the Limerick Development Plan 2022-2028 Volume 6, while the Kerry CDP 2022-2028 contains policies which support the sustainable development of the Shannon Estuary, in line with the SIFP and the recommendations of its environmental assessment, recognising the estuary's potential as an Energy Hub. The Regional Spatial and Economic Strategy for the Southern Region (Southern RSES) also contains policy and objectives which support and promote the realisation of the policies and recommendations of the SIFP. Section 5.6.4 of the SIFP states: *The SIFP proposes a Strategic Development Location around the Tarbert-Ballylongford complex to accommodate further development of the energy infrastructure and allow for economic development that will be attracted to such a significant site by virtue of its energy provision and deepwater facilities.'*

The SIFP is unequivocal that a strategic energy hub has become established within the Shannon Estuary by virtue of the presence of both the Moneypoint and Tarbert power stations, with this hub facilitating the growth of strategic grid infrastructure and other synergistic industries such as renewable energy and combined heat and power. The SIFP builds on existing industry connectivity, synergy and existing infrastructure to create a more sustainable and attractive network for investment.

Shannon Estuary Economic Taskforce Report[9]

The Programme for Government 2020 committed to supporting the Shannon Estuary region through the establishment of an Economic Taskforce to evaluate the economic development potential of the Shannon Estuary area, and to determine how this potential can be realised in both an economically and environmentally sustainable way. The independent Shannon Estuary Economic Taskforce was established on 21st April 2022, with the twofold objective to create a long-term vision for the region and to outline a practical action plan to realise it. The objective of this taskforce was to propose practical recommendations for action on key underdeveloped areas of opportunity, as opposed to providing a reference list of initiatives for which actions are already underway, although there may be some potential for overlap. The taskforce worked with public and private sector stakeholders to propose such actions for implementation, with recommendations on how to deliver those in a timely and effective way.

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[7] When a geographical area is identified as an energy hub, it signifies that the location has significant potential for energy production, storage and distribution. Hubs integrate various energy sources (such as renewables, fossil fuels) and optimise their use.

[8] Clare Co. Council, Kerry Co. Council, Limerick City and Co. Councils, Shannon Development and Shannon Foynes Port Company (2013): Strategic Integrated Framework Plan for the Shannon Estuary. Available at: Strategic Integrated Framework Plan for the Shannon Estuary | Limerick.ie

[9] Shannon Estuary Economic Taskforce (2023): Shannon Estuary Economic Taskforce Report. Available at: Shannon Estuary Economic Taskforce Report - DETE (enterprise.gov.ie)

Section 2.5 Retaining Employment Gains by Enabling Secure, Affordable Decarbonisation of Industry:

> *In the case of natural gas, the Taskforce recognises that this is considered a green transition fuel by the EU since 2021 and its use is encouraged 'to allow us to accelerate the shift from more polluting activities, such as coal generation, towards a climate neutral future, mostly based on renewable sources'. In addition to providing a new energy supply that is reliable, cost competitive, and incremental for our industries in the region to both decarbonise and grow, the Taskforce remains of the view, expressed in our interim report, that an LNG import / storage facility and electricity generation would be a significant strategic investment in the North Kerry / West Limerick region. Most importantly, it would greatly assist efforts to attract other large capital investments there. We understand that such investments would be capable of using and distributing hydrogen when energy from Atlantic wind becomes available at a later stage, as promoted by EU 'Green Deal' policies.*

Healthy Kerry Framework (2021-2027)[10]

The Healthy Kerry Framework supports the national 'Health Ireland' vision. Three strategic pillars have been set out within the Framework for the 2021 to 2027 period, namely, 'health communities', 'wellbeing in the workplace / remote working' and 'policy frameworks'. The focus of the health communities pillar includes supporting all sectors of society to promote health and wellbeing in Kerry.

County Kerry Local Economic and Community Plan (LECP) 2016-2022[11]

The adopted LECP sets out a vision for Kerry County over the 2016-2022 Plan period. Three themes – namely, economic development and job creation, quality of life, and community and social inclusion – and their associated high-level goals have been set out to achieve this vision. Goals relevant to the population and human health assessment of the Proposed Development are spread across these three themes.

The draft LECP for the 2023-2029[12] period is currently being prepared (consultation period ended on 28th February 2024). High level goals which are relevant to the Proposed Development and population and human health assessment include:

- HLG1: A diverse and balanced economy supporting job creation and sustainable vibrant communities; and
- HLG6: A health and active County which promotes well-being.

Listowel Municipal District Plan 2020-2026[13]

Tarbert has been identified within the Listowel Municipal District Plan as a principal location for future investment in housing, employment, infrastructure, social and community facilities. An overall strategic objective of the Plan is to 'provide an improved quality of life for all citizens of the plan area by promoting the area's economic potential" (OS-01) and "support the sustainable development of land zoned with in the Tarbert / Ballylongford area" (OS-08). The Plan also

[10] Kerry County Council (2021): Healthy Kerry Framework 2021-2027. Available at: Healthy-Kerry-Framework-FINAL.pdf (healthykerry.ie)

[11] Kerry County Council (2016): County Kerry Local Economic and Community Plan 2016-2022. Available at: Local Economic Community Plan | kerrycoco.ie

[12] Kerry County Council (2023): Kerry Local Economic and Community Plan 2023-2029. Socio-Economic Statement. Available at: Kerry Local Economic Community Plan 2023-2029 Consultation | kerrycoco.ie

[13] Kerry County Council (2020): Listowel Municipal District Local Area Plan 2020-2026. Available at: Listowel Municipal District Plan 2020-2026 | kerrycoco.ie

notes how air quality and visual and recreational open space are a factor in supporting human health and well-being.

6.2.3 Guidance

The following standards and guidelines have been used to guide the assessment of the population and human health effects of the proposed development:

- European Commission – Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report[14] (EU guidance)
- Environmental Protection Agency (EPA) – Guidelines on the information to be contained in Environmental Impact Assessment Reports[15] (Irish guidance)
- Institute of Public Health in Ireland (IPH) – Health Impact Assessment Guidance: Manual and Technical Guidance[16]
- Government of Ireland – Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment[17] (Irish guidance)
- Design Manual for Roads and Bridges (DMRB) – LA 112 Population and Human Health[18] (UK guidance)
- Institution of Environmental Management and Assessment (IEMA) – Health in Environmental Impact Assessment: A primer for a proportionate approach[19]
- IEMA – Determining Significance for Human Health in Environmental Impact Assessment[20]

It should be noted that, with the exception of EPA guidelines, standards set out in other guidance / methodologies have been used to guide the assessment, rather than being used as standards to follow.

6.3 Assessment Methodology

6.3.1 Approach to Data Collection

The table below sets out the data sources used to establish the baseline conditions within the study area.

Table 6.1: Data sources

Data source	Date	Contents
Central Statistics Office/An Phríomh-Oifig Staidrimh (CSO)	2024	2022 census data for baseline development

[14] European Commission (2017): 'Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report'. Available at: Circabc (europa.eu)

[15] Environmental Protection Agency (2022): 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'. Available at: Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (epa.ie)

[16] Institute of Public Health in Ireland (2021): Health Impact Assessment Guidance: Manual and Technical Guidance. Available at: Health Impact Assessment | Institute of Public Health

[17] Government of Ireland (2018): 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment'. Available at: gov.ie - Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018) (www.gov.ie)

[18] Design Manual for Roads and Bridges (2020): LA 112 Population and Human Health. Available at: LA 112 - Population and human health (standardsforhighways.co.uk)

[19] Institution of Environmental Management and Assessment (2017): Health in Environmental Impact Assessment: A primer for a proportionate approach.

[20] Institution of Environmental Management and Assessment (2022): Determining Significance for Human Health in Environmental Impact Assessment. Available at: IEMA - Launch of the EIA guidance for considering impacts on human health - November 2022

Data source	Date	Contents
Pobal	2023	2022 Pobal HP[21] Deprivation Index
Sports Ireland / Sport Eireann	2024	Location of recreational trails, including walking, cycling, horse-riding, paddling and snorkelling trails.
Failte Ireland	2024	Tourist attractions

6.3.2 Approach to Impact Assessment

There are no published standards or technical guidelines in Ireland that set out preferred methodology for assessing the likely population and human health effects of a development. However, there are a series of commonly used, best-practice methodologies for assigning the significance of population and human health effects during the construction and operation of a development. This section describes the approached used to conduct this assessment.

The assessment methodology proceeds by determining the sensitivity of receptors that have the potential to be affected by the construction or operation of the proposed development. The magnitude of impacts experienced by those receptors is then determined. A combination of the sensitivity of receptor and the magnitude of impact in relation to the receptor has been used to assess the significance of potential effects.

The outcome has been used to aid the development of appropriate mitigation measures in order to avoid or reduce potential adverse effects.

The steps undertaken for the assessment are as follows:

1. Identifying receptors in the study area and determining their sensitivity to potential changes in accordance with best practice guidance listed in 6.2.3 above.
2. Identifying activities and components of the proposed development that could have an impact on population and human health receptors.
3. Determining the magnitude of the impacts these receptors will experience.
4. Assessing the significance of effects that arise as a result of the impacts on the receptors, incorporating any mitigation measures included within the proposed development, and assessing any residual effects.

This chapter utilises good practice, informed by EPA, DMRB LA112 and IEMA guidance (as set out in section 6.2.3 above).

6.3.2.1 Technical scope

In accordance with the EPA guidelines[22], this assessment has considered effects on community receptors arising as a result of the construction, operation and maintenance and decommissioning of the proposed development. The assessment considers both direct and indirect effects on receptors arising as a result of the proposed development, in particular, effects on:

- **Land use and social considerations**, including effects on land requirements (both temporary and permanent) and accessibility to community receptors (namely, residential properties (and gardens); community facilities, businesses and public open spaces (such as parks and play areas));

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[21] HP refers to Trutz Haase and Jonathan Pratschke who were the first authors to develop a census based deprivation index for the Republic of Ireland.

[22] Environmental Protection Agency (2022): 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'. Available at: Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (epa.ie)

- **Economic activity** including employment and tourism; and
- **Human health**, including environmental effects on human health contained in corresponding chapters (such as air quality, noise, landscape and traffic), and general neighbourhood quality (the interactions between these environmental effects).

Neighbourhood quality effects occur if there are two significant adverse effects occurring at the same location at the same time – impacting the amenity of a neighbourhood, street, community facility or open space. These potential effects are noise and vibration, air, the landscape and road and traffic effects.

6.3.2.2 Assessment criteria

Sensitivity of receptor

The sensitivity of receptors is determined by their capacity to absorb proposed changes. It reflects their vulnerability to change, resilience to change and in some cases the availability of alternative resources of a similar value.

Table 6.2 sets out criteria that have been utilised to describe and assess the sensitivity of receptors.

Table 6.2: Sensitivity criteria for receptors

Sensitivity	Criteria
Very High	● A vulnerable receptor with no means to absorb changes. ● A receptor accessed on a daily basis. ● No alternative facilities, access arrangements or opportunities are available within an easily accessible distance. ● Daily activities prevented. ● Population with a very poor health status
High	● A vulnerable receptor with very little capacity and means to absorb changes. ● No alternative facilities, access arrangements or opportunities are available within an easily accessible distance. ● A frequently accessed resource. ● High level of deprivation ● Daily activities limited a lot. ● Population with a poor health status
Medium	● A receptor with limited capacity and means to absorb changes. ● A limited range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance. ● A moderately, or-semi-frequently accessed resource. ● Moderate level of deprivation ● Daily activities moderately limited ● Population with a health status in line with regional/national average
Low	● A non-vulnerable receptor with sufficient capacity and means to absorb changes. ● A wide range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance. ● An infrequently accessed resource. ● Low level of deprivation ● Daily activities limited a little. ● Population with a good health status
Negligible	● A receptor that is currently not in use ● Very low levels of deprivation / an affluent area ● Daily activities not limited at all.

Source: Mott MacDonald, 2024 (adapted from EPA, 2022; IEMA, 2022; IPH, 2021; and DMRB 202).

Magnitude of impact

To evaluate the magnitude of impact, each impact has been assessed in terms of the following indicators:

- Spatial scope – whether impacts are likely to be felt within the study area or more widely
- Extent – how many community resources are likely to experience impacts and the extent of these impacts.
- Duration – whether the impacts would be short or long-term (as defined by EPA guidelines).
- Reversibility – whether the impact is permanent or temporary (as defined by EPA guidelines).

The criteria for defining magnitude for the assessment of impacts are defined in the table below.

Table 6.3: Impact magnitude criteria

Magnitude	Criteria
Major	• A large proportion of the study area is impacted • The impact is permanent (lasting over 60 years) or long-term (lasting 15 to 60 years) • Demolition / total loss of a resource • Partial loss of resource and/or quality and integrity of the receptor • Unable to or requires extreme intervention to return to the baseline
Moderate	• A moderate proportion of the study area is impacted. • The duration over which the impact is experienced is medium-term (lasting seven to 15 years) • Impacts a moderate number of receptors • Partial loss of/damage to key characteristics, features or elements of the receptor • Requires considerable intervention to return to the baseline
Minor	• A small proportion of the study area is impacted • The duration over which the impact is experienced is short-term (lasting one to seven years) • Affects a small number of receptors • Minor loss of, or alteration to, key characteristics, features or elements of the receptor • Baseline returns without intervention or with only limited intervention
Negligible	• A very small proportion of the study area is impacted • Impact is very short-term (lasting less than a year) • Impacts a very few number of receptors • Very minor loss or detrimental alteration to characteristics, features or elements of the receptor • Baseline remains consistent
Indiscernible	• A few receptors affected • Impact is momentary / brief (lasting less than a day) • No loss or detrimental alteration to the receptor • No change to baseline

Source: Mott MacDonald, 2024; (adapted from EPA, 2022; IEMA, 2022; IPH, 2021; and DMRB 202).

For impacts which do not fall entirely into the assessment criteria for sensitivity and magnitude, professional judgement and justifications have been provided for assigning sensitivity and magnitude categories to each impact.

Significance of effect

Effect significance is a product of the sensitivity of receptors and the magnitude of effects. In line with EPA guidance, effects can be:

- Positive – a change which improves the quality of the environment.
- Neutral – no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
- Negative – a change which reduces the quality of the environment.
- Likely – the effects that can reasonably be expected to occur because of the planned project if all mitigation measures and properly implemented.
- Unlikely – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

In line with EPA guidance, the significance of effects have been determined as imperceptible, not significant, slight, moderate, significant, very significant and profound. These are described in Table 6.4.

Table 6.4: Description of significance of effects

Significance	Description
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 character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
Profound effects	An effect which obliterates sensitive characteristics

Source: EPA (2022): EIAR Guidelines

Effects that are assessed as moderate to profound are considered to be significant, and would require mitigation. Table 6.5 set out the relationship between magnitude, sensitivity and significance.

Table 6.5: Significance of effect

		Magnitude				
		Indiscernible	Negligible	Minor	Moderate	Major
Sensitivity	Very High	Slight / Not Significant	Moderate / Slight	Significant / Moderate	Very Significant / Significant	Profound
	High	Not Significant	Slight	Moderate	Significant	Profound / Very Significant
	Medium	Not Significant / Imperceptible	Slight / Not Significant	Slight	Moderate	Significant / Moderate
	Low	Imperceptible	Not Significant	Slight / Not Significant	Slight	Moderate
	Negligible	Imperceptible	Imperceptible	Not Significant / Imperceptible	Not Significant	Slight / Not Significant

Source: Mott MacDonald 2024 (created using EPA Guidelines, 2022)

6.3.3 Study Area

The Proposed Development is situated in the administrative boundary of County Kerry. Where possible, the population and human health conditions are considered according to the following spatial areas:

- The study area for residential properties, community facilities, businesses and agricultural landholdings is 500m from the red line boundary of the proposed development. This is due to receptors within 500m being more likely to experience potential effects as a result of the construction and operation of the proposed development;
- Local Impact Area (LIA) – defined as the electoral division of Tarbert; and
- Wider Impact Area (WIA) – defined as County Kerry.

Regional (South West Ireland) and national (Ireland) data has been used as comparator areas.

6.3.4 Assumptions and Limitations of the EIAR

The following assumptions have been identified for the assessment:

- The L-1010 will be widened to two-lanes in advance of the construction of the Proposed Development.
- The assessment of significant effects has been carried out against a benchmark of current baseline conditions within the LIA and WIA. As with any dataset, these may be subject to change over time, which may influence the findings of the assessment and could lead to the assessment being subject to statistical time lag.
- The information sourced for this report has been gathered using publicly available, open-source datasets and it is assumed that this information was correct at the time of writing.
- The assessment on amenity/neighbourhood quality relies on qualitative description and evidence of significant effects within other EIAR chapters, namely Chapter 10: Air, Chapter 13: Noise and Vibration, Chapter 14: The Landscape and Chapter 17: Roads and Traffic.
- The number of residential properties, community facilities, businesses and agricultural landholdings in proximity (within 500m – and assumed to be most likely to experience effects) to the Proposed Development have been estimated using satellite imagery and are listed within section 6.4.2 below.

6.4 Baseline Conditions

6.4.1 Population

6.4.1.1 Demographic profile

The table below shows the demographic structure of the LIA, County Kerry, South West Ireland and Ireland. 2022 Census data indicates that 757 people live in the LIA – a decline of 1% since the previous Census in 2016. This is dissimilar to wider areas, with County Kerry, South West Ireland and Ireland each experiencing a rise in population (of 6%, 7% and 8%, respectively) over the same period.

Data suggests that the LIA has a much higher proportion of older people (aged 65 and above) and a much lower proportion of working age people (15-64 year) when compared to comparator areas. 31% of the LIA population is aged 65 and above, which is considerably higher than the proportion within County Kerry (19%) and double the proportion across South West Ireland (16%) and Ireland (15%). In contrast, 53% of the LIA population are within the working age category, which is considerably lower than the County Kerry (63%), the South West and Ireland average (both 65%).

Table 6.6: Demographic structure of the LIA

	Total population	Children (<15 years)	Young people (15-24 years)	Working age (15-64 years)	Older people (65+ years)
LIA	757	17%	8%	53%	31%
County Kerry	156,458	18%	11%	63%	19%
South West	740,614	19%	12%	65%	16%
Ireland	5,149,139	20%	13%	65%	15%

Source: CSO Census 2022

6.4.1.2 Deprivation

Pobal data provides a measurement and comparison of relative levels of deprivation. The Pobal HP Deprivation Index[23] sets out eight levels of deprivation, ranging from 'extremely disadvantaged' to 'extremely affluent' as set out in in Table 6.7 below.

Table 6.7: Pobal HP Deprivation Index

Level	Description
1 (most deprived)	Extremely disadvantaged
2	Very disadvantaged
3	Disadvantaged
4	Marginally below average
5	Marginally above average
6	Affluent
7	Very affluent
8 (least deprived)	Extremely affluent

Source: Pobal 2023

According to the Index, the LIA (the electoral division of Tarbert) is an area with a marginally below average level of deprivation. This is in line with the overall level of deprivation across County Kerry (also marginally below average).

6.4.2 Land Uses and Social Considerations

6.4.2.1 Residential properties

The are 412[24] residential properties in the LIA which makes up 0.5% of the housing stock in County Kerry. Approximately 50 residential properties are located within 500 meters of the Proposed Development, the majority of which are along the L-1010.

6.4.2.2 Community facilities and land

There are several community facilities in the LIA, the majority of which are located within the town of Tarbert (to the east of the Proposed Development). This includes schools, healthcare providers and places of worship. There is only one community facility within 500m of the Proposed Development. This is Tarbert Comprehensive School which is located approximately 270m to the east.

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[23] Pobal (2023): HP Deprivation Indices 2022. Available at: Pobal HP Deprivation Index Launched - Pobal

[24] Central Statistics Office (2023): Housing Stock and Vacancy Rate. Available at: F2095 - Housing Stock and Vacancy Rate (cso.ie)

Community facilities that are located over 500m away from the Proposed Development, but are located along construction traffic routes include:

- Tarbert Medical Centre;
- Wishing Tree Pre-School;
- St Mary's Roman Catholic Church; and
- Tarbert Community Playground.

6.4.2.3 Businesses

Data on the number of businesses within the LIA is not available, however there are numerous businesses in the LIA and along construction traffic routes beyond the LIA. Latest available data indicates there are 11,359 businesses within County Kerry, majority of which are within the construction sector (20%). Businesses within Kerry equate to 23% of businesses in the South West of Ireland and 3% across Ireland.

6.4.2.4 Agricultural land holdings

There are 43 agricultural land holdings with a combined 1,878 hectares of farmland within the LIA[25]. All 43 farms are grassland used for grazing cattle. The Proposed Development will span across 5 agricultural land holdings.

6.4.2.5 Transport network

Transport facilities are important community infrastructure. The LIA is served by three bus services. These are summarised in the table below.

Table 6.8: Local Bus Routes

Route Number	Operator	Route	Weekday Frequency	Weekend Frequency
274	TFI Local Link	Tarbert – Trailee (via N67 and R551)	Three services per day in both directions	Three services per day in both directions
314	Bus Eireann	Limerick – Tarbert – Ballybunion (via N69)	Four services per day in both directions (to/from Tarbert)	Four services per day in both directions (to/from Tarbert)
595	TFI Local Link	Tarbert – Croom & Mid-Western Regional Hospital (via part N69 between Tarbert and Glin)	Three services per day in both directions	Three services per day in both directions

Source: bustimes.org, locallinkkerry.ie, transportforireland.ie, busireann.ie, locallinklc.ie

There is no rail provision within the LIA. The nearest railway station is in Tralee (40km south of the Proposed Development).

6.4.3 Economic Activity

6.4.3.1 Employment

Table 6.9 shows key employment indicators. The proportion of the employed working age population in the LIA (70%) is in line with that in County Kerry South West Ireland and Ireland –

[25] Central Statistics Office (2023): Census of Agriculture 2020. Available at: Agricultural Statistics by Electoral Division - CSO - Central Statistics Office

all 69%. At 4%, the LIA has a slightly lower proportion of unemployed people compared to wider areas.

Table 6.9: Employment indicators

Location	Working age population	Employed (%)	Unemployed (%)
LIA	398	70%	4%
County Kerry	98,135	69%	7%
South West Ireland	479,163	69%	6%
Ireland	3,360,537	69%	6%

Source: Census 2022

6.4.3.2 Employment sectors

Table 6.10 shows key employment sectors.

Table 6.10: Employment sectors

Sectors	LIA		County Kerry		South West Ireland		Ireland	
	No.	%	No.	%	No.	%	No.	%
Agriculture, forestry and fishing	19	7%	4,459	7%	15,320	5%	82,228	4%
Building and construction	19	7%	4,154	6%	19,166	6%	134,482	6%
Manufacturing industries	59	21%	7,208	11%	53,603	16%	273,102	12%
Commerce and trade	53	19%	14,357	21%	71,758	22%	552,642	24%
Transport and communications	13	5%	3,452	5%	23,577	7%	212,383	9%
Public administration	10	4%	3,840	6%	16,375	5%	131,639	6%
Professional services	69	25%	16,115	24%	80,825	24%	568,105	24%
Other	38	14%	13,960	21%	51,344	15%	365,716	16%

Source: Census 2022

6.4.3.3 Tourism

There are several tourist attractors within the LIA, including beaches, museums, historical landmarks and recreational trails. Five tourist attractors are located within proximity to the Proposed Development, namely:

- Kilnaughtin Church and Graveyard – located 90m south of the proposed development.
- Tarbert Bridewell Courthouse and Jail Museum located 880 meters east, in Tarbert.
- John F Leslie Woodland Walk – a 5km out-and-back trail near Tarbert (620m east of the proposed development).
- Shannon Estuary Way – a 39.4km walking routes between Ballybunion to Tarbert Ferry Port.
- Wild Atlantic Way – a 2,600km coastal route along the Irish west coast. Part of which uses the R551 (approximately 500m south) and N67 within Tarbert (approximately 900m east) of the proposed development.

6.4.4 Human Health

6.4.4.1 Health indicators

Census 2022 data suggests that a quarter (25%) of the LIA population has a disability. This is slightly higher than the County Kerry, South West Ireland and Ireland proportion – all 22%.

In terms of general health, 83% of the LIA population reported having 'good' or 'very good' health in the 2022 Census. This is in line with proportions across County Kerry (84%), South West Ireland (84%) and Ireland (83%).

Table 6.11: General health

	LIA	County Kerry	South West Ireland	Ireland
Very good	46%	52%	54%	53%
Good	37%	32%	30%	30%
Fair	12%	9%	8%	9%
Bad	2%	1%	1%	1%
Very Bad	0%	0%	0%	0%
Not stated	4%	6%	6%	7%

Source: Census 2022

6.4.4.2 Air quality management

As outlined in Chapter 10 (Air), there are no localised air quality issues in the area. Data presented within Chapter 10 demonstrates annual mean NO_2, PM_{10}, and $PM_{2.5}$ concentrations between 2018 and 2022 are well below the corresponding air quality standards.

6.4.4.3 Noise environment

As set out in Chapter 13 (Noise and Vibration), there are several noise sensitive receptors in proximity to the proposed works. These receptors are exposed to ambient/background noise – largely consisting of intermittent road traffic noise (mainly on the L-1010) and local community noise such as livestock, birdsong and wind rustling.

6.4.4.4 Landscape amenity

As set out in Chapter 14 (The Landscape), the proposed works are located on the south bank of the Shannon Estuary and in proximity to 'Visually Sensitive Areas' and 'Views and Prospects'. The area has a gently undulating coastal zone with agricultural fields occupying a large proportion of the study area.

Chapter 14 further describes the local area as follows: "*Although the landscape in the vicinity of the proposed development is principally that of a working rural landscape, there is some sense of remoteness and tranquillity due to the area's low population levels. Houses in the study area are generally located on elevated ground and oriented to take advantage of open views, particularly towards the Shannon when available. For these reasons, it is considered that residents enjoy a notable sense of rural amenity*."

6.5 Likely Significant Effects

In accordance with the EPA Guidelines and the above methodology, the following sections provide an overview of the likely significant effects, within the study area, on:

- Land use and social considerations, including effects on land requirements, accessibility and general amenity.
- Economic activity e.g. employment, tourism and population.
- Human health, considered with reference to, and interactions with, other environmental receptors contained in corresponding chapters such as air, noise, and traffic.

6.5.1 Do Nothing

In the event that the proposed development does not proceed, the ‘do nothing’ effect would be that effects on the local population would not occur as a result of the construction of the proposed development.

6.5.2 Construction phase

This section describes and assesses the potential construction phase population and human health effects of the proposed development.

Table 6.12: Effects during the construction phase

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
Population				
Changes in resident population	Due to the nature of the project, the proposed development will not lead to an increase in the resident population of the area.			
Land use and social considerations The proposed development will not require land from community facilities, non-agricultural businesses, tourist attractions of public open spaces during the construction period				
Temporary land requirements	**Low** – There is no agricultural infrastructure on the land required. The land affected is currently used as grazing land for farms and it is considered that there is sufficient capacity to absorb the temporary loss of land.	Construction of the proposed 220kV substations, including construction compounds and cable routes, will temporarily require approximately 12 hectares of agricultural land within the LIA for a period of 27 months. The requirement for land spans across five agricultural land holdings in the LIA.	**Minor** –The minimal area of land required is along the periphery of land holdings, the land will be required for 27 months. As such, the magnitude of impact is considered to be minor. Land required temporarily will be reinstated and returned to its current use at the end of the construction phase.	**Not significant (not significant)**
Permanent land requirements	**Negligible** - The land affected is owned by the Applicant. There is no agricultural infrastructure on the land required.	The proposed 220kV substations will permanently require approximately 1hectares of agricultural land across the study area.	**Negligible** – The land required permanently represents a small proportion of the land in the LIA.	**Imperceptible (not significant)**
Temporary delay in journey time affecting drivers accessing receptors along the L-1010	**Very High** – residential properties and key community facilities (such as Tarbert Comprehensive School) are located on, or accessed via, the L-1010. As these receptors are accessed daily by residents, receptors along the L-1010 are considered to have a very high sensitivity.	It is assumed that the L-1010 will be widened to two-lanes within the vicinity of the scheme in advance of the construction of the Proposed Development. Construction activities along the L-1010 is therefore limited to cable pulling, as such, full road closures and/or diversions are not anticipated during the 27-month construction period.	**Indiscernible** - While the duration of impact is over 2 years (27 months), access will be maintained to all receptors along the L-1010 throughout the construction period. Users of the L-1010 during this period will experience momentary delays, consequently, the	**Slight adverse (not significant)**

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
			magnitude of impact is, assessed as indiscernible.	
Economic activity				
Temporary changes in employment	**Low** - The construction workforce is likely to be sourced from across the County and region. In County Kerry the proportion of the working age population which is unemployed is slightly lower than national proportions. The sensitivity of the receptor (unemployment) is therefore considered to be low.	During construction of the proposed development, there will be a beneficial impact on the economy through the provision of employment opportunities – via both new and existing construction contracts. This is likely to be beneficial in terms of local employment opportunities associated with direct employment from construction activities, as well as for local businesses through indirect and induced expenditure. Construction of the proposed development will result in the temporary creation of jobs – both directly and indirectly. It is expected that the number of construction workers required throughout the duration of the construction phase will peak at approximately 60 persons for the substation, and up to three crews of 5 to 8 persons for the cable system. A number of these jobs could be expected to be filled by residents of County Kerry. However, it is assumed that the majority of construction jobs would be accessed by people (i.e. both employed as well as unemployed) from across the wider South West region.	**Negligible** - The proportion of construction workers and/ or contracts that would be sourced locally is currently unknown. However, if it assumed that all jobs are new and sourced from the pool of County Kerry residents who are unemployed, the change in unemployment would equate to approximately 1% for a period of 27 months. The magnitude of impact is minor as only a small proportion of the population will be impacted.	**Not Significant (not significant)**
Human health				
Temporary changes in health and wellbeing due to changes in the local environment / neighbourhood quality	The construction of the proposed development may result in temporary environmental changes (such as noise and dust) for communities in proximity to construction activities – resulting in an overall change in neighbourhood quality for these communities. Changes in neighbourhood quality result from a combination of significant residual (post-mitigation) effects reported by other assessment topics – specifically noise and vibration, air, landscape and road and traffic effects. For a neighbourhood effect to be identified, at least two significant residual effects must combine in the same location. No significant residual effects have been reported in relevant environmental chapters, therefore there is **no effect on health and wellbeing** anticipated during the construction phase of the proposed development.			

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
Electromagnetic Fields (EMF)	EMF is produced whenever electricity is present. Electromagnetic interference (EMI) is disturbance that affects an electrical system due to magnetic and electric fields, electromagnetic induction, conduction or electromagnetic radiation emitted from an external source. High voltage electrical equipment creates EMF, which can potentially have implications for human health and may cause EMI to other electrical/electronic equipment (e.g., communications) or infrastructure (e.g. power lines). The proposed development includes new electrical equipment. EMF limits are specified in the EU Directive 2013/35/EU Electromagnetic Fields (EMF) limits, published in 2013 and enforced in the Ireland by the Department of Environment, Climate and Communications, EPA and the Health & Safety Authority – all of which reference the International Commission on Non-Ionising Radiation Protection (ICNIRP) guidelines. Equipment used during construction of the Proposed Development will also comply with applicable health and safety standards for EMF. As this equipment will be installed, operated and maintained correctly, levels of electromagnetic emissions are unlikely to exceed the acceptable limits for workers or the public, or to cause EMI. Power supplies used for construction are generally insufficient to cause any significant EMI. Consequently, there will be **no significant health effects** associated with the construction of the proposed development.			
Temporary changes in social cohesion	**Low** – Welfare facilities will be provided onsite for construction workers. As such, the presence of the construction workforce is unlikely to put considerable pressure on resources within nearby settlements. Daily activities of residents within the LIA will therefore be limited a little.	During the day, the workforce will be present on construction sites and compounds. Although the number of construction workers for each element of the construction is not yet confirmed, the presence of construction workers is likely to be noticeable for those living in the area. Additionally, as construction workforces are, in general, predominantly male, perceptions of personal safety for women may decrease due to the presence of sizable construction workforce in the local vicinity of the new development.	**Minor** - Construction workers are likely to be spread out throughout the LIA. The severity predominantly relates to a minor change in quality of life and the impact will be rapidly reversed.	**Slight adverse (not significant)**

Temporary disruption as a result of increased construction traffic	**Very High** – residential properties and key community and recreational facilities are located on, or accessed via, the L-1010, N67 and N69.
	In addition to residential properties, sensitive receptors located on the L-1010, N67 and N69 include:
	• L-1010
	  – Tarbert Comprehensive School
	• N67
	  – Tarbert Medical Centre
		The local community may experience temporary disruption during the construction phase due to the increased number of construction vehicles on local roads, particularly along:
		• L-1010 which will experience 16 (90%) additional High Goods Vehicle (HGV) daily movements and 112 (49%) increase in all vehicles between Ballylongford and Tarbert Comprehensive School.
		• N67 which will experience 16 (9%) additional High Goods Vehicle (HGV)
			Negligible – While Chapter 17 (Roads and Traffic) notes the LIA will experience an increase of up to 90% in HGV movements and 49% in all vehicle movements, roads within the LIA will continue to operate notably below theoretical capacity, even with the addition of traffic generated during construction of the proposed development. Access will be retained and any disruption is not likely to stop people from being	**Slight adverse (not significant)**

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
	– Tarbert Bridewell Courthouse and Jail Museum – Wild Atlantic Way – Wishing Tree Pre-School ● N69 – St Mary's Roman Catholic Church – Tarbert Community Playground – Bus Route 314	daily movements between N67/R551 junction and N67/N69 junction. ● N69 which will experience up to 13 (6%) additional High Goods Vehicle (HGV) daily movements between N67/N69 junction and Glin/Foynes. ●	able to travel between communities or access community resources. As such, community severance is unlikely to occur.	

6.5.3 Operation and Maintenance Phase

This section describes and assesses the potential population and human health effects of the proposed development during the operation and maintenance phase.

Table 6.13: Effects during the operation and maintenance phase

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
Population				
Due to the nature of the project, the proposed development will not lead to an increase in the resident population of the area.				
Land use and social considerations				
The permanent requirement for land will take place during the construction phase. As such, these have been identified and assessed in Table 6.15 above. No further impacts to land use and social considerations have been identified during the operation and maintenance phase.				
Economic activity				
Permanent on-site employment	**Low** - The sensitivity of the LIA is low due to the proportion of the working age population which is unemployed being slightly lower than national proportions.	As set out in Chapter 5, it is currently assumed that the proposed substations will be unmanned and operated remotely, with a four-person operation and maintenance crew visiting the site on a weekly basis. If it is	**Indiscernible** – As it is currently unknown if employment will be sourced locally, the magnitude of impact is assessed as negligible	**Imperceptible (not significant)** Overall, it is assessed that the negligible magnitude of impact and

Source	Sensitivity of receptor	Description of impact	Magnitude of impact	Significance of effect
		assumed that the these are new jobs created by the proposed development, the four jobs would equate to 1.4% of all jobs in the LIA and 0.001% of jobs in the County.	and indiscernible at the County level.	the medium sensitivity receptor would result in a neutral effect, which is not significant.
Human health				
Electromagnetic Fields (EMF)	There will be no significant health effects associated with EMF in the operation and maintenance of the proposed development. The Proposed Development will operate in accordance with EMF health and safety standards.			

6.5.4 Decommissioning Phase

It is not envisaged that the EirGrid substation and grid connection will be decommissioned, however, over time elements of the proposed development, for example, cables, may need to be replaced.

As presented in Chapter 5, the SLNG substation has a predicated design life of 25 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned. Similarly, it is not intended to decommission the proposed electricity cabling.

However, in the event that the proposed development is decommissioned, the activities associated with the decommissioning phase will be similar to those associated with the construction phase. Therefore, no further assessment of the decommissioning phase has been undertaken.

6.6 Cumulative Effects

Cumulative effects consider the potential effects of the proposed development in combination with the potential effects of other existing or approved developments within the surrounding area, as listed in Chapter 4.

In addition to the proposed development, there are other developments proposed in the vicinity of the site. Chapter 4 of this EIAR provides all the developments in the vicinity of the proposed development.

The cumulative schemes would have no significant effects on the population of the area due to the mitigation proposed, and the nature of the projects which are largely localised on the STEP Power Plant site. As such, amenity impacts are considered to be minimal.

There may be some degree of nuisance and/or disturbance during the construction stages of the schemes. Based on EIARs of the projects that are being assessed cumulatively, it is evident that noise, dust and traffic delays arising from cumulative schemes would be short-term and temporary, and therefore would not result in a significant cumulative effect.

The following developments has been considered as cumulative assessment as part of the intra-project of overall STEP facility:

- Strategic Gas Reserve Facility – this is the subject of a SID pre-application (ABP-319245-24) comprising of a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works.
- Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566).
- Gas Pipeline – planning permission exists for the development of a 26km natural gas pipeline which will facilitate connection from the STEP Power Plant to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.
- Data Centre Campus – as part of the STEP Power Plant masterplan, a data centre campus is proposed to the west of the STEP site. This is a future development and will be subject to its own EIAR and planning application.

Based on available EIARs, no significant negative population and human health effects are expected during the construction and operation of the proposed development.

6.6.1 Land uses and social considerations

6.6.1.1 Land requirements

The Proposed Development will have a temporary 'not significant' and a permanent 'imperceptible' effect on land use due to the loss of agricultural land in the construction phase. A number of cumulative effects, in particular those related to the overall STEP project, have the potential to lead to a further loss of agricultural land within the study area. This could result in a negative cumulative impact on land use, although it is not likely to be significant as majority of the land required is currently owned by the Applicant.

6.6.1.2 Reduction in access

The delivery of cumulative schemes is likely to increase volumes of traffic on the local road network. As set out in Chapter 17 (Roads and Traffic), the combined impact on driver delays as a result of the proposed development and cumulative schemes is assessed as minor which is not significant.

6.6.2 Economic activity

6.6.2.1 Employment

The construction and operation of the proposed development is expected to generate employment. It is not possible to estimate the temporary construction impacts of each cumulative scheme due to a lack of accessible information on construction activities required for other projects. However, the overall STEP project (including the Proposed Development) is likely to create approximately 1,350 additional temporary construction jobs (approximately 75 via the proposed development, 200 via the Gas Pipeline and 1,070 for the Power Plant) and 38 operational jobs (4 via the proposed development and 34 full time jobs at the Power Plant). This would result in a moderate beneficial temporary effect on the construction employment receptor and a slight beneficial long term effect on the operational employment receptor.

6.6.3 Human health

6.6.3.1 Neighbourhood amenity

As stated in Chapter 10 (Air), Chapter 13 (Noise and Vibration), there is potential for adverse dust and noise effects during construction as a result of proposed development occurring at the same time as the construction of nearby schemes. It is assumed that, where there is potential for works to be carried out at the same time, appropriate mitigation measures required to minimise or avoid likely adverse effects arising from each scheme that comprise the cumulative effect. No significant effects on visual amenity have been identified in Chapter 14 (The Landscape). As such, negative cumulative effects on amenity are not likely to be significant.

6.6.3.2 EMF

The proposed development and cumulative schemes will operate in accordance with limits set by the EU Directive 2013/35/EU Electromagnetic Fields (EMF) and International Commission on Non-Ionising Radiation Protection (ICNIRP). As such, it is assumed that there will be no significant cumulative health effects associated with EMF during the construction and operation of the proposed and cumulative schemes.

6.6.3.3 Traffic disruption

The assessment on disruption is associated with the volume of traffic on the local road network and, as stated in Chapter 17 (Roads and Traffic), roads in the study area have relatively low traffic flows. As stated in Table 6.12, the proposed development will have a slight adverse effect on disruption. While the cumulative developments are likely to increase traffic (and HGV flows) in the study area, the cumulative effect on severance will be relatively low given the notable level of residual road capacity and construction traffic generated by the proposed development and cumulative developments.

6.7 Mitigation and Monitoring

The proposed development has been designed, as far as possible, to minimise effects on population and human health. Appropriate mitigation options have been identified.

6.7.1 Construction Phase

The following mitigations relevant to the population and human health assessment are proposed during the construction phase:

- To manage changes in access in the construction phase, a Construction Environmental Management Plan (CEMP) has been developed to communicate planned activities and minimise disruption to stakeholders that may be affected by construction activities.
- A Construction Traffic Management Plan (CTMP) has been developed as part of the CEMP.
- No HGV traffic will be allowed pass the existing school on the Coast Road at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure the continued safe delivery and collection of children at the school' regarding the control of noise and traffic.
- Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays.
- The start and end times of construction shifts will be staggered within the construction complex (for example civil employees 07:30 – 18:00, or 07:45 – 17:45). This small stagger in shift start and ending times could lessen the impact of traffic peaking, refer to Chapter 17 (Roads and Traffic). Construction works outside these hours will only take place in exceptional circumstances (i.e., for specific engineering works e.g., concrete pours etc.). It is likely that a number of continuous construction phase works will also be required outside these hours on a limited number of occasions. These works will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities.
- To address risks of exposure to radon, workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019. Radon barriers are also to be installed in areas where a high radon risks have been identified.
- Water quality testing will be undertaken pre-construction, during construction and post-construction for any identified drinking water abstraction sources which may be impacted by construction activities.
- The CEMP includes best practice mitigation to minimise air quality and noise impacts associated with construction vehicles and the construction and operation of the plant.
- Where land is used temporarily, it will be reinstated to its previous state after construction.
- Land clearance works will take place on a phased basis and with consideration of seasonal restrictions e.g. lambing season, harvest seasons, etc., if applicable.
- Construction haul roads will be maintained and dust control measures implemented in accordance with best practice set out in Chapter 10 (Air).

6.7.2 Operation and Maintenance Phase

No specific mitigations relevant to the population and human health assessment are proposed during the operation and maintenance phase. In accordance with best practice (as set out in Chapter 10 (Air) and Chapter 13 (Noise) respectively), air and noise emissions will be minimised at source to reduce exposure of effects on operational personnel.

6.8 Residual Effects

There are no significant residual population and human health effects predicted during the construction and operational and maintenance phases. It is acknowledged that inconvenience will be caused in some areas due to the increase in construction traffic, however, as the construction periods have been phased, effects will be temporary and negligible.

Table 6.14 summarises the significance of effects pre- and post- mitigation.

Table 6.14: Summary of effects

Phase	Potential impact	Significance of effect	Mitigation	Residual significance of effect
Construction	Temporary land requirements	Not significant (not significant)	None	Not significant (not significant)
	Permanent land requirements	Imperceptible (not significant)	None	Imperceptible (not significant)
	Temporary delay in journey time affecting drivers accessing receptors along the L-1010	Slight adverse (not significant)	CTMP Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays. It is proposed to stagger the various shift starting and ending times within the construction complex (for example civil employees 07:30 – 18:00, or 07:45 – 17:45). This small stagger in shift start and ending times could lessen the impact of traffic peaking, refer to Chapter 17 (Roads and Traffic). Construction works undertaken outside of these hours will only take place in exceptional circumstances and will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities, in particular. No HGV traffic will be allowed pass the existing school on the Coast Road at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure	Slight adverse (not significant)

Phase	Potential impact	Significance of effect	Mitigation	Residual significance of effect
			the continued safe delivery and collection of children at the school' regarding the control of noise and traffic.	
	Temporary changes in employment	Slight beneficial (not significant)	None	Slight beneficial (not significant)
	Temporary changes in health and wellbeing due to changes in the local environment / neighbourhood quality	Not significant	CEMP	Not significant
	EMF	Not significant	None	Not significant
	Temporary changes in social cohesion	Slight adverse (not significant)	None	Slight adverse (not significant)
	Temporary disruption as a result of increased construction traffic	Slight adverse (not significant)	CTMP Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays. It is proposed to stagger the various shift starting and ending times within the construction complex (for example civil employees 07:30 – 18:00, or 07:45 – 17:45). This small stagger in shift start and ending times could lessen the impact of traffic peaking, refer to Chapter 17 (Roads and Traffic). Construction works undertaken outside of these hours will only take place in exceptional circumstances and will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities, in particular. No HGV traffic will be allowed pass the existing school on the Coast Road at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure the continued safe delivery and collection of children at the school' regarding the control of noise and traffic.	Slight adverse (not significant)
Operation	Permanent on-site employment	Imperceptible (not significant)	None	Imperceptible (not significant)

Phase	Potential impact	Significance of effect	Mitigation	Residual significance of effect
	EMF	Not significant	None	Not significant

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Chapter 7 - Land, Soils and Hydrogeology

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7.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of the likely significant environmental effects posed by the proposed development comprising the Shannon Technology and Energy Park (STEP) 220kV Grid Connection, based on the full outline design as described in Chapter 5 – Description of the Proposed Development.

This assessment evaluates the pre- and post-mitigation (i.e. residual) effects arising during construction and operational phases on a series of sensitive receptors identified for Land and Land Use, Soils and Geology and Hydrogeology. This chapter should be read in conjunction with the following chapters, and their appendices, which present related impacts arising from the proposed development and proposed mitigation measures:

- Chapter 8 – Surface Water and Flooding
- Chapter 9 – Biodiversity

A specific Water Framework Directive (WFD) screening has been conducted (Section 7.5.3) for WFD groundwater bodies intersected by the scheme working areas, to assess the impact of the proposed construction activities on their status and to WFD objectives.

7.2 Policy and Guidance

7.2.1 Policies

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

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

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

- The Drinking Water Directive 98/93/EC (European Commission, 1998), amended by Directive 2020/2184 (European Commission, 2020) concerns water quality for human consumption, and is implemented in Ireland as S.I. No. 122/2014 (Office of the Attorney General, 2014). Thresholds for potable groundwater quality indicators are specified in S.I. No. 366/2016 (Office of the Attorney General, 2016).
- The Waste Framework Directive 2008/98/EC (European Commission, 2008) provides waste management principles for the protection of water, soils and places of special interest, and establishes an order of preference for managing and disposing of waste.

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

- Planning and Development Act 2000 (as amended)
- Planning and Development Regulations 2001(as amended)
- Wildlife Act 1976 (as amended)

This legislation requires various branches of Government and statutory agencies to consult and take due regard for potential conservation of geological heritage features. Any geological features within the red line boundary (RLB) that are considered valuable and worthy of protection, these features would be classified as Geological Heritage Sites and County Geological Sites, which may be viewed online (Geological Survey Ireland, 2024).

7.2.2 Guidance

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

- Guideline for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (Institute of Geologists of Ireland, 2013).
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency (Environmental Protection Agency, 2022).
- Guidelines on the Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Road Authority, 2009) (now Transport Infrastructure Ireland (TII))
- Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Inland Fisheries Ireland, 2020).
- Control of Water Pollution from Construction Sites - Guide to Good Practice (C532) (CIRIA, 2001).
- Methodology for establishing groundwater threshold values and the assessment of chemical and quantitative status of groundwater, including an assessment of pollution trends and trend reversal. Wexford: Environmental Protection Agency (Craig & Daly, 2010).

7.3 Assessment Methodology

7.3.1 Assessment Scope

The main scope of this assessment consists of the analysis of likely significant effects posed by the proposed development works (considering both construction and operational phases) on hydrogeological and geological elements, and to provide indications for appropriate mitigation measures where required. A detailed description of the overarching methodology of the EIAR is presented in Chapter 4.

The assessment method follows a staged approach involving:

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

The impact assessment methodology is based on the guidance listed in Section 7.2 and tailored accordingly based on professional judgement and experience. Details of the author and experience is provided in Appendix 1.1. The approach used for each stage of this assessment is discussed in detail in the sections below.

7.3.2 Approach to Data Collection

A desktop study was undertaken to review the existing accessible data, in addition to assessments carried out to date. From this data, outlined in Table 7.1, constraints and likely sensitive receptors have been identified.

Table 7.1: Data sources used to inform the land, soils and hydrogeology chapter of this EIAR

Data Source	Date	Data Content
Ground Investigation Data		
STEP Hydrological and Hydrogeological Impact Assessment **(Arup, 2007)**	2007	• Borehole logs • Inferred groundwater contour maps
Land and Land Use		
CORINE Land Cover (CORINE, 2018)	2018	• CORINE Land Use
Shuttle Radar Topography Mission (SRTM) data (USGS, 2024)	2024	• Ground elevation data
Irish Townland and Historical Map Viewer	2024 (Accessed April 2024)	• Historical mapping • Historical aerial imagery
Soils and Geology		
Shannon Technology and Energy Park (STEP) Power Plant, Environmental Impact Assessment Report (AECOM, 2024)	2024	• Screening of environmental receptors within proposed STEP power plant site
Geological Survey of Ireland (GSI) Web Map Viewer (Geological Survey of Ireland, 2024a)	2024 (Accessed April 2024)	• Superficial Deposits (scale 1:50,000); • Bedrock Geology (scale 1:100,000); • Borehole Logs; and • Geohazards include landslide susceptibility.

Data Source	Date	Data Content
EPA database (Environmental Protection Agency, 2022)	2022 (Accessed April 2024)	• SIS National Soils; • Special Areas of Conservation (SACs); • Special Protection Areas (SPAs); and • National Heritage Areas (NHA).
Hydrogeology		
GSI Web Map Viewer (Geological Survey Ireland, 2024)	2024 (Accessed April 2024)	• Groundwater Bodies; • Karst features including caves, dry valleys, enclosed depressions, estavelles, springs, superficial solution features, swallow holes and turloughs; • Karst traced underground connections; • Groundwater Resource Potential; • Groundwater Vulnerability; • Wells and Springs; • Group Scheme and Public Supply Source; • Protection Areas; and • Superficial Deposit Permeability.
EPA Maps (Environmental Protection Agency, 2024)	2024 (Accessed April 2024)	• National Water Monitoring Stations; • Hydrometric Gauges; • Radon Risk Map; • WFD Waterbodies (Groundwater, Lake, River, Coastal and Transitional) and status; and • WFD Catchments and Sub catchments.
EPA Water Quality in Ireland 2016-2021 (Environmental Protection Agency, 2022)	2022	• Factors Determining WFD Status; and • Nutrients and Trends.

The validity of the site-specific soil, geology and groundwater data from the Arup (2007) ground investigation (detailed in Table 7.1) was reviewed prior to use within this assessment. This information is considered to remain relevant as there have been no subsequent changes to area of the proposed development which would have resulted in changes the underlying geology.

7.3.3 Approach to Impact Assessment

7.3.3.1 Identification of Receptors

A part of the current scope consists of identifying the environments and associated sensitive receptors potentially impacted by the proposed development. The criteria used to define receptors for the study area (based on a 500m buffer zone extended around each proposed working area as detailed in Section 7.3.4) are summarised below in Table 7.2.

Table 7.2: Summary of key receptors to be considered

Environmental Elements	Key Receptor
Land and Land Use	• Land use types and potential contaminants
Soils and Geology	• Soils, superficial deposits, bedrock geology and other geological features, further to a review of GSI data and site specific ground investigation. • Mapped karst landforms including caves, dry valleys, enclosed depressions, estavelles, springs, superficial solution features, swallow holes and turloughs. • Geological heritage sites. • Geohazards: recorded events, primarily landslides, karst features. • Economic geological sites.
Hydrogeology	• Groundwater body and both quantitative and qualitative status classification as assigned under the WFD. • Groundwater: Groundwater abstractions from Public Supply Schemes, Group Water Schemes and local domestic/agricultural wells (with varying degrees of location accuracy) mapped by the GSI including Source Protection Zones (SPZs). • Traced underground connections of known water dye trace studies. • Groundwater discharges. • Groundwater Drinking Water Protection Areas. • Aquifer Type, as assigned by the GSI; relates to the aquifers productivity in terms of well yields as detailed below: – Ll – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones – Lm – Bedrock which is Generally Moderately Productive – Lk – Locally Important Aquifer – Karstified to a limited degree or area – Rkd – Regionally Important Aquifer–Karstified (diffuse) – Lg – Locally Important Aquifer– Sand and gravel • Aquifer Vulnerability. • Designated sites that are hydrologically or hydrogeologically connected to the proposed development (e.g. by way of karst connections, or by linear features such as water courses). • Boreholes
Water Quality	All of the above under hydrogeology

Source: (National Road Authority, 2009)

7.3.3.2 Assessment of Receptor Sensitivity

A receptor is defined as an element potentially subjected to an impact by the proposed construction activities. The sensitivity (also referred as “importance” in the 2009 National Road Authority (NRA) guidelines) of geological or hydrogeological receptors should be assessed on the basis of their quality, extent (scale) and rarity. Typical criteria to be applied in assessing the importance of these elements are provided by NRA - *Guidelines on the Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (National Road Authority, 2009) hereafter referred to as the NRA Guidelines, and EPA - *Guidance on the Information to be contained in Environmental Impact Assessment Reports* (Environmental Protection Agency, 2022), hereafter referred to as the EPA EIAR Guidelines, as set out in Table 7.3 and Table 7.4Table 7.4. These guidelines are an industry standard, which are typically used for projects akin to the proposed development.

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

Table 7.3: Estimation of Sensitivity/Importance of Soil and Geology Receptors

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

Source: (National Road Authority, 2009)

Table 7.4: Estimation of Sensitivity/Importance of Hydrogeology Attributes

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

Source: (National Road Authority, 2009)

7.3.3.3 Assessment of Magnitude of Impact

The significance of any potential effect has been determined based on the sensitivity of the feature to be protected and the magnitude of the impact on the receiving geological/ hydrogeological environments. The terms used to define magnitude of impact, are in accordance with the NRA Guidelines and in line with the concepts provided by the EPA EIAR Guidelines (2022). A classification of these attributes is provided in Table 7.5.

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

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

Table 7.5: Criteria for Rating Impact Significance

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Large Adverse (Negative) – Direct – Indirect	• Results in loss of attribute and / or quality and integrity of attribute.	• Removal of large proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. • Potential high risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >2% annually.	• Loss of high proportion of future quarry or pit reserves. • Irreversible loss of high proportion of local high fertility soils. • Removal of entirety of geological heritage feature. • Requirement to excavate / remediate entire waste site. • Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse (Negative) – Direct – Indirect	• Results in impact on integrity of attribute or loss of part of attribute.	• Removal of moderate proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. • Potential medium risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >1% annually.	• Loss of moderate proportion of future quarry or pit reserves. • Removal of part of geological heritage feature. • Irreversible loss of moderate proportion of local high fertility soils. • Requirement to excavate / remediate significant proportion of waste site. • Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse (Negative) – Direct – Indirect	• Results in minor impact on integrity of attribute or loss of small part of attribute.	• Removal of small proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. • Potential low risk of pollution to groundwater from routine run-off • Calculated risk of serious pollution incident >0.5% annually.	• Loss of small proportion of future quarry or pit reserves. • Removal of small part of geological heritage feature. • Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. • Requirement to excavate / remediate small proportion of waste site. • Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Negligible (Neutral) – No predicted impact	• Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Calculated risk of serious pollution incident <0.5% annually.	• No measurable changes in attributes.
Minor Beneficial (Positive) – Direct – Indirect	• Results in minor improvement of attribute quality	• Not specified	• Minor enhancement of geological heritage feature. • Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial (Positive) – Direct – Indirect	• Results in moderate improvement of attribute quality	• Not specified	• Moderate enhancement of geological heritage feature. • Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial (Positive) – Direct – Indirect	• Results in major improvement of attribute quality	• Not specified	• Major enhancement of geological heritage feature. • Calculated reduction in pollution risk of 75% or more where existing risk is >1% annually.

Source: (National Road Authority, 2009)

7.3.3.4 Assessment of Significance of Effect

The significance of an impact and its effect are determined based on the sensitivity of the potential receptor (Table 7.3 and Table 7.4) and the magnitude of impact considered (Table 7.5). The matrix to determine the significance of an effect is provided in the following (Table 7.6).

Table 7.6: Significance of an effect matrix

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

Source: (National Road Authority, 2009)

7.3.3.5 WFD Methodology

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

The achievement of good groundwater status involves meeting a series of conditions, which are designed to satisfy the criteria defined in the WFD and the Groundwater Directive. In order to assess whether these conditions are being met, a sequence of tests has been prescribed for each of the quality elements defining good (chemical and quantitative) groundwater status.

There are five chemical and four quantitative tests to satisfy for compliance. Each test is applied independently, and the results are combined to give an overall assessment of groundwater body chemical and quantitative status. The worst-case classification from the relevant chemical status tests is reported as the overall chemical status for the groundwater body, and the worst-case classification of the quantitative tests is reported as the overall quantitative status for the groundwater body. The worst result of the chemical and quantitative assessments is reported as the overall groundwater body status.

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

A baseline WFD screening assessment (Section 7.5.3) has been conducted against WFD status for the one groundwater body intersected by the proposed development, following the EPA WFD groundwater quantitative status guidelines (Craig & Daly, 2010).

7.3.4 Study Area

The proposed development includes two 220kV substations, and two 220kV underground cable circuits between the STEP Power Plant site and the existing LCIM near Kilpaddoge Substation. The development site is located between Tarbert and Ballylongford in County Kerry, on the south side of the Shannon Estuary. The proposed development spans approximately five kilometres from east to west, running parallel to the Shannon Estuary shoreline.

Installation of ducting and joint bays for the underground cable sections along the L-1010 will be constructed by Kerry County Council as part of their proposed L-1010 widening works and will be constructed before the proposed development. Construction phase activities along these sections, to be carried out under the STEP 220kV Grid Connection scope of works, only comprises cable pulling through the pre-installed ducts, and does not include any intrusive works. As such, the magnitude of impact from the construction phase activities along the L-1010 sections of the underground cable route is considered to be Negligible (Neutral) – no predicted impact. These sections of the proposed development are therefore not included within the following assessment and are not considered part of the study area within this chapter.

It should also be noted that the internal access road to the Gas Insulated Substation (GIS) compound has been assessed as part of the main STEP power plant site application, and as such is not included in this assessment.

Three sections of the proposed cable route divert away from the L-1010 and as such will not be included in the Kerry County Council scope of works. All construction and operational phase activities along these sections will be carried out under the STEP 220kV Grid Connection scope of works. For the purpose of this assessment, the study area is split into four areas comprising the land required to construct these three cable sections as well as the substation compound (including a 500m buffer around these elements), as shown on Figure 7-1 and detailed below:

- Substation compound (housing the two substations): Comprises a 0.05km^2 compound at the western end of the underground cable alignment.
- Underground Cable Section 1 (UCS1): Comprises a 0.7km long section from the GIS compound to the L-1010;
- Underground Cable Section 2 (UCS2): Comprises a 0.4km long section from Coolnanoonagh to Farranawana; and,
- Underground Cable Section 3 (UCS3): Comprises a 1.4km long section in the far east of the development, from the L-1010 to the feed in loop in proximity to the Klpaddoge Substation.

The 500m buffer zone has been informed by the design of the proposed development, noting that the potential effects on ground conditions will be limited to the development footprint, and not the wider area. However, the immediately surrounding land is also considered in terms of any potential contamination to migrate onto or off site via groundwater.

Figure 7-1: Study area

7.3.5 Limitations of this EIAR

- This EIAR is predominantly based on desk-based information, with ground investigation available from the STEP Power Plant Application (ABP- 319566), which overlaps with part the study area at the Substation Compound and UCS1 (sources of information listed in Table 7.1). Future confirmatory ground investigation will be undertaken.
- Information sources include third party data and publicly available information. Mott MacDonald have not validated nor warrant the information presented in these third party reports. These sources of information are considered to be accurate for the purposes of this report.
- The report is based on outline design presented in Chapter 5.

7.4 Receiving environment

The following sections present an overview of the baseline conditions for the receiving environments and associated receptors (following methodology provided in Section 7.3 within the working areas defined in Chapter 5.

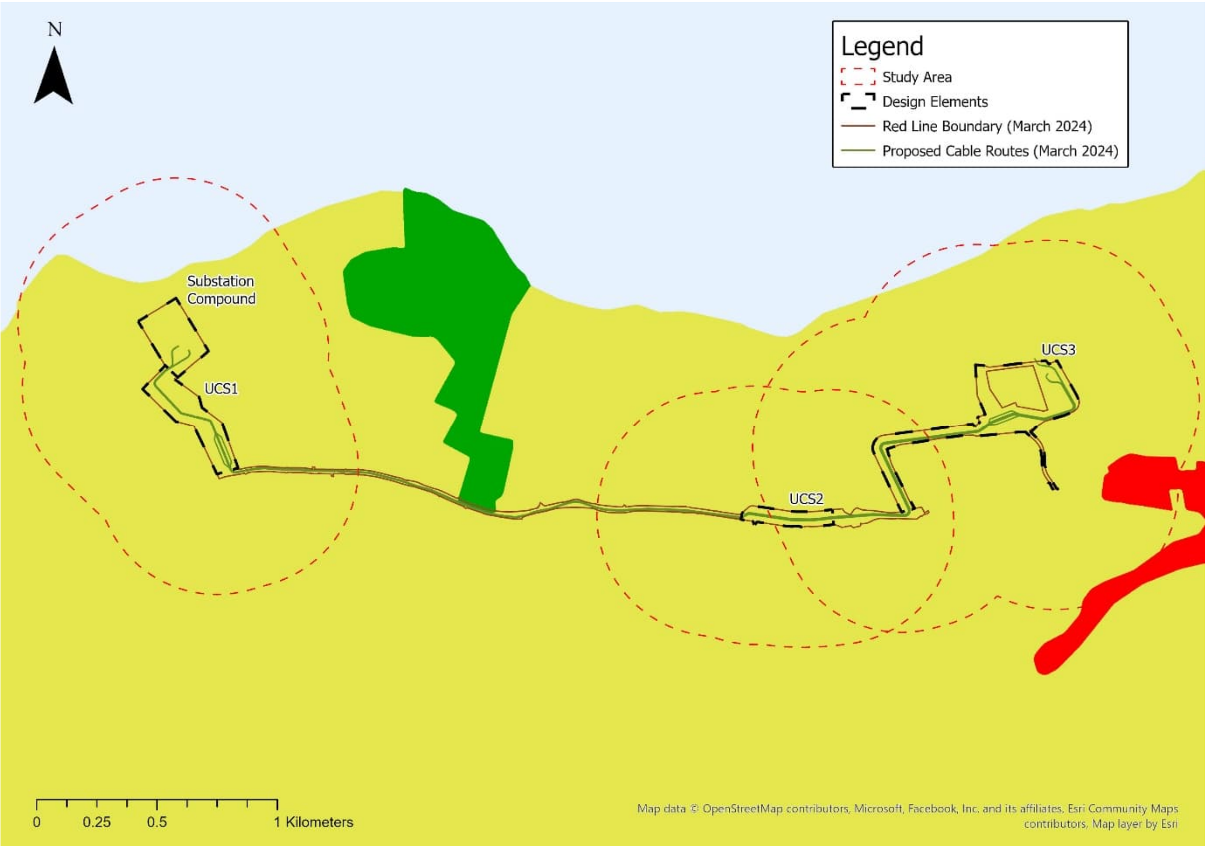
7.4.1 Land and Land Use

The land use designations in the study area have been obtained using the Corine Land Cover Dataset (CORINE, 2018). The land uses within the study area are shown on Figure 7.2 and summarised below:

- The predominant land use type identified within the study area is pastures, which is present across the whole of the proposed substation site and the whole of all three proposed cable section sites. Land use of this nature is abundant within the local area and is therefore considered to have a Low sensitivity.

- Discontinuous urban fabric is identified within the buffer zone of proposed UCS3, to the south-east of the proposed cable alignment. This is located 200m from the proposed development at its closest point. This type of land use is considered to have a Low sensitivity.
- An area classified as sea and ocean is located within the buffer zone of the proposed substation site and within the buffer zone of UCS3. This refers to the Lower River Shannon, which is located 100m north of the proposed substation site at its closest point and is considered to have a Medium sensitivity.

Figure 7-2: CORINE Land Use 2018



Corine Land Use Classifications: Yellow = Pastures, Red = Discontinuous Urban Fabric and Green = Coniferous forest

Source: (CORINE, 2018)

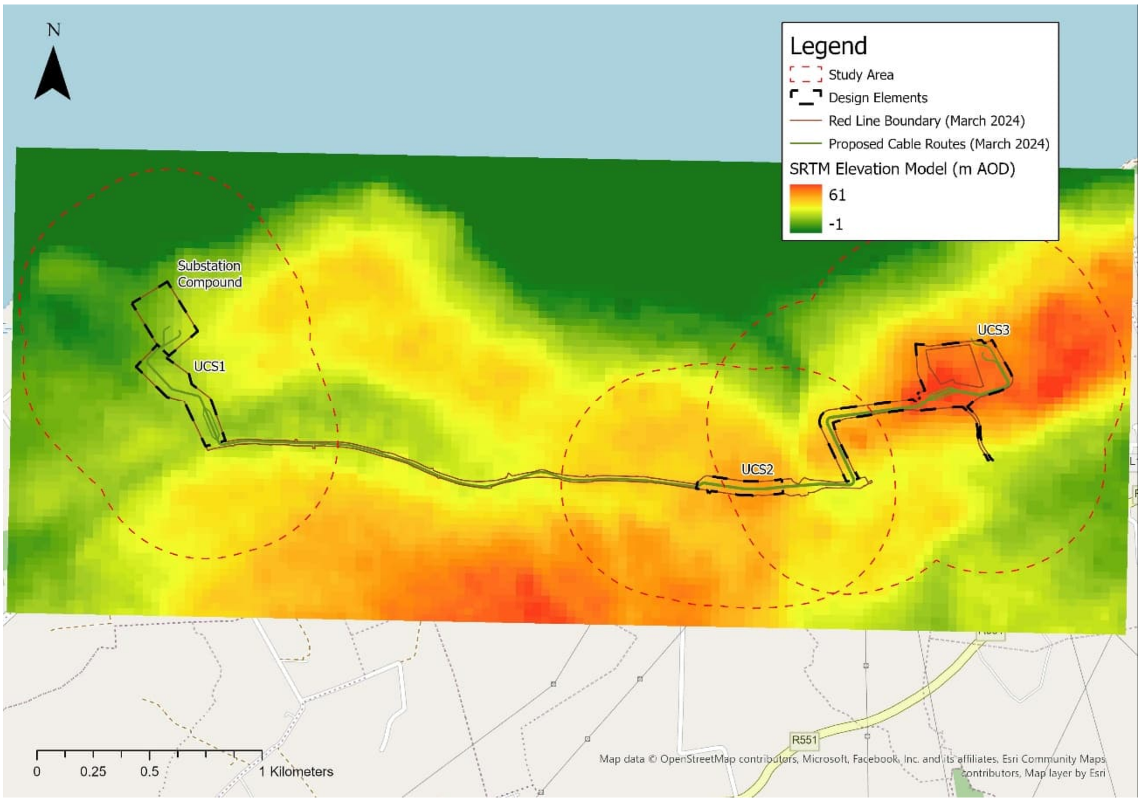
A review of historical mapping and historical aerial imagery (Ordnance Survey Ireland, 2024) indicates that have been no major changes to the land use in the study area between the 1830s and 2018. However, the following noteworthy changes have been identified on the available records:

- Gradual expansion of Tarbert into the south-east of the buffer zone between the 1830s and 1995, largely comprising construction of properties along the L-1010.
- Construction of occasional farm buildings within agricultural land across the study area.

The existing Kilpaddoge Substation is located within the 500m buffer, approximately 230m north of UCS3.

Shuttle Radar Topography Mission (SRTM) data shown on Figure 7.3 (USGS, 2024) indicates that the topography of the study area is generally undulating. Ground elevation ranges from 61m above ordnance datum (AOD) at the eastern end of the proposed cable alignment, to 0m AOD at the coastline. Topographic highs are present at the eastern edge of the proposed cable alignment, in the south of the buffer zone to the south of the L-1010 and in the buffer zone to the east of the proposed substations. In general, the topography slopes to the north toward the Shannon Estuary. Topography also converges on surface water features in places, forming river valleys.

Figure 7-3: SRTM ground elevation data (USGS, 2024)



No ground cover classification dataset is currently available for the study area. However, a review of available aerial imagery suggests that the majority of the study area comprises soft standing (across pasture land). Some areas of hardstanding are identified where the urban fabric of Tarbert extends into the far east of the buffer zone of UCS3. It is also noted that the main alignment of the proposed below ground cable route follows the L-1010, comprising a tarmac road.

No licensed or historic waste facilities have been identified within the study area (Environmental Protection Agency, 2019).

No licensed or surrendered Integrated Pollution Control (IPC) sites have been identified within the study area (Environmental Protection Agency, 2020).

A summary of the identified land and land use receptors, and associated sensitivity classifications is provided in Table 7.7.

Table 7.7: Summary of land and land use receptors

Design Element	**Land Use Type**	**Distance from red line boundary (m)**	**Potential Contaminants**	**Sensitivity**
Substation Compound	Pastures	0	Pesticides, fertilisers, ammonium.	Medium
	Sea and ocean	100	N/A	Medium
UCS1	Pastures	0	Pesticides, fertilisers, ammonium.	Medium
UCS2	Pastures	0	Pesticides, fertilisers, ammonium.	Medium
UCS3	Pastures	0	Pesticides, fertilisers, ammonium.	Medium
	Discontinuous urban fabric	200	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Low
	Sea and ocean	410	N/A	Medium

7.4.2 Soils and Geology

Soil types were identified using the Teagasc database (Environmental Protection Agency, Teagasc, Cranfield University, 2014). Superficial deposits and bedrock were identified using the Geological Survey of Ireland (GSI) database (Geological Survey of Ireland, 2024a).

A detailed hydrological and hydrogeological EIA was carried out by Arup in 2007 to assess the potential impacts of the Shannon Liquefied Natural Gas (LNG) Terminal Development on protected wetland habitats to the west of the study area (Arup, 2007). As part of this assessment, a ground investigation (GI) was completed, which included completion of a number of exploratory locations within the western section of the study area, including the substation compound and UCS1. Findings of this GI pertinent to this assessment area summarised in Section 7.4.2.6.

These investigation reports were undertaken by third parties ((ARUP (2007) and Halcrow (2007)) and Mott McDonald takes no responsibility for the conclusions presented in those reports. The reports were undertaken to provide geotechnical recommendations for previous approved scheme designs, although provide useful information with regard to the Proposed Development. Site specific soil and geology data collected as part of an intrusive investigation at the Site of the Proposed Development in 2007 was reviewed as part of this assessment. This information is considered to remain relevant as there have been no subsequent changes to the Site which would have resulted in changes the underlying geology of the Site.

7.4.2.1 Soils

The predominant soil type within the study area is Kilrush, which is described as fine, well-drained, loamy drift with siliceous stones. A small area of Boyne soil type is identified in the central portion of proposed UCS1, approximately 140m north of the L-1010. This soil type is described as silty river alluvium.

Soil sensitivity values have been assigned based on the classifications in Table 7.3. Soils identified as ‘loamy’ or ‘alluvium’ are considered well drained and/or highly fertile and are classified as having High sensitivity. As such, all soil types within the study area are classified as High sensitivity.

7.4.2.2 Superficial Deposits

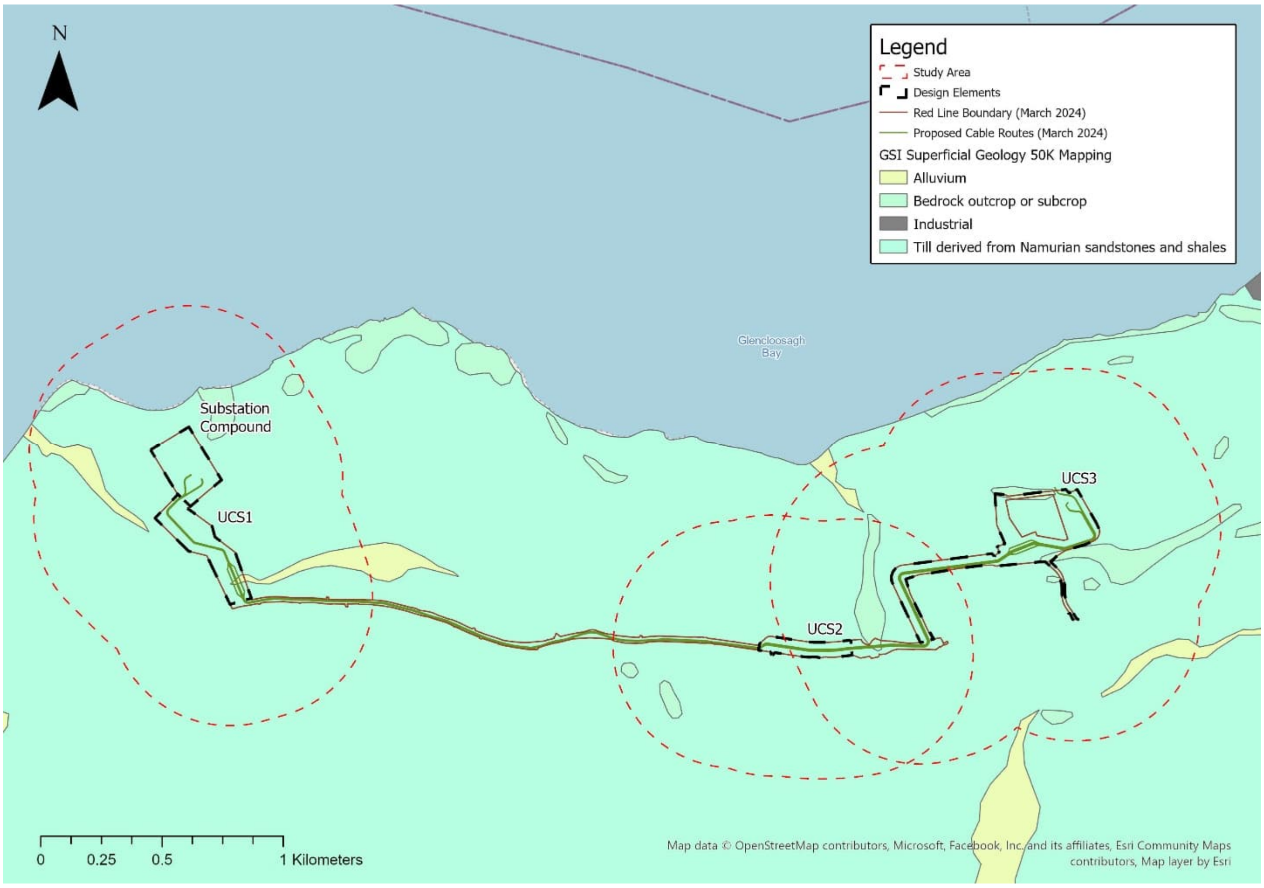
GSI mapping of superficial deposits, presented in Figure 7.4, shows that the majority of the study area is underlain by Till, derived from Namurian sandstones and shales. The Till found within the area is described as a 'clay with substantial components of sand (c.20%), gravel (c.20-40%), pebbles (c.20-50%) and occasional cobbles and boulders' (Arup, 2007). The subsoil type is characterised by poor drainage and low infiltration properties (Arup, 2007). Till is therefore considered moderately poorly drained for the purposes of this assessment, and therefore has Low sensitivity.

Small areas of Alluvium are also located across portions of UCS1 and within the buffer zone of UCS3, predominantly along rivers and streams. Alluvium is considered well drained and/or highly fertile and has High sensitivity.

There are also few areas of bedrock outcrops or subcrops, particularly adjacent to UCS3, where superficial cover is absent.

Limited historical ground investigation data across the buffer zone of UCS1 and the substation compound encountered superficial deposits ranging from a thickness of 0 to 8m (more details provided in Section 7.4.2.6). No ground investigation data is currently available in the vicinity of UCS2 or UCS3.

Figure 7-4: Superficial geology (Geological Survey of Ireland, 2024a)

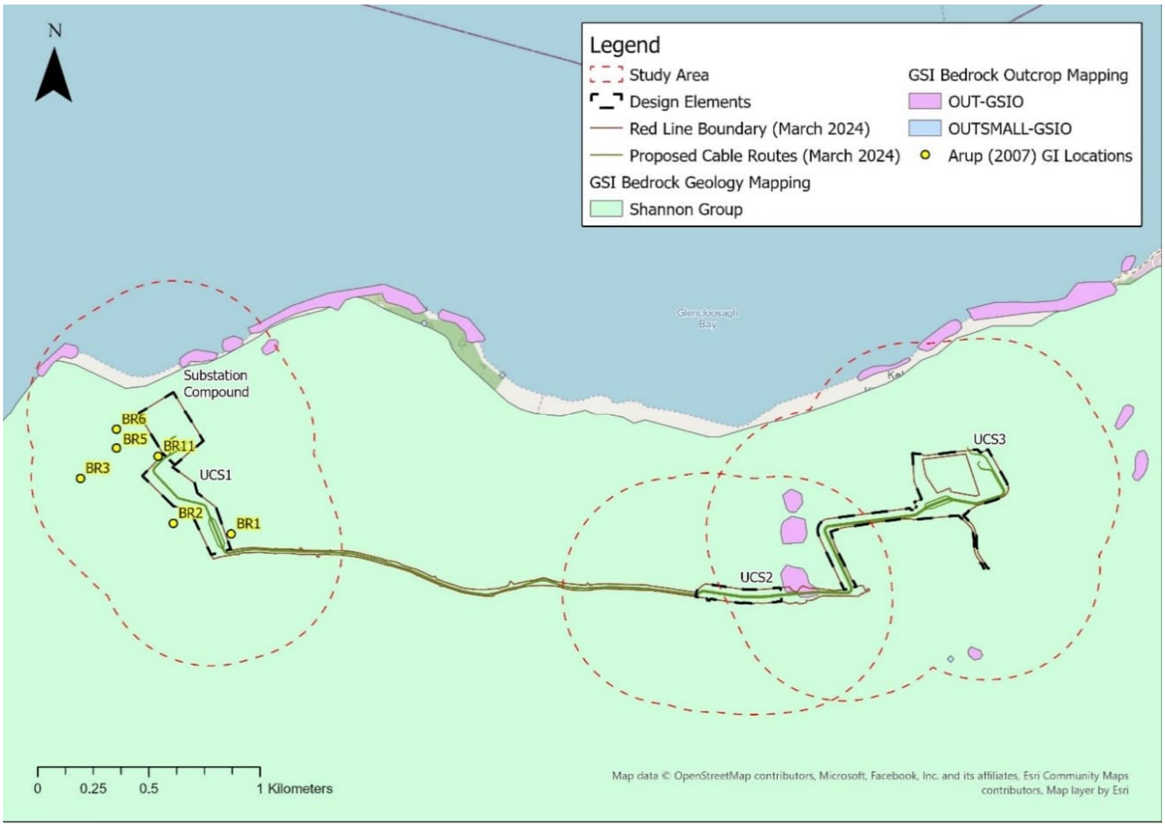


7.4.2.3 Bedrock Geology

GSI mapping, presented in Figure 7.5, shows that the bedrock geology underlying the study area comprises the Shannon Group, which is described as comprising mudstones, siltstones and rippled sandstones. In North Kerry, the Shannon Group is generally very poorly exposed and very little geological mapping has been accomplished here (Sleeman, Pracht, & Claringbold, 1999). Bedrock outcrops are generally present along the coastline, however, small outcrops are located within the study area. The study area is absent of any recorded structural geology features including faults, fissures and folds.

GSI geological mapping (Geological Survey of Ireland, 2024c) indicates that the Shannon Group in the vicinity of the study area generally dips to the north toward the Shannon Estuary.

Figure 7-5: Bedrock geology (Geological Survey of Ireland, 2024a)



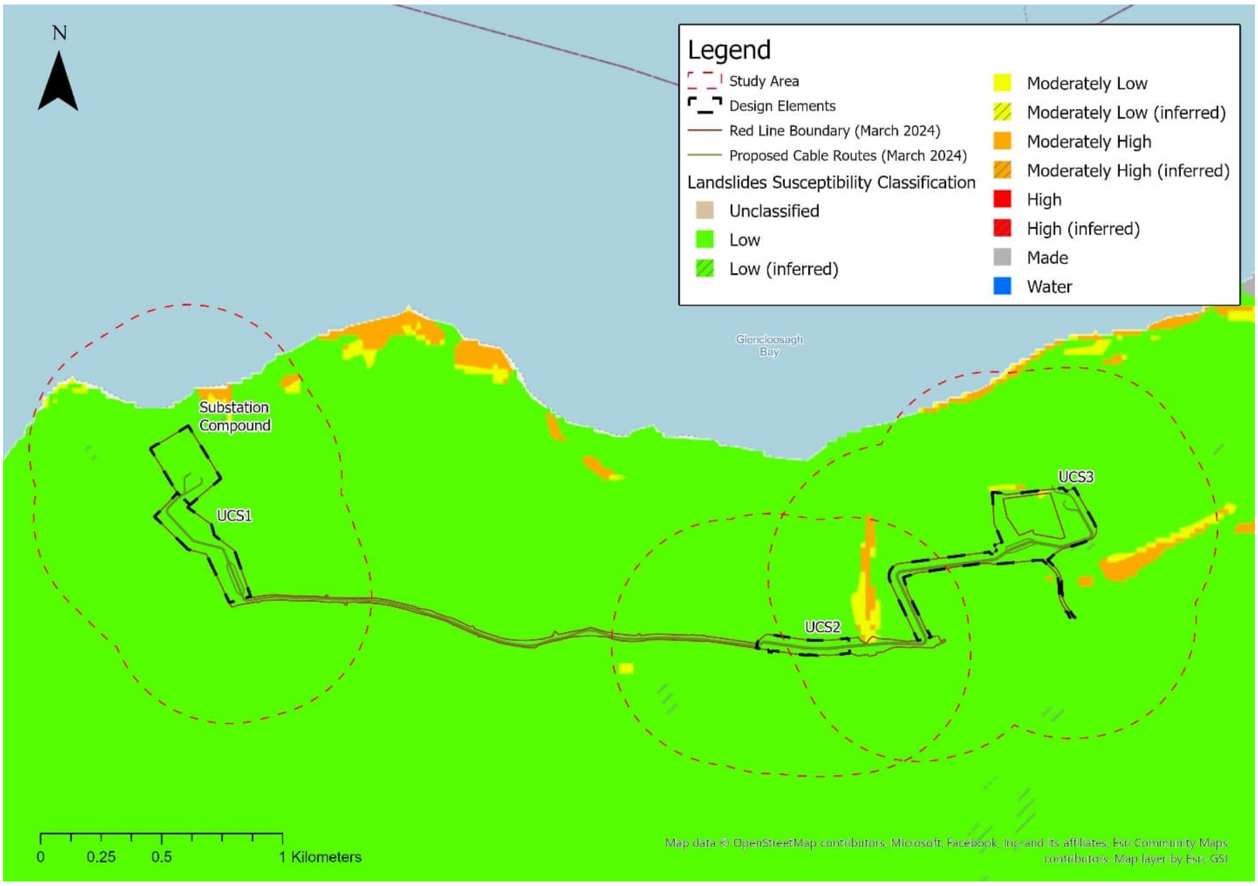
7.4.2.4 Geological Heritage

The GSI Geological Heritage mapping portal does not identify any geological heritage sites within the study area (Geological Survey of Ireland, 2021). The closest heritage site is Beal Point (Carboniferous outcrop), located 12km west of the study area. The geological significance of the site is therefore considered to be low, with the bedrock geology considered to have a Low sensitivity. The sensitivity of the bedrock aquifer is discussed in Section 7.4.3.

7.4.2.5 Landslides

The landslide susceptibility classification is Low across most of the study area, as shown on Figure 7-6. However, small areas of Moderately Low to Moderately High susceptibility are present, associated with the coastline and river/stream channels. Notably, an area of Notably Low susceptibility is located within the RLB of UCS3. Other than this the landslide susceptibility within the RLB in the study area is Low. No landslide events have been recorded with the study area or surrounding areas.

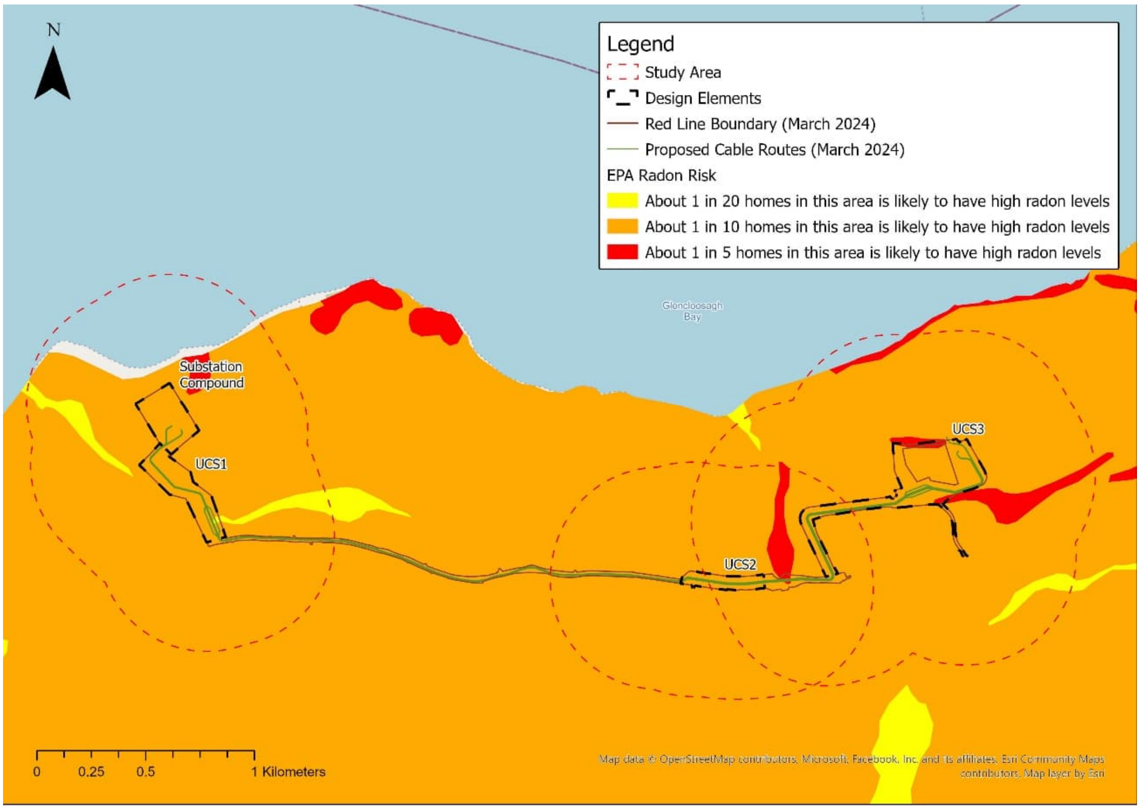
Figure 7-6: Landslide susceptibility classification (Geological Survey of Ireland, 2024a)



7.4.2.6 Radon

The EPA Radon Map, shown on Figure 7.7, categorises radon risk based on indoor radon measurements and geological information, including bedrock type, quaternary geology, soil permeability and aquifer type (Environmental Protection Agency, 2024). This map shows that the study area is primarily located in an area where 10% of homes are estimated to be above the reference level of 200 becquerels per cubic metre (Bq/m^3). Radon risk in these areas is considered to be Moderate. However, small areas estimated as having 20% of homes above the 200Bq/m^3 reference level, which are classified as High risk. A radon test is legally required for ground floor and basement workplaces located in high radon areas.

Figure 7.7: Radon Risk Map (Environmental Protection Agency, 2024)



7.4.2.7 Ground Investigation

A summary of the geology encountered during the 2007 GI (Arup, 2007), within the vicinity of the substation compound and UCS1, are provided in Table 7.8 below. This includes information from six borehole locations which intersect the study area – BR1, BR2, BR3, BR5, BR6 and BR11 (locations shown on Figure 7.5.

Table 7.8: Summary of geology encountered at GI locations within the study area (Arup, 2007)

Stratum	Depth to Base (m bgl)	Thickness (m)	Description
Upper Till	0 to 3	0 to 3 – absent in the south of UCS1 (BR2) and reaches a maximum thickness in the south-east corner of the Substation Compound (BR11)	Medium-dark brown boulder clay. Typically encountered as slightly sandy, gravelly clay with sandstone pebbles and occasional cobbles and boulders.
Lower Till	0 to 8	0 to 6 - absent in the south of UCS1 (BR2) and reaches a maximum thickness in the north-west corner of the Substation Compound (BR6)	Dark grey boulder clay. Encountered as slightly sandy gravelly clay with many cobbles.
Shannon Group	Total depth not proven		Light to dark grey medium to fine grained sandstone, with interbedding of siltstone and mudstone.

Water strikes were recorded within the Till at most of exploratory locations, at depths ranging from 1 to 4m bgl.

Based on permeability testing results, Arup (2007) concluded that the shallow soils are of relatively low permeability, except in isolated areas that have higher sand or gravel content. This information is considered to remain relevant as there have been no subsequent changes to the Site which would have resulted in changes the underlying geology of the Site.

7.4.2.8 Summary

A summary of the identified soils and geology receptors, and associated sensitivity classifications is provided in Table 7.9.

Table 7.9: Summary of soils and geology receptors

Design Element	**Receptor**	**Distance from red line boundary (km)**	**Sensitivity**
Soils			
Substation compound	Kilrush (fine, well drained, loamy drift with siliceous stones)	0	High
UCS1	Kilrush (fine, well drained, loamy drift with siliceous stones)	0	High
	Boyne (silty river alluvuim)	0	High
UCS2	Kilrush (fine, well drained, loamy drift with siliceous stones)	0	High
UCS3	Kilrush (fine, well drained, loamy drift with siliceous stones)	0	High
Superficial Deposits			
Substation compound	Till	0	Low
	Bedrock at outcrop	0.04	Low
	Alluvium	0.2	High
UCS1	Till	0	Low
	Alluvium	0	High
	Bedrock at outcrop	0.28	Low
UCS2	Till	0	Low
	Bedrock at outcrop	0.1	Low
	Alluvium		High
UCS3	Till	0	Low
	Bedrock at outcrop	0	Low

Design Element	**Receptor**	**Distance from red line boundary (km)**	**Sensitivity**
	Alluvium	0.3	High
Bedrock Geology			
All	Shannon Group (mudstones, siltstones and rippled sandstones)	0	Low
Landslides*			
Substation compound	Low Susceptibility	0	N/A
	Moderately Low Susceptibility	0.1	N/A
	Moderately High Susceptibility	0.11	N/A
UCS1	Low Susceptibility	0	N/A
	Moderately Low Susceptibility	0.35	N/A
	Moderately High Susceptibility	0.4	N/A
UCS2	Low Susceptibility	0	N/A
	Moderately Low Susceptibility	0.05	N/A
	Moderately High Susceptibility	0.04	N/A
UCS3	Low Susceptibility	0	N/A
	Moderately Low Susceptibility	0	N/A
	Moderately High Susceptibility	0.01	N/A

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

7.4.3 Hydrogeology

A series of hydrogeological elements/attributes including groundwater karst features, aquifer designations, aquifer vulnerability, groundwater abstraction sources, public supply source protection areas (PSSPA), group scheme preliminary source protection areas (GSPSPA) and springs have been screened for the study area, to classify hydrogeological sensible receptors, with the support of mapping tools available on the GSI Groundwater Data Viewer (Geological Survey of Ireland, 2024c). Data from the 2007 GI (Arup, 2007) has also been used for hydrogeological conceptualisation. Hydrogeological receptors sensitivity/value is based on the classifications described in Table 7.4.

7.4.3.1 Aquifers and Groundwater Flow

The Shannon Group, which underlies the entire study area, is classified as a Locally Important Aquifer (LI – Bedrock which is Moderately Productive only in Local Zones) which has a Medium sensitivity. There are no sand and gravel aquifers within the study area.

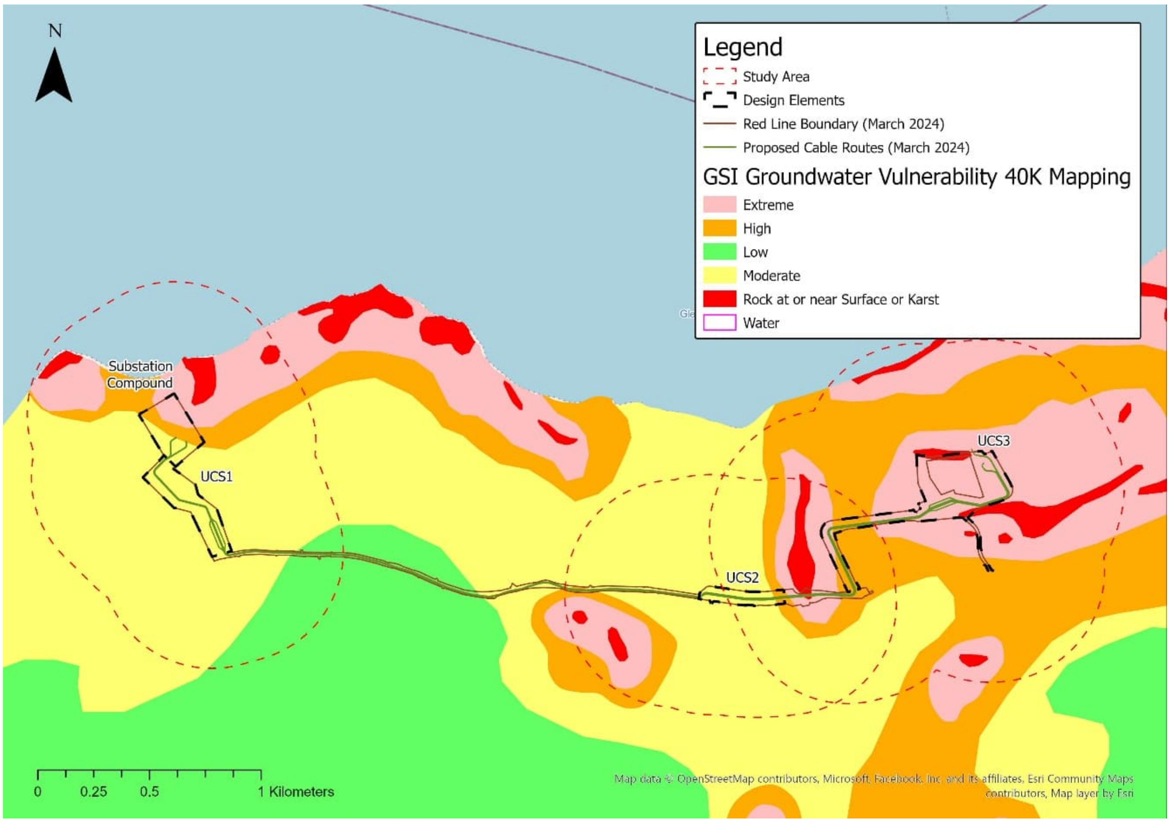
The Shannon Formation within the area is reported to dip in a general northerly direction. Is therefore considered likely that the regional groundwater flow direction within the bedrock aquifer is down-dip to the north, toward the Shannon Estuary, which is also consistent with the local topographic gradient. This is in line with the findings of the 2007 GI (Arup, 2007), which inferred a general groundwater flow direction within both the superficial deposits/subsoils and bedrock to the north and north-west in the vicinity of the Substation Compound and UCS1. It is considered likely that the groundwater flow in the vicinity of UCS2 and UCS3 is in a similar direction.

The estuary is tidally influenced, with a reported tidal range of up to approximately 5.4m. Given the proximity of the study area to the coast, it is possible that there is a reversal in groundwater flow direction during high tide. Limited groundwater quality data was collected during the 2007 GI (Arup, 2007). Groundwater samples from both bedrock and subsoil installations recorded low chloride and sodium concentrations, with a range of 40-54mg/l and 22-40mg/l, respectively. This suggests that the groundwater is not brackish in the area and that there is limited connectivity between groundwater and the Shannon Estuary.

The bedrock aquifer in the region is reported to have a transmissivity which ranges from 2-20m^2/d, with groundwater flow expected to occur entirely via fractures and faults. Flows within the aquifer are considered likely to be concentrated in a thin zone of upper weathered bedrock (Geological Survey of Ireland, 2024d).

Groundwater vulnerability within the study area, identified using GSI Groundwater Data Viewer (Geological Survey of Ireland, 2024c) ranges from Low to Extreme, with some areas classified as ‘Rock at or Near Surface or Karst’. The areas of Extreme groundwater vulnerability within the study area occur where the fractured bedrock is outcropping or near surface, with the groundwater vulnerability classification decreasing with distance away from the outcrop (see Figure 7.8). In general, areas of Extreme and High groundwater vulnerability dominate the far eastern side of the study area, at UCS2 and UCS3, with most of the rest of the study area classified as Moderate or Low.

Figure 7.8: Groundwater vulnerability mapping (Geological Survey of Ireland, 2024c)



Based on permeability testing results, Arup (2007) concluded that the shallow soils across the area of GI (in the vicinity of the substation compound and UCS1) are of relatively low permeability, except in isolated areas that have higher sand or gravel content.

7.4.3.2 Protected Areas

The Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) extend into the buffer zones of the proposed substation compound and UCS3. At its closest point, the SAC and SPA are located 90m north of the proposed substation compound. As the SAC is a surface water body ecosystem which is protected by EU legislation, this area is considered to have Extremely High sensitivity.

Ballylongford Bay is classified as a proposed Natural Heritage Area (pNHA) and extends into the far west of the substation compound buffer zone, 240m west of the proposed development at its closest point.

7.4.3.3 Wells, Springs and Abstractions

No Group Scheme or Public Supply Scheme Source Protection Areas are located within the study area (Geological Survey of Ireland, 2024c).

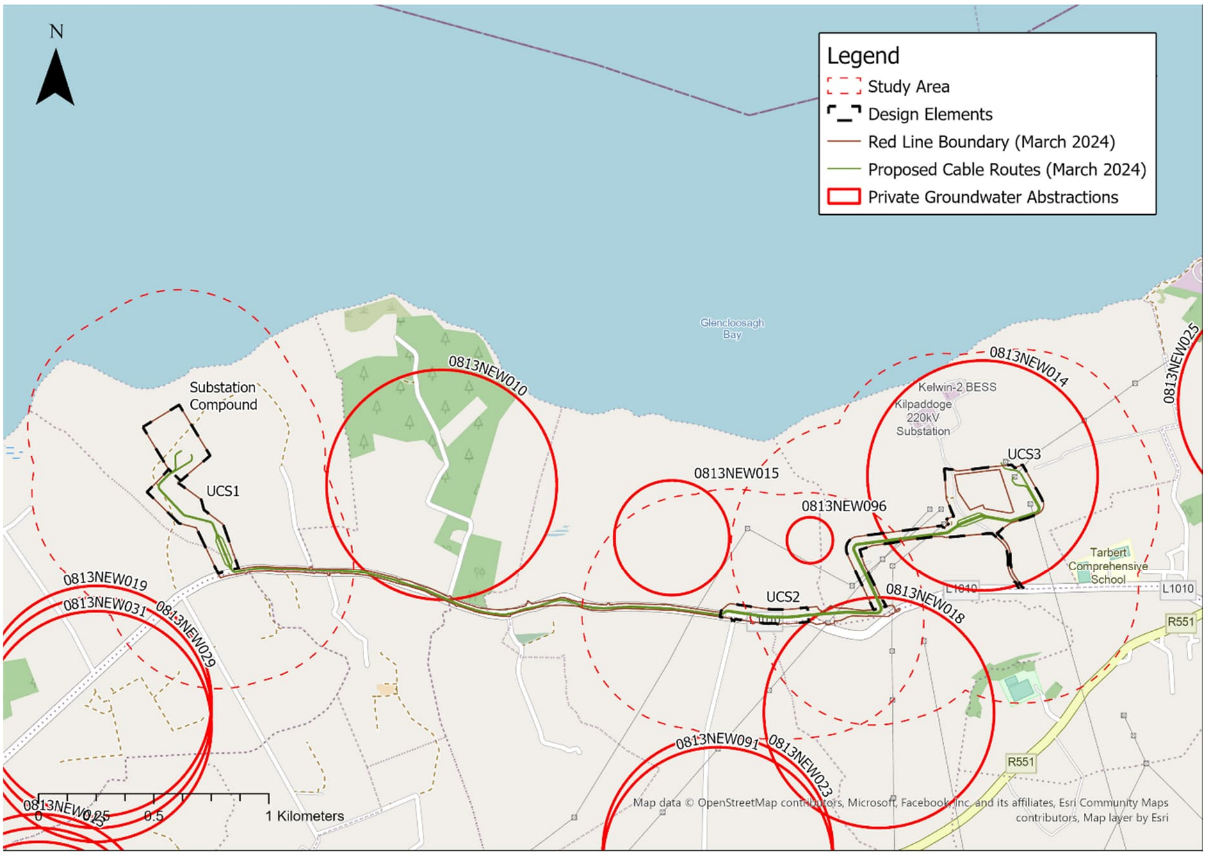
A screening of private groundwater abstractions has been carried out using the GSI Groundwater Data Viewer (Geological Survey of Ireland, 2024c). The available dataset does not provide the exact location of abstractions, but rather provides circles within which the abstractions are located, with differing sized circles shown depending on location accuracy. Eight private groundwater abstractions have been identified with location radii which intersect the study area, as detailed in Table 7.10 and shown on Figure 7.9. For the purpose of this assessment, it is assumed that each abstraction is located at the closest point of the location radius to the proposed development. Poor yield class abstractions area considered to have a

Medium sensitivity and the excellent yield class abstraction is considered to have a High sensitivity.

Table 7.10: Private groundwater abstractions within close vicinity of the study area

GSI ID	Location Accuracy (km radius)	Location Description	Depth	Yield (m^3/d)	Use
0813NEW014	1	Location radius extends across the whole of the eastern end of UCS3	30.5	21.8 (class – Poor)	Agricultural and domestic
0813NEW018	1	Location radius intersects the eastern edge of UCS2 and the south-western portion of UCS3.	29.9	21.8 (class – Poor)	Agricultural and domestic
0813NEW010	1	Approximately 450m east of the UCS1 red line boundary at its closest point	33.5	26 (class – Poor)	Agricultural and domestic
0813NEW015	0.5	130m north-west of the UCS2 red line boundary at closest point	20.7	21.8 (class – Poor)	Agricultural and domestic
0813NEW096	0.2	Approximately 60m west of the UCS3 red line boundary at its closest point.	90	617 (class – Excellent)	Other
0813NEW019	1	Approximately 290m south-west of the UCS1 red line boundary at its closest point.	33.5	12.8 (class – Poor)	Agricultural and domestic
0813NEW029	1	Approximately 300m south-west of the UCS1 red line boundary at its closest point.	8.2	8.7 (class – Poor)	Agricultural and domestic
0813NEW031	1	Approximately 350m south-west of the UCS1 red line boundary at its closest point.	31.7	15 (class – Poor)	Agricultural and domestic

Figure 7-9: Private groundwater abstractions (Geological Survey of Ireland, 2024c)



No karst features, springs or springs have been identified within the study area.

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

7.4.3.4 Groundwater Levels

During the 2007 GI (Arup, 2007) water strikes were typically recorded in the upper weathered portion of the Shannon Group bedrock, at depths within the west of the study area ranging from 1 to 4.7m below ground level (bgl). A round of ground of groundwater monitoring was carried out in April 2007, which recorded piezometric levels within the Shannon Group ranging from 15.07m above ordnance datum (AOD) to the south-east of UCS1 to 2.41m AOD at the substation compound. Groundwater levels in meters below ground level are not available and no groundwater level data is currently available in the vicinity of UCS2 and UCS3.

7.4.3.5 WFD Groundwater Bodies Screening

The study area is located within the Ballylongford WFD Groundwater Body (IE_SH_G_030), which is categorised as poorly productive bedrock. The WFD status of the groundwater body is 'Good' and the risk status is currently 'Not at Risk' (Environmental Protection Agency, 2021).

7.4.3.6 Summary

A summary of the identified hydrogeological receptors, and associated sensitivity classifications is provided in Table 7.11.

Table 7.11: Summary of hydrogeology receptors

Design Element	Receptor	Distance from red line boundary (km)	Sensitivity
Aquifers			
All	Shannon Group *Locally Important Aquifer (LI – Bedrock which is Moderately Productive only in Local Zones)* *GW vulnerability varies from Moderate to Extremely High across the study area.*	0	Medium
Source Protection Areas			
No Group Scheme or Public Supply Scheme Source Protection Areas are located within the study area. The closest Source Protection Area to the study area is the Glin PWS, located 7.7km east of the red line boundary and classified as 'not in use'. This is not considered to be sensitive to activities within the study area.			
Wells, Springs and Abstractions			
UCS1	Borehole 0813NEW019 – Agricultural and domestic use. Depth 33.5m. Yield 12.8m^3/d.	0.29	Medium
	Borehole 0813NEW029 – Agricultural and domestic use. Depth 8.2m. Yield 8.7m^3/d.	0.30	Medium
	Borehole 0813NEW031 – Agricultural and domestic use. Depth 31.7m. Yield 15m^3/d.	0.35	Medium
	Borehole 0813NEW010 – Agricultural and domestic use. Depth 33.5m. Yield 26m^3/d.	0.45	Medium
UCS2	0813NEW018 – Agricultural and domestic use. Depth 29.9m. Yield 26m^3/d.	0	Medium
	0813NEW015 – Agricultural and domestic use. Depth 20.7m. Yield 12.8m^3/d.	0.13	Medium
	0813NEW096 – 'Other' use. Depth 90m. Yield 617m^3/d.	0.2	High
UCS3	0813NEW014 – Agricultural and domestic use. Depth 30.5m. Yield 12.8m^3/d.	0	Medium
	0813NEW018 – Agricultural and domestic use. Depth 29.9m. Yield 26m^3/d.	0	Medium
	0813NEW096 – 'Other' use. Depth 90m. Yield 617m^3/d.	0.06	High
Protected Areas			
Substation compound	Lower River Shannon SAC River Shannon and River Fergus Estuaries SPA	0.09	Extremely High
	Ballylongford Bay pNHA	0.23	Medium
UCS1	Lower River Shannon SAC River Shannon and River Fergus Estuaries SPA	0.13	Extremely High
	Ballylongford Bay pNHA	0.27	Medium
UCS3	Lower River Shannon SAC River Shannon and River Fergus Estuaries SPA	0.4	Extremely High

Design Element	Receptor	Distance from red line boundary (km)	Sensitivity
Groundwater/Surface Water Interactions			
No groundwater/surface water interaction features have been identified in relation to ecologically designated SPA/SAC sites, the closest of which are estuarine and therefore not considered groundwater dependent.			

7.5 Likely Significant Effects

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

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

7.5.1 Construction Phase

7.5.1.1 GIS Substations

The construction phase activities associated with the substations, which could pose risks to land, soils and hydrogeology, are summarised below, and are described in more detail in Chapter 5 of this EIAR.

The site preparation works for the GIS substation site (to house both substations) will include:

- Demarcation of construction works areas, clearance, and site levelling to prepare the works area. As the substations are to be located on an area set aside for the STEP Power Plant laydown area, the site levelling works are anticipated to be completed as part of the STEP Power Plant enabling works.
- Stone for compound surfacing will be graded into place using excavator.

Water will be tankered onto site as required during the construction phase.

The main civil works for constructing the new GIS buildings will include:

- **Foundations works:** To commence after the completion of STEP Power Plant site clearance and grading. The foundation installation will involve excavation, form work, steel reinforcement, and concrete placement. Foundations will be designed in accordance with the appropriate and relevant EirGrid Technical Specifications. Excavated material will either be reused on-site or disposed of off-site in accordance with applicable legal requirements. The total bulked cut for the substation foundations is estimated to be 3700m^3.
- **Structural steelwork erection:** The two GIS Buildings will be steel portal two storey buildings over partial basements constructed in accordance with EirGrid technical specification.
- **Cladding and building finishing works:** Cladding and building finishing works and the installation of building services, e.g. drainage, internal circulation road, will be undertaken once the structural frame and steel support structures are completed.
- **Permanent foul and surface water drainage works:**
  - **Water Supply:** A new potable water supply is required for proposed welfare facilities (toilet and wash hand basin) within the 220kV GIS building. It is proposed to be sourced from the existing public watermain system via a new connection to the STEP Power Plant.

– **Foul Water:** During construction, portable chemical toilets will be provided for the duration of the works and all waste material will be removed from site and disposed of to an appropriately licensed facility.
– **GIS Buildings and Substation Drainage:** Drainage of the site of the proposed GIS building and substation will be achieved by a combination of piped and channel drainage designed to collect surface water runoff from hardstanding areas, GIS building roof and the internal access track within the two substation compounds. Collected storm water runoff will pass through new silt trap chambers and hydrocarbon interceptors to remove any entrained pollutants prior to discharging to the River Shannon via a new piped outfall (Part of the STEP Power Plant application). The decision to connect the drainage from the GIS compound to the STEP Power Plant Drainage was made following discussions with the design team, to avoid discharge to the Rallappane Stream and reduce environmental impacts.

7.5.1.2 Underground Cabling

Installation of ducting and joint bays for the underground cable sections along the L-1010 will be constructed by Kerry County Council as part of their proposed L-1010 widening works. These works are to take place in advance of the STEP 220kV Grid Connection, so there are not anticipated to be any cumulative effects. The construction phase activities along these sections, to be carried out under the STEP 220kV Grid Connection scope of works, only comprises cable pulling through the pre-installed ducts, and does not include any intrusive works. As such**,** the magnitude of impact from the construction phase activities along the L-1010 sections of the underground cable route is considered to be Negligible (Neutral) – no predicted impact. These sections of the proposed development are not included within the following assessment.

Three sections of the proposed cable route which divert away from the L-1010, and as such will not be included in the Kerry County Council scope of works: UCS1, UCS2 and UCS3.

The main civil works included in the construction of these three underground cable sections will include:

- **Trenching and ducting:** The trench depth for installations in agricultural lands is 1.575m and will require a centre-to-centre spacing of approximately 5.5m to maintain the required cable ratings. Following excavation of the trench, bedding material, Cement Bound Granular Material (CBGM) will then be laid, the ducts put in place, protection strips laid on top and the trench will be backfilled. The duct installation will progress sequentially starting at one joint bay and moving towards the next joint bay along the route. The construction area will move in tandem with the progress of the duct installation, with only the relevant portion of the section cordoned off while under construction.
- **Cable installation and jointing:** Joint bays will be required to be installed along the cable route to join consecutive lengths of cable and to facilitate cable pulling. Joint bays generally consist of precast concrete walls and base located below ground with typical approximate dimensions of 8m length x 2.5m width x 2.3m depth for 220kV joint bays. Sand or lean mix concrete will be used as required as a blinding layer to the underside of the chamber. The ducts will be installed to each end of the chamber, then proven, cleaned and sealed.
- **Cable crossings:** Underground cable crossings will be required on the Kilpaddoge substation access road**,** within UCS3. It is proposed that these cables will be crossed using Horizontal Directional Drilling (HDD). Other cable crossings are to be assessed at the detailed design stage.
- **Horizontal Directional Drilling:** The HDD compound will consist of launch and reception pits as the drilling rig requires the temporary installation of a level hardstanding area on a geotextile base. A pilot hole will be drilled from one side of the crossing to the other side while supporting the bored hole with bentonite. The drill bit will be oriented by the surveyor, and the driller will push the drill string into the ground to maintain the bore path. A steering

system, guided by tri-axial magnetometers and accelerometers that provide real time directional information to the surveyor at the driller's console, will be used to navigate the bores.

- **Water crossings:** One water crossing has been identified within the study area, which is located at the Ralappane Stream, in the south of UCS1. The proposed crossing method for this stream is open cut. This will comprise dry works, with the watercourse isolated from the works area using an impermeable barrier. Water would be conveyed over the isolated section of the channel by pumping or use of a temporary diversion.

7.5.1.3 Assessment of Effects

The construction phase assessment of effects for lands, soils and hydrogeology are summarised in Table 7.12.

Table 7.12: Construction phase assessment of effects

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
Land Use	Substation compound	**Loss/change of land use.** The GIS substations will be built on an existing compound, which will be constructed as part of enabling works under the STEP Power Plant scope of works. Temporary works during the construction of the substations include foundations works, profiling of access roads for road drainage, installation of substation drainage systems and landscaping of the substation site. **The Lower River Shannon is located 100m north of the red line boundary. Land use will not be impacted by the proposed development.**	The footprint of the GIS substation compound and associated temporary works area covers an area of approximately 1ha. This is considered to be negligible in scale compared to the adjacent land use.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low Significance of Effect: Imperceptible	Construction (temporary and permanent)
	UCS1, UCS2 and UCS3	**Loss/change of land use.** The underground cable route sections, to be trenched and ducted as part of the STEP 220kV project are located in areas of agricultural pastures. An area of discontinuous urban fabric is located 200m east of underground cable section 3. Temporary works during the construction of the cable include trenching, ducting, cable installation and jointing. The construction swathe for the cable trenching within agricultural lands is to be approximately 38m wide, which includes the cable trench, haul road and stockpile areas.	Trench construction will be in small sections at a time, which will be negligible in scale compared to the adjacent land use. The land surface above the trenches and joint bays will be restored during construction to be similar to the existing conditions.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low Significance of Effect: Imperceptible	Construction (temporary)
Land and Soils	Substation compound	**Impact on soils.** No topsoil stripping will be required as the GIS substations will be built on an existing compound, which will be constructed as part of enabling works under the STEP Power Plant scope of works. There is therefore anticipated to be no impact on soils at the proposed substation compound.	None required.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of Effect: Imperceptible	Construction (permanent)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
		Impact on land/soils. Vegetation clearance is to take place around the proposed substation, where required.	Vegetation clearance will be carried out between 1st September and 1st March in order to protect breeding birds, i.e. outside of the bird breeding season.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of Effect: Imperceptible	Construction (permanent)
	UCS1, UCS2 and UCS3	**Impact on soils.** Trenching for the underground cable sections will comprise excavation of High sensitivity soils. Anticipated trench dimensions are 1.7m wide and 1.575m deep within agricultural land. Following excavation of the trench, CBGM will then be laid, the ducts put in place, protection strips laid on top and the trench will be backfilled.	The top 0.675m of the cable trenches are to be reinstated with the excavated material, in line with the natural ground conditions and landowner recommendations. Trench construction will be in small sections at a time, which are negligible in scale compared to the surrounding soil type.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of Effect: Imperceptible	Construction (temporary)
Land, Soils, Geology and Hydrogeology	Substation compound	**Landslide risk.** An area of Moderately High landslide susceptibility is located 110m north of the substation compound. Intrusive works during the substation construction, particularly foundation works, have the potential to trigger a landslide in this area. The Moderately High susceptibility zone is adjacent to the Shannon Estuary (SAC and SPA), and any landslides would likely discharge into this Extremely High sensitivity water body. Soils in the Moderately High susceptibility zone have a High sensitivity.	No mitigation measures specific to landslide risk are included in the design to date. Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High, Extremely High Significance of Effect: Moderate/Significant, Profound	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
	UCS2	**Landslide risk.** The proposed cable trench along this section is located 60m from a Moderately High susceptibility landslide zone at its closest point. Trenching operations in this area have the potential to trigger a landslide in the area. Soils in this area have a High sensitivity.		Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High Significance of Effect: Moderate/Significant	
	UCS3	**Landslide risk.** The proposed cable trench along this section is located 100m from a Moderately High susceptibility landslide zone at it's closest point, and the proposed HDD crossing in this area is located 260m from this landslide risk zone. Trenching operations in this area have the potential to trigger a landslide in the area. Soils in this area have a High sensitivity.		Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High Significance of Effect: Moderate/Significant	
Geology, Soils and Hydrogeology	All	**Exposure to radon.** Areas of high radon risk are located within the study area at UCS1, UCS2, UCS3 and the substation compound. Human health receptors are considered to have a Very High sensitivity.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	Magnitude and Quality of Impact: Large Adverse (Negative) Receptor Sensitivity: Very High	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
				Significance of Effect: Profound	
Geology, Soils and Hydrogeology	Substation compound	**Loss of bedrock.** The substation foundations cover a combined area of 1850m^2 and a depth of 1.5m. Groundwater vulnerability underlying the substation is High, suggesting bedrock is close to ground surface. As such it is possible that some bedrock excavation will be required, into the Shannon Group aquifer.	The volume of potential bedrock excavation in comparison to the volume of the geological formation is considered to be negligible. This is not expected to significantly impact local or regional scale geological receptors.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Low Significance of Effect: Imperceptible	Construction (permanent)
	UCS1, UCS2 and UCS3	**Loss of bedrock.** Anticipated trench dimensions are 1.7m wide and 1.575m deep. Some excavation of bedrock could be required in areas where bedrock is close to surface.			Construction (permanent)
	All	**Use of concrete.** Concrete is highly alkaline and can affect groundwater and surface water quality through direct spillages and/or migration through the subsoil. Contamination from wet concrete and concrete run-off during construction has the potential to infiltrate through the subsoil and migrate to the Shannon Group aquifer, especially where the bedrock is at outcrop or near surface. Shallow groundwater flow could also form a pathway to the Shannon Estuary.	Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided. The Contractor will ensure that all concrete truck wash watering/cleaning is undertaken offsite where possible. A concrete washout procedure will be developed by the contractor prior to works commencing.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, Extremely High Significance of Effect: Imperceptible	Construction (temporary)
	UCS3	**Disruption of bedrock during construction of HDD crossing**. Underground cable crossings at the Kilpaddoge substation access road will be crossed by a 80m HDD, reaching a maximum depth of 5m bgl. This has the potential for minor disruptions to the soils and geology. Groundwater vulnerability is classified as Extreme in this area, suggesting that bedrock is close to surface. The HDD crossing may therefore penetrate the bedrock.	Any disruption is likely to be small in nature. There is not anticipated to be a significant change in the nature of the geological resource. Drilling mud, such as bentonite clay, will be an inert and non-toxic substance.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium	Construction (temporary and permanent)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
			Muds will be properly managed to avoid discharges to the watercourse. HDD cooling water will be discharged free of any chemicals and with a similar temperature to the water in the watercourse. Visual observations shall be undertaken to check for bentonite breakout.	Significance of Effect: Imperceptible	
		Open cut crossing at the Ralappene stream. This will require removal of topsoil and potentially excavation down to the bedrock aquifer. Open cut crossings have the potential to generate slit and suspended solids which could discharge to surface water bodies and/or leach into groundwater.	Disruption of bedrock is likely to be minor in nature and over a small area. In order to reduce the risk of discharging sediment it is proposed to carry out all of these works in a dry works area. This will be carried out by installing an impermeable barrier between the watercourse and the works area. Water pumped from the dry works area would be treated using settlement tanks to remove sediment prior to discharge back to the watercourse. Watercourse Crossing Procedures will be developed by the contractor before any works commence and agreed with IFI.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
	Substation compound	**Leaks/spills from construction vehicles.** A maximum of approximately 16 Heavy Goods Vehicle (HGV) movements per day will be required during the site preparation and civil construction phase of the proposed substation construction. There is risk of contamination of soils and groundwater from increased use of vehicles during construction, that have the potential to leak/spill hydrocarbons onto the road surface. Groundwater vulnerability is High at the substation compound, indicating that there is a rapid pathway from ground surface to groundwater in the area. Soils in this area are classified as High sensitivity. The Shannon Group aquifer is classified as Medium sensitivity. Shallow groundwater flow could form a pathway to the Shannon Estuary.	Additional mitigation measures are to be considered in areas of High and Extreme groundwater vulnerability. This could include additional speed restrictions, wheel washing and exclusion of refuelling activities in these areas. Following adherence to the avoidance and mitigation measures listed above, the risk of a serious pollution incident from leaks and spills from construction vehicles is considered to be <0.5% annually.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, High, Extremely High Significance of Effect: Imperceptible	Construction (temporary)
	UCS1 and UCS2	**Leaks/spills from construction vehicles.** A maximum of 48 HGV movements per day will be required during the civil construction of the cable route. There is risk of contamination from increased use of vehicles during construction, that have the potential to leak/spill hydrocarbons onto the road surface. Groundwater vulnerability is classified as Moderate across most of cable routes 1 and 2, indicating that the subsoil may somewhat impede vertical migration of contaminant to groundwater in this area. However, preventative measures are still essential. Soils in this area are classified as High sensitivity. The Shannon Group aquifer is classified as Medium sensitivity. Shallow groundwater flow could also form a pathway to the Shannon Estuary.		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, High, Extremely High Significance of Effect: Imperceptible	
	UCS3	**Leaks/spills from construction vehicles.** A maximum of 48 HGV movements per day will be required during the civil construction of the cable route. There is risk of contamination from increased use of vehicles during construction, that have the potential to leak/spill hydrocarbons onto the road surface. Groundwater vulnerability ranges from High to Extreme indicating that there is a rapid pathway from ground surface to groundwater in the area.		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, High, Extremely High	

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
		Soils in this area are classified as High sensitivity. The Shannon Group aquifer is classified as Medium sensitivity. Shallow groundwater flow could also form a pathway to the Shannon Estuary.		Significance of Effect: Imperceptible	
Hydrogeology	All	**Migration of residual agricultural contaminants to groundwater.** Potential to encounter residual agricultural contaminants that could become remobilised during excavation works. Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils. Mobilised contaminants could migrate to Shannon Estuary via shallow groundwater flow.	None in current design. Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium, Extremely High Significance of Effect: Slight, Significant	Construction (temporary)
	UCS1, UCS2 and UCS3	**Migration of contamination through cable trench.** There is the potential for the cable trenches to act as a preferential flow pathway for contaminants from the ground surface to groundwater, especially in areas where there are no significant superficial deposits. In areas where the full thickness of superficial cover is removed, a permanent, more permeable pathway from ground surface to the aquifer may be created. The trenches could also act as a preferential lateral flow pathway for groundwater contamination (pre-existing or as a result of construction phase activities). Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils. The most acute risk from this pathway would be from the direct discharge of agricultural contaminants into the cable trench during construction (e.g. if left open overnight).	Backfilling of the trench in line with natural ground conditions to avoid the creation of new flow pathways or ponding/soakage of surface water runoff. Construction works are to follow best practice procedures (i.e. open excavations to be secured) which will minimise the likelihood of direct discharge of contaminants in to the trench.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium, Extremely High Significance of Effect: Slight, Significant	Construction (permanent and temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
			Additional mitigation measures have also been proposed to manage the residual risk, which are included in Section 7.8 Residual Effects.		
	UCS3	**Migration of shallow contamination to the Shannon Group aquifer via HDD crossing.** Underground cable crossings at the Kilpaddoge substation access road will be crossed by a 80m HDD, reaching a maximum depth of 5m bgl. This has the potential to form a pathway for residual agricultural contamination from shallow soils to the Shannon Group aquifer. Shallow groundwater flow could also form a pathway for contaminants mobilised by the HDD crossing to the Shannon Estuary.	The HDD Contractor will conduct the drilling works in a safe and controlled manner with due regard for site constraints including environmental issues. The Contractor will be required to ensure that their proposed works do not adversely affect groundwater and aquifers. A HDD Procedure will be developed prior to any works commencing.	<u>Magnitude and Quality of Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity</u>: Medium, Extremely High <u>Significance of Effect</u>: Imperceptible	Construction (permanent and temporary)
	Substation compound	**Groundwater contamination from silt and stockpile runoff.** Approximately 4,600m^3 of material will be excavated during the construction of the substations, with some short-term stockpiling required before it is removed from site. This will be stockpiled for a limited time. This poses some contamination risk to receptors from turbidity/silt runoff.	Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to watercourses and groundwater. Silt fences will be installed downslope of any area where silt is generated. Daily visual monitoring of the slit fences will be undertaken.	<u>Magnitude and Quality of Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity</u>: Medium, Extremely High <u>Significance of Effect</u>: Imperceptible	Construction (temporary)
	UCS1, UCS2 and UCS3	**Groundwater contamination from stockpile runoff.** Approximately 9400m^3 of material will be excavated during the construction of the cable trenches, with some short-term stockpiling required before it is removed from site or reinstated. This will be stockpiled for a limited time. This poses some contamination risk to receptors from turbidity/silt runoff.			

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
			Particular attention should be made to areas of High and Extreme groundwater vulnerability at UCS2 and UCS3. Soil stockpiles from topsoil stripping will be maximum 2m in height depending on local soil conditions, as well as working strip width. Topsoil shall not be placed within 10m of watercourses or wetlands where it could be eroded and enter the watercourse.		
	All	**Accidental leakages and spills.** Numerous substances used on construction sites have the potential to pollute water if not properly managed and treated. Such substances include fuels, lubricants, cement, silt, and other substances which arise during construction. Accidents and disasters may result in spillage or leakage of fuel or oil and pose a contamination risk. Shallow groundwater, if present in superficial deposits or the Shannon Group, could provide a pathway to the Shannon Estuary. In areas of High and Extreme groundwater vulnerability, there is likely a rapid pathway from ground surface to the Shannon Group aquifer.	Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces. All tanks and drums will be bunded in accordance with established best practice guidelines. Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, Extremely High Significance of Effect: Imperceptible	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
	All	**Dewatering impacts (if required) on nearby groundwater abstractions.** Due to the shallow nature of the proposed cable trench and substation excavations, it is possible that dewatering will not be required during construction. The following abstractions are located outside of the red line boundary but may be impacted by dewatering: • Borehole 0813NEW019 (Medium sensitivity) • Borehole 0813NEW029 (Medium sensitivity) • Borehole 0813NEW031 (Medium sensitivity) • Borehole 0813NEW010 (Medium sensitivity) • Borehole 0813NEW018 (Medium sensitivity) • Borehole 0813NEW015 (Medium sensitivity) • Borehole 0813NEW096 (High sensitivity)	No mitigation is possible in relation to the impact of dewatering on groundwater abstractions. However, trench construction will be in small sections at a time and as such dewatering would only occur over a small area at a time Monitoring requirements are considered in Section 7.8 Residual Effects.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium, High Significance of Effect: Slight, Slight/Moderate	Construction (temporary)
	All	**Preferential flow pathway through dewatering wells (if required).** Shallow contamination from agricultural sources or from construction phase leaks/spills have the potential to migrate to the Shannon Group aquifer via borehole flooding/cross completion of dewatering wells. Due to the shallow nature of the proposed cable trench and substation excavations, it is possible that dewatering will not be required during construction.	None included in current design. Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	Magnitude and Quality of Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of Effect: Slight	Construction (temporary)

Receiving Environment	Design Element	Construction Phase Impacts	Avoidance and embedded mitigation measures included in design to date	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
	UCS2 and UCS3	**Potential for groundwater abstractions to be located within red line boundary.** The available location radius for groundwater abstraction well 0813NEW018 overlaps with UCS2, and the available location radius for 0813NEW014 and 0813NEW018 overlaps with UCS3. It is therefore possible that these abstractions are located within the red line boundary.	None included in current design. Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	<u>Magnitude and Quality of Impact</u>: Large Adverse (Negative) <u>Receptor Sensitivity</u>: Medium <u>Significance of Effect</u>: Slight	Construction (permanent and temporary)

7.5.2 Operation and Maintenance Phase

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

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

Operational phase activities, outlined in Chapter 5, are assessed in Table 7.13.

Table 7.13: Operational phase assessment of effects

Receiving Environment	Design Element	Operational Phase Impacts	Avoidance and mitigation measures included in design	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
Land Use	Substation compound	**Loss/change of land use.** The GIS substations are to be built on an existing compound, which will be constructed as part of enabling works under the STEP Power Plant scope of works. As such, there will be no change in land use.	None required	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	Operational (long-term)
	Underground Cable Route	**Loss/change of land use.** No land use changes are anticipated along the cable routes during the operational phase from proposed scheme.	None required	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	Operational (long-term)
Soils and Geology	All	No soils and geology impacts anticipated during the operational phase.	None required	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, High Significance of Effect: Imperceptible	Operational (long-term)

Receiving Environment	Design Element	Operational Phase Impacts	Avoidance and mitigation measures included in design	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
Geology, Soils and Hydrogeology	All	**Exposure to radon.** Areas of high radon risk are located within the study area at UCS1, UCS2, UCS3 and the substation compound. Human health receptors are considered to have a Very High sensitivity.	Additional mitigation measures have been proposed to manage this risk, which are included in Section 7.8 Residual Effects.	<u>Magnitude and Quality of Impact</u>: Large Adverse (Negative) <u>Receptor Sensitivity</u>: Very High <u>Significance of Effect</u>: Profound	Operational (long-term)
Hydrogeology	Substation compound	**Impact on groundwater flow.** Substation foundations could act as a barrier to groundwater flow. These are expected to extend to a maximum depth of 1.5m below ground level.	Due to the shallow nature of the subsurface structures, these are considered unlikely to significantly impede groundwater flow.	<u>Magnitude and Quality of Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity:</u> Medium <u>Significance of Effect</u>: Imperceptible	Operational (long-term)
	Underground cable route	**Migration of contamination through cable trench.** There is the potential for the cable trenches to act as a preferential flow pathway for contaminants from the ground surface to groundwater, especially in areas where there are no significant superficial deposits. The trenches could also act as a preferential lateral flow pathway for groundwater contamination (pre-existing or as a result of construction phase activities). Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present	Reinstating site soils in the upper part of the trench in line with natural ground conditions to avoid the creation of new flow pathways. Construction works are to follow best practice procedures (i.e. open excavations to be secured) which will minimise the likelihood of there being construction phase contamination which would migrate through the trench during the operational phase. Due to the shallow nature of the cable trenches, it is possible that groundwater will not be intercepted.	<u>Impact</u>: Small Adverse (Negative) <u>Receptor Sensitivity</u>: Medium <u>Significance of Effect</u>: Slight	Operational (long-term)

Receiving Environment	Design Element	Operational Phase Impacts	Avoidance and mitigation measures included in design	Magnitude and Quality of remaining impact and Significance of Effect	Duration of effect
	Substation compound	**Site water discharges**. Discharges, such as firewater discharge or wastewater from the onsite welfare facilities, may contain contaminants that have the potential to pollute groundwater.	Wastewater from the onsite facilities will be discharged by gravity sewer to a sealed foul water holding tank. The holding tank will be monitored by a high-level alarm which will alert the site operators when the when the tank capacity is approaching full. A well-sealed drainage system will minimise leakages, prevent contamination migrating downwards to impact groundwater and will reduce infiltration from rainwater, reducing any potential for contamination to be mobilised. The facilities themselves will store potentially contaminative substances in secure bunded areas which are further secured by the site drainage system.	Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	Operational (long-term)

7.5.3 WFD Groundwater Status

The groundwater screening assessment is summarised in Table 7.14. The small scale of the proposed development relative to the magnitude of the WFD waterbody is deemed to pose very low risk to the delivery of long term WFD no deterioration and status objectives, such that no further (additional) assessment is required.

Table 7.14: WFD Groundwater Assessment

Test	Impact Assessment
Quantitative Status	
Saline (or other) intrusions	No impact on saline intrusions anticipated due to the shallow nature of the scheme and short-term duration of dewatering (if required). It would be expected that groundwater within the proposed development could already be brackish, due to its proximity to the tidal Shannon Estuary. However, groundwater quality data from the 2007 GI recorded low chloride and sodium concentrations, which could suggest that the water is not brackish (Arup, 2007). This will be investigated further during the pre-construction ground investigation.
Impact of groundwater on surface water ecological/quantitative status	In areas where the superficial deposits are thin or absent, groundwater within the Shannon Group aquifer is likely to be in continuity with overlying surface water. Potential dewatering during substation foundation works, cable trenching, and excavation of the launch pits for HDD crossings have the potential to impact groundwater levels and baseflow to rivers, especially works along UCS1, adjacent to Ralappene Stream. There is also potential for construction phase activities to impact on groundwater quality, which could impact local surface water bodies. However, if required, dewatering will be short-term and localised, and following the mitigation measures outlined in Sections 7.5.1.3 and 7.5.2, no significant impacts are anticipated to ether recharge or water quality in the aquifer. As such, the remaining risk to surface water is low from a ecological/quantitative perspective.
Groundwater Dependant Terrestrial Ecosystem (GWDTE) quantitative status	Ballylongford WFD Groundwater body has been designated as a protected area for Groundwater in SPA/SAC habitats. However, the closest SPA/SAC areas to the scheme is the Lower River Shannon located 90m north of the Proposed Development. These are not considered GWDTEs.
Water balance	No predicted impact to water balance of the WFD groundwater body. Dewatering, if required, will be temporary and phased over short sections of the route. Addition of hardstanding across the substation compound will slightly reduce recharge locally. However, due to the small size of the site compared to the underlying groundwater body, the impact is considered to be negligible. The ground surface along the underground cable route will be reinstated to natural conditions, so this element will not have any significant impacts on recharge rates.
Chemical Status	
Saline (or other) intrusions	No further impact on saline intrusions anticipated due to the shallow nature of the scheme. Groundwater within the proposed development is considered likely to already be brackish in nature due to its proximity to the coast. This will be confirmed during the pre-construction ground investigation.
Impact of groundwater on surface water ecological/chemical status	Dewatering discharge locations have not been identified. There is potential for small amounts of groundwater intercepted in trenches to be discharged to local streams or watercourses. Any discharges to surface water will be treated to remove contaminants and silt in accordance with IFI requirements. This may have a minor, local, temporary impact on surface water chemistry, but would be expected to have a negligible temporary impact (and no permanent impact) to the wider WFD surface water bodies.
GWDTE chemical status	Ballylongford WFD Groundwater body has been designated as a protected area for Groundwater in SPA/SAC habitats. However, the closest SPA/SAC areas to the scheme are estuarine/marine related habitats, which are not considered GWDTEs.
Drinking water protected areas	Ballylongford, located approximately 3.5km west of the proposed development, is served by the Listowel Regional Water Supply. The Listowel Regional Water Supply serves a population of 14,781 persons and the supply volume is 9,749m3/day (Uisce Eireann, 2021). This water supply is sourced from the River Feale, which has a catchment boundary located 2.5km south of the proposed development at it's closest point. Due it's distance from the proposed development, the impact to this source from the proposed development is considered to be negligible. No designated public supply or group scheme

	source protection areas have been identified within 2.5km of the scheme and therefore the impact of this scheme to drinking water supplies is considered negligible.
General chemical assessment	The risk of accidental spills and leaks of contaminants (accidents and disasters), such as hydrocarbons, will be minimised by the embedded and additional mitigation measures implemented during construction and operation. The impact to the chemical status of the Ballylongford WFD groundwater body is considered negligible.

7.5.4 Decommissioning Phase

The proposed SLNG substation is expected to have a design life of 25 years and as such, it is not possible to identify at this stage either the waste management routes or specific facilities that will be used, as these are liable to change over such a timescale. Where decommissioning takes place, all above-ground components associated with the proposed development will be disassembled and removed from the site.

With regard to the Eirgrid substation, itis expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned. It is not intended to decommission the proposed electricity cabling. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

7.6 Cumulative Effects

Cumulative effects are:

- Those arising from intra-project interactions, including the main STEP Power Plant; or,
- Those arising from impacts of the proposed development in combination with impacts of other proposed or consented development projects that are not yet built or operational.

An assessment of potential cumulative effects is provided in Sections 7.6.1 and 7.6.2 below.

7.6.1 Intra-project Interactions

Installation of ducting and joint bays for the underground cable sections along the L-1010 will be constructed by Kerry County Council as part of their proposed L-1010 widening works. These works are to take place in advance of the STEP 220kV Grid Connection project, so there are not anticipated to be any cumulative effects.

The proposed site of the main STEP Power Plant is directly east of the STEP 220kV Grid Connection substations. The main STEP Power Plant comprises construction and operation of a Combined Cycle Gas Turbine (CCGT) gas-powered power plant, 120 MWh Battery Energy Storage System (BESS), Above Ground Installation (AGI) and associated plant, equipment, and infrastructure. The construction programme of the development is expected to take approximately 32 months, with the civil works of relevance to land soils and hydrogeology to be mainly carried out during the 10-month enabling phase. This enabling phase will include the following activities:

- Excavation and infilling to prepare the development platform;
- Installation of process and utility equipment, piping and instrumentation; and,
- Construction of buildings and site landscaping.

The risk of mobilisation of contaminants by the main STEP Power Plant will be minimised by best construction practices and adherence to WFD directives and national guidelines. Therefore, the cumulative effect on soil, geology and hydrogeology receptors from mobilisation of contaminants is considered imperceptible.

The STEP power plant application includes a new site access road and bridge over the Ralappane stream which is also to be crossed by the proposed 220kV cables. These works will not occur simultaneously and therefore are not likely to generate cumulative effects.

There is potential for cumulative effects of dewatering during construction to have an adverse effect on groundwater receptors. However, dewatering works are only expected to be short-term and localised, with dewatering along the cable trench to be across small sections at a time if required. Should the situation arise that dewatering is required across both developments, construction activities will be planned and phased, in consultation with the construction management team for the STEP. Therefore, the cumulative effect of hydrogeology receptors from dewatering is considered to be imperceptible.

There is potential for the cumulative irreversible quantitative loss of soils and bedrock due to excavation work associated with the main STEP project. However, quantitative loss of soil and bedrock is not expected to significantly impact local or regional scale soil or geological receptors and the cumulative effect would be imperceptible.

Taking account of mitigation measures proposed, the cumulative effect both schemes proceeding simultaneously is considered to be a negligible impact to a Low to Extremely High sensitivity environment and the significance of the effect has been assessed as imperceptible.

In addition to the main STEP Power Plant detailed above, the wider STEP development will include a 26km long gas pipeline from the Shannon LNG Terminal to the Foynes AGI, a Strategic Gas Reserve Facility and a Data Centre Campus.

An EIS has been carried out for the proposed gas pipeline, which identified no significant effects to lands, soils and groundwater from the development (Arup, 2008). The EIS also identified that no cumulative effects are likely following the implementation of mitigation measures.

The Data Centre Campus and strategic gas reserve development will both be assessed in an EIAR in the future, which will include an assessment of the potential for cumulative effects with other elements of the overall project. A pre-application request was submitted for the Strategic Gas Reserve Facility (ABP-319717-24). The Data Centre Campus forms parr of the overall Master Plan for the STEP Power Plant application.

7.6.2 Inter-project Interactions

Further to a review of planning applications undertaken in April 2024, a list of other known existing and/or approved and relevant developments and other known planned developments, which may result in cumulative effects, is presented in Table 4.2 of Chapter 4 (Methodology). The developments, which are considered to be relevant to this chapter are summarised below in Table 7.15.

Table 7.15: Planning applications in the vicinity of the proposed development of relevance to land soils and hydrogeology

Reference	Address	Developer	Grant Date	Description	Distance	Notes
Kerry County Council						
19115	Kilpaddoge, Tarbert, Co. Kerry	Glencloosagh Energy Limited	07.02.2020	For a 10 year permission for a grid stabilisation facility comprising of: the construction up to 4 no. rotating stabilisers, 5 no. battery storage containers, 1 no. control room, 2	1km	ePlan - Online Planning Details
VA03.307798	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	EirGrid Plc	04.06.2021	Installation of 400kV electricity transmission cables, extension to the existing Kilpaddoge Electrical Substation and associated works, between the existing Moneypoint 400kV Electrical Substation in the townland of Carrowdoita South County Clare and existing Kilpaddoge 220/110kV Electrical Substation in the townland of Kilpaddoge County Kerry. The development includes work in the foreshore.	1km	307798 | An Bord Pleanála (pleanala.ie)
20850	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	Kilpaddoge Green Engergy Ltd.	12.11.2020	For changes to the previously permitted peaker power plant development (planning ref. 13/138). It is proposed to change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.	1km	ePlan - Online Planning Details
21/549		Donal Muprhy Glencloosagh Energy Limited	Granted: 20/08/2021	10 year planning permission for a high intertia synchronous compensator compound containing electrical equipment containers including a 220 kV high voltage gas insulated switchgear (GIS) substation compound containing a GIS substation building, a battery storage compound containing 5 no. battery storage containers, enclosed in steel containers, associated elements comprising various underground cables and ducts, and all necessary works. The planning application is on lands where grid stabilisation facility was previously permitted under planning register no 19/115.	1km	ePlan - Online Planning Details
20/438 and ABP appeal Ref. 308643	Meelcon, Carhoona, Farranawana, Tarbert,Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy,	Ballylongford Windfarm Group	Granted: 21/06/2021	Amendment to previous granted permission which related to change in connection grid route for wind farm. A NIS was submitted with this application. The revised route will entail the construction of approximately 12.1km of 38kV underground electric cable connecting the existing	~1km	ePlan - Online Planning Details

	Lislaughtin, Glamcullare south, Gurteenavallig, Co Kerry,			permitted windfarm (19/381) to the 38Kva/110Kva substation at Kilpaddoge, Tarbert, County Kerry. The underground cables will be located along the public roads R-551, R552 and L-1010 and along 2 sections of private property. The development will also consist of the connection of the permitted windfarm (19/381), via existing permitted underground electricity cable.		
18/392	Tarbert Island Tarbert Co Kerry Tarbert Island	SSE Renewables (Ireland) Ltd	Granted: 18/02/2019	10-year permission to construct a battery storage facility within a total site area of up to 2.278ha, to include 50 no. self-contained battery container units with associated HVAC cooling units, 13 converter and 13 step up transformer container units, associated compound cabling and ducting, a grid transformer, a single storey substation / control building with welfare facilities, a cable route grid connection to the existing ESB substation building	2km	ePlan - Online Planning Details
ABP-308643-20 (20438)	Meelcon, Carhoona, Farranawana, Tarbert,Doonard Upper and Lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare South, Gurteenavallig, Co Kerry	The Ballylongford Windfarm Group	21.06.2021	Amend a previously granted permission (Ref 19381, Ref: 304807- 19) which relates to a change in the grid connection route for the permitted wind farm. The revised route will entail the construction of approximately 12.1km of 38kV underground electric cable connecting the existing permitted windfarm (19/381) to the 38kva/110kva substation at Kilpaddoge, Tarbert. Refused by Kerry County Council on the 28.10.2020.	~1km	308643 | An Bord Pleanála (pleanala.ie)
ABP 308643 (20438)	Meelcon, Carhoona, Farranawana,Tarbert,Doonad upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co Kerry	Ballylongford Windfarm Group	21/6/2021	Amendment to previous granted permission which related to change in connection grid route for wind farm.	~1km	308643 | An Bord Pleanála (pleanala.ie)
ABP 318540	Tarbert Island, Tarbert, Co. Kerry. (www.ssetarbertnextgen.com)	SSE Generation Ireland Ltd	Case is due to be decided by 05/06/2024	10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works	3km	318540 | An Bord Pleanála (pleanala.ie)
23284	Ballymacasy, Coolnagraigue, Ballyline East, Ballyline West, Leanamore And Dromalivaun, Co Kerry	Harmony Solar Kerry Ltd	17/10/2023	Apply for a 10 year permission and 40 year operation for a solar farm of 146.6 hectares, on 3 no. land parcels consisting as described herin: west parcel (ballymacasy, ballyline east and ballyline west townlands) c 58.48 hectares, central parcel (coolnagraigue townland) c. 53.8	5km	ePlan - Online Planning Details

				hectares and east parcel (leanamore and dromalivaun townlands) c 34.32 hectares, a route corridor for an under ground internal electrical cable connecting the west and central parcels to the east parcel consisting of c 3772 meters in length.		
ABP 315838	Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	SSE Generation Ireland Ltd	Under construction	Application received under Section 4 of the Development (Emergency Electricity Generation) Act 2022 (the Act) for a designated development (construction of a temporary, 5 year, 150MW emergency generation plant – limited to a maximum of 500 operational hours per annum) located at Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	3km	Emergency Electricity Generation 315838 | An Bord Pleanála (pleanala.ie)

The most significant adverse cumulative impacts from these developments are likely to be irreversible quantitative loss of soils and bedrock due to excavation work associated with the developments listed. However quantitative loss of soil and bedrock is not expected to significantly impact local or regional scale soil or geological receptors and the cumulative effect would be at most slight adverse.

Other cumulative impacts are considered minimal.

7.7 Mitigation and Monitoring

Design and embedded mitigation measures are specified in Table 7.12. A CEMP will be prepared, included within the planning application, and implemented during the construction phase in consultation with the Planning Authority. This will specify the range of measures to avoid and minimise impacts that may occur in construction. This requires the appointed contractor to have in place appropriate consents for works that could affect groundwater and to implement specific measures to protect nearby receptors. Key CEMP measures of relevance to soils geology and hydrogeology will include;

- Fuel storage – bunded tanks to prevent spillages and designated fuelling areas with spillage control;
- Chemical storage – all potentially polluting chemicals will be stored in secure weatherproof enclosures with spill kits;
- Concrete to be brought to site by covered truck, with wet concrete operations adjacent to watercourses avoided;
- Concrete truck wash watering/cleaning will be undertaken off-site if possible;
- Concrete wash water will be collected;
- A concrete washout management plan will be developed prior to construction by the appointed contractor
- The site will be kept secure to prevent vandalism which can lead to pollution from stored liquids escaping and entering drains;
- Any spillages will be cleared immediately by excavating and disposing of affected soils in accordance with the Waste Management Act 1996, and associated regulations;
- Silt control measures will be used to control silt generated from activities on site and prevent it from gaining access to nearby waterbodies; and,
- Should dewatering be required any discharges will be treated to remove contaminants and silt and disposed of in accordance with EPA requirements.
- Adherence to best practice procedures during the construction of the HDD crossing. A HDD Procedure will be developed prior to any works commencing.
- A dewatering management plan will be developed by the contractor before construction work commences. All construction activities, including construction traffic, will be managed through the site Construction Environmental Management Plan (CEMP), which will set out key mitigation measures for, and monitoring of, potential impacts from traffic.
- Bentonite Breakout procedure will be developed.
- An appropriately qualified person will be present on site during construction to identify visual and olfactory evidence of contamination during excavation.
- Any contaminated ground will be characterised according to Waste Acceptance Criteria and dealt with via a bespoke remediation strategy or a materials management plan. Any waste arising will be managed in accordance with the Waste Management Act 1996 (as amended) and associated Regulations.

In addition to the above, a pre-construction confirmatory survey of wells and groundwater abstractions will be undertaken.

Should dewatering be required, water level monitoring will be undertaken pre-construction, during construction and post-construction for groundwater abstractions which may be impacted by dewatering. A dewatering license will also be obtained for any dewatering operations over $25m^3/d$, in line with EPA regulations and EU law (Environmental Protection Agency, 2024b).

Water quality testing should also be undertaken pre-construction, during construction and post-construction for any identified drinking water abstraction sources which may be impacted by construction activities.

To address risks of exposure to radon, workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019. Radon barriers are also to be installed in areas where a high radon risks have been identified.

The following mitigation measures will be implemented to address residual landslide risk and risk of contaminant migration through the cable trench (as summarised in Section 7.8):

- Geotechnical testing during the ground investigation phase will include slope stability testing, which will inform landslide risks and the requirement of additional mitigation measures (such as dewatering).
- A Geotechnical Risk Register will be created to ensure any landslide and slope stability risks are systematically captured.
- Where groundwater seepage poses a risk to trench or substation excavation stability, additional measures (such as dewatering) will be used to mitigate these risks.
- A suitably designed drainage system will be installed to divert water away from the landslide risk zones.
- A phase of ground investigation prior to construction of the cable trench is to include an assessment of shallow groundwater quality within the superficial deposits (if present). This will identify any existing contamination and inform the requirement of remediation (as outlined in the CEMP detailed above).
- Installation of clay barriers along the trench to minimise groundwater flows along the cable route.

7.8 Residual Effects

Following mitigation, the remaining component of an effect is considered a residual effect. Significance of residual effects is also determined using the criteria of Table 7.5.

In assessments for both construction and operational phase, the majority of impacts are negligible or small and would be mitigated by rigorous land, soils and hydrogeology protection measures, resulting in effects which are imperceptible. However, following the mitigation measures included in the current design (April 2024), some risks remain with effects which are Slight, Moderate/Significant and Profound. To address these outstanding risks, additional mitigation measures have been proposed, which result in residual effects which are all imperceptible. These are summarised in Table 7.16Table 7.16.

Table 7.16: Assessment of residual effects

Receiving Environment	Design Element	Potential Residual Impacts	Magnitude and Quality of remaining impact and Significance of Effect	Further Mitigation	Residual Effect	Duration of effect
Land, Soils, Geology and Hydrogeology	Substation compound	**Landslide risk.** An area of Moderately High landslide susceptibility is located 110m north of the substation compound. Intrusive works during the substation construction, particularly foundation works, have the potential to trigger a landslide in this area. The Moderately High susceptibility zone is adjacent to the Shannon Estuary (SAC and SPA), and any landslides would likely discharge into this Extremely High sensitivity water body. Soils in the Moderately High susceptibility zone are High sensitivity.	Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High, Extremely High Significance of Effect: Moderate/Significant, Profound	Geotechnical testing during the ground investigation phase will include slope stability testing, which will inform landslide risks and the requirement of mitigation measures. A Geotechnical Risk Register will be created to ensure any landslide and slope stability risks are systematically captured. Where groundwater seepage poses a risk to trench or substation excavation stability, additional measures (such as dewatering) will be used to mitigate these risks. A suitably designed drainage system will be installed to divert water away from the landslide risk zones. The use HDD for cable crossing at UCS3 minimises the disturbance of shallow, less cohesive soils. This crossing is located in a Low landslide susceptibility zone.	Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: Medium, Extremely High Significance of Effect: Imperceptible	Construction (temporary)
	UCS2	**Landslide risk.** The proposed cable trench along this section is located 60m from a Moderately High susceptibility landslide zone at it's closest point. Trenching operations in this area have the potential to trigger a landslide in the area. Soils in this area are High sensitivity.	Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High Significance of Effect: Moderate/Significant		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High Significance of Effect: Imperceptible	
	UCS3	**Landslide risk.** The proposed cable trench along this section is located 100m from a Moderately High susceptibility landslide zone at it's closest point, and the proposed HDD crossing in this area is located 260m from this landslide risk zone.	Magnitude and Quality of Impact: Moderate Adverse (Negative) Receptor Sensitivity: High		Magnitude and Quality of Impact: Negligible (Neutral) Receptor Sensitivity: High	

Receiving Environment	Design Element	Potential Residual Impacts	Magnitude and Quality of remaining impact and Significance of Effect	Further Mitigation	Residual Effect	Duration of effect
		Trenching operations in this area have the potential to trigger a landslide in the area. Soils in this area are High sensitivity.	<u>Significance of Effect</u>: Moderate/Significant		<u>Significance of Effect</u>: Imperceptible	
Geology, Soils and Hydrogeology	All	**Exposure to radon.** Areas of high radon risk are located within the study area at UCS1, UCS2, UCS3 and the substation compound. Human health receptors are considered to have a Very High sensitivity.	<u>Magnitude and Quality of Impact</u>: Large Adverse (Negative) <u>Receptor Sensitivity</u>: Very High <u>Significance of Effect</u>: Profound	Workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019. Radon barriers are to be installed in areas where a high risk has been identified.	<u>Magnitude and Quality of Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity</u>: Very High <u>Significance of Effect</u>: Imperceptible	
Hydrogeology	UCS1, UCS2 and UCS3	**Migration of contamination through cable trench.** There is the potential for the cable trenches to act as a preferential flow pathway for contaminants from the ground surface to groundwater, especially in areas where there are no significant superficial deposits. The trenches could also act as a preferential lateral flow pathway for groundwater contamination (pre-existing or as a result of construction phase activities). Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils. The most acute risk from this pathway would be from the direct discharge of agricultural contaminants into the cable trench during construction (e.g. if left open overnight).	<u>Impact</u>: Small Adverse (Negative) <u>Receptor Sensitivity</u>: Medium, Extremely High <u>Significance of Effect</u>: Slight, significant	Installation of clay barriers along the trench to minimise groundwater flows along the cable route. Due to the shallow nature of the cable trenches, it is possible that groundwater will not be intercepted.	<u>Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity</u>: Medium, Extremely High <u>Significance of Effect</u>: Imperceptible	Construction (permanent and temporary) Operational (long-term)
	All	**Migration of residual agricultural contaminants to groundwater.** Potential to encounter residual agricultural contaminants that could become remobilised during excavation	<u>Impact</u>: Small Adverse (Negative) <u>Receptor Sensitivity</u>:	A phase of ground investigation will be carried out prior to construction, which will include an assessment of shallow	<u>Impact</u>: Negligible (Neutral) <u>Receptor Sensitivity</u>:	Construction (temporary)

Receiving Environment	Design Element	Potential Residual Impacts	Magnitude and Quality of remaining impact and Significance of Effect	Further Mitigation	Residual Effect	Duration of effect
		works. Due to the agricultural land use within the study area, there is the potential for agricultural contaminants to be present within the shallow soils.	Medium, Extremely High Significance of Effect: Slight, Significant	groundwater quality within the superficial deposits (if present). This will identify any existing contamination and inform the requirement of remediation (as outlined in the CEMP, detailed in section 7.7). An appropriately qualified person will be present on site during construction to identify visual and olfactory evidence of contamination during excavation.	Medium, Extremely High Significance of Effect: Imperceptible	
	All	**Dewatering impacts on nearby groundwater abstractions.** Due to the shallow nature of the proposed cable trench and substation excavations, it is possible that dewatering will not be required during construction. However, due to the lack of site specific, contemporary ground investigation data the requirement for dewatering cannot be ruled out. The following abstractions are located outside of the red line boundary but may be impacted by dewatering: • Borehole 0813NEW019 (Medium sensitivity) • Borehole 0813NEW029 (Medium sensitivity) • Borehole 0813NEW031 (Medium sensitivity) • Borehole 0813NEW010 (Medium sensitivity) • Borehole 0813NEW018 (Medium sensitivity) • Borehole 0813NEW015 (Medium sensitivity) • Borehole 0813NEW096 (High sensitivity)	Impact: Small Adverse (Negative) Receptor Sensitivity: Medium, High Significance of Effect: Slight, Slight/Moderate	A no derogation agreement will be made with owner/operators of groundwater sources to ensure continuity of water supply during period in which water supply may be impacted.	Impact: Negligible (Neutral) Receptor Sensitivity: Medium, High Significance of Effect: Imperceptible	Construction (temporary)

Receiving Environment	Design Element	Potential Residual Impacts	Magnitude and Quality of remaining impact and Significance of Effect	Further Mitigation	Residual Effect	Duration of effect
		Preferential flow pathway through dewatering wells (if required). Shallow contamination from agricultural sources or from construction phase leaks/spills have the potential to migrate to the Shannon Group aquifer via borehole flooding/cross completion of dewatering wells. Due to the shallow nature of the proposed cable trench and substation excavations, it is possible that dewatering will not be required during construction. However, due to the lack of site specific, contemporary ground investigation data the requirement for dewatering cannot be ruled out.	Impact: Small Adverse (Negative) Receptor Sensitivity: Medium Significance of Effect: Slight	The drilling and installation of dewatering wells will be carried out in accordance with best practice procedures. This will include avoidance of cross completion between two geological formations and proper sealing of borehole headworks to prevent ingress of surface water/flood water into the installations.	Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	Construction (temporary)
	UCS2 and UCS3	**Potential for groundwater abstractions to be located within red line boundary.** The available location radius for groundwater abstraction well 0813NEW018 overlaps with UCS2, and the available location radius for 0813NEW014 and 0813NEW018 overlaps with UCS3. It is therefore possible that these abstractions are located within the red line boundary.	Impact: Large Adverse (Negative) Receptor Sensitivity: Medium Significance of Effect: Slight	Following detailed design, in the event that an abstraction is present within the red line boundary an alternative water supply will be provided by the client.	Impact: Negligible (Neutral) Receptor Sensitivity: Medium Significance of Effect: Imperceptible	Construction (permanent and temporary) Operational (long-term)

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MOTT MACDONALD

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 8 - Surface Water and Flooding

July 2024

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Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 8 - Surface Water and Flooding

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8 Surface Water and Flooding

8.1 Introduction

This chapter considers the potential impacts during construction, operation (including maintenance) and decommissioning associated with:

- Surface waters;
- Water supply and wastewater discharge (including drinking water supply network, foul water and the drainage network);
- Water Framework Directive (WFD) surface water objectives; and
- Flood risk.

This assessment focuses on impacts associated with the installation of the circa 5km HV underground cables and two GIS substations and is based on the proposed development detailed in Chapter 5 Description of the Proposed Development.

Proposed mitigation measures to prevent, reduce and/or offset the anticipated potential impacts are presented as appropriate.

The assessment of the likely significant effects arising from the proposed development on groundwater is presented in Chapter 7 Land, Soils and Hydrogeology. The assessment of impacts on biodiversity is discussed in Chapter 9 Biodiversity.

Existing surface water quality and flood risk in the vicinity of the proposed development has been established based on a desktop study and field surveys conducted by Triturus Environmental Ltd. in 2023.

8.2 Policy and Guidance

8.2.1 Policies

The Kerry County Development Plan (CDP) 2022 – 2028 outlines the following policies in relation to water which are relevant to the proposed development and Volume 6 of the CDP details measures for fine sediment control which the proposed development should have regard to. CDP policies include:

- KCDP 13-1: Ensure compliance with the Water Framework Directive.
- KCDP 13-2: Achieve water quality targets by implementing the national River Basin Management Plan (and associated programmes of measures).
- KCDP 13-6: Protect all sources and potential sources of public water supply, including their zones of contribution within the County from pollution resulting from any development and/or land use.
- KCDP 13-7: Protect existing and potential water resources for the county, in accordance with the EU Water Framework Directive (2000/60/EC), the current National River Basin Management Plan and any amending or replacement version, the Pollution Reduction Programmes for designated shellfish waters, the provisions of the Groundwater Protection Scheme for the county and any other protection plans for water supply sources, with an aim to improving all water quality.
- KCDP 13-8: Protect rivers, streams and other watercourses and where applicable ensure developments follow guidelines outlined in the IFI’s Planning for Watercourses in the Urban Environment, 2020.

- KCDP 13-24: Support the incorporation of Sustainable Urban Drainage Systems (SUDs) in all public and private development in urban areas.

8.2.2 Guidance

This assessment follows guidelines established by Transport Infrastructure Ireland (TII) / National Roads Authority (NRA) in its *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (NRA, 2009), hereafter referred to as the NRA Guidelines. Regard has also been had to:

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Inland Fisheries Ireland, 2020);
- Control of Water Pollution from Construction Sites - Guide to Good Practice (C532) (CIRIA, 2001); and
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Office of Public Works, OPW, 2009), hereafter referred to as the Flood Risk Guidelines.
- Department of Housing, Local Government and Heritage (DHLGH) (2018). River Basin Management Plan 2018-2021.
- EPA (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- Flood Risk Management, Climate Change Sectoral Adaptation Plan, prepared by the Office of Public Works, September 2019

The Flood Risk Guidelines aim to integrate flood risk management into the planning process to assist the delivery of sustainable development. They aim to encourage a transparent and consistent consideration of flood risk in the planning process.

The objectives of the Flood Risk Guidelines are given as:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The Flood Risk Guidelines categorise flood risk in the form of three Flood Zones. These Flood Zones each relate to geographical areas at high, moderate or low flood risk, depending on if they are zone A, B or C respectively. Table 8.1 provides a definition of each Flood Zone.

The flood risk likelihood is defined as a percentage risk of occurring in any year. For example, a flood event may be described as having an annual exceedance probability (AEP) of 1%, this can also be written as a 1 in 100 year event. Critical infrastructure vulnerable to flooding should be located in Flood Zone C.

Table 8-1: Definition of Flood Zones

Flood Zone	Description
A	The AEP of flooding from rivers and seas is highest (greater than 1%AEP for flooding, or 0.5%AEP for coastal flooding)
B	The AEP of flooding from rivers and the sea is moderate (between 0.1% AEP and 1% AEP for river flooding, and between 0.1% AEP and 0.5% AEP for coastal flooding)
C	The probability of flooding from rivers and the sea is low (less than 0.1% AEP for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in Zone A or B

Source: The Office of Public Works, The Planning System and Flood Risk Management, Guidelines for Planning Authorities (November 2009).

In general, potential sources of flood risk to a development are as identified in Table 8.2.

Table 8-2 Categories of Flood Risk

Category	Mechanism
Fluvial flooding	Exceedance of the flow capacity of the channel of a river, stream or other natural watercourse (which may be culverted). Fluvial flooding is typically associated with heavy rainfall events, and excess water spills onto the river floodplain.
Coastal and tidal flooding	Caused by high astronomical tide, storm surge, wave action, and local bathymetric effects, often in combination. In estuaries and watercourses affected by tidelocking, flooding can occur as a result of high tidal levels and high fluvial flows in combination.
Pluvial flooding (overland flow)	Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water.
Groundwater flooding	Raised groundwater levels, typically following prolonged rain (that may be slow to recede). High groundwater levels may result in increased overland flow flooding. Normally associated with catchments where porous substrate and/or aquifers exist.
Flooding from artificial drainage systems	Blockage or overloading of pipes, sewers, canals, and drainage channels or failure of pumping systems. Typically occurs following heavy rainfall or as a result of high water levels in a receiving watercourse.
Flooding from infrastructure failure	Structural, hydraulic or geotechnical failure of infrastructure that retains, transmits, or controls the flow of water. Examples include hydro-power dams, water supply reservoirs, canals, flood defence structures, underground conduits (e.g. sewers), and water treatment tanks.

Source: OPW (2009) The planning System and Flood Risk Management, Guidelines for Planning Authorities & CIRIA (2004) Development and Flood Risk, C624, Box 2.3

The proposed development has been screened for all potential sources of flooding. The key sources of information to determine the existing flood risk were the flood maps on the OPW flood information portal, namely Floodinfo.ie. The online flood maps come from different studies as follows:

- The Flood Maps provide information based on the National Catchment-based Flood Risk Assessment and Management (CFRAM) study from 2012. The flood maps present the river and coastal flood extents for the present-day scenario.
- The Coastal Maps provide information from the National Coastal Flood Hazard Mapping in 2021. These maps produced updated national scale coastal flood extents and depths maps for a wider range of return periods for the present day and future scenarios.
- The National Indicative Fluvial Mapping (NIFM) provide a second generation of indicative fluvial spatial data of a higher quality and accuracy.
- Kerry County Development Plan 2022-2028 Volume 5 (3) Strategic Flood Risk Assessment

- Shannon Technology and Energy Park (STEP) Power Plant, Appendix A6.3: Site-Specific Flood Risk Assessment (FRA) report.

8.2.3 Legislative Context

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

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

- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy, i.e. the Water Framework Directive, WFD).
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), which gave legal effect to the WFD in Ireland.

This assessment has regard to the preliminary ruling of Case C-301/22 in relation to *Peter Sweetman v An Bord Pleanála & Others* which recognised the obligation of the Competent Authority when deciding upon an application for development consent that this potentially affects both assigned and unassigned water bodies.

8.2.3.1 Water Framework Directive

The WFD 2000/60/EC commits EU member states to achieve good qualitative and quantitative status of all inland and coastal waters at six-year intervals.

The WFD classification scheme for surface water quality includes five status classes: High, Good, Moderate, Poor and Bad based on the biological and supporting physicochemical (nutrients, oxygen condition, temperature, transparency, salinity and river basin specific pollutants (RBSPs) and hydromorphological quality elements.

The Biological Quality Elements are phytoplankton, macrophytes, phytobenthos, benthic invertebrate fauna and fish.

The overall ecological status relates to the biological and physicochemical parameters. Overall ecological status classification for a waterbody is determined, according to the 'one out, all out' principle, by the element with the worst status out of all the biological and supporting quality elements.

Good status means achieving satisfactory quality water, suitable for local communities' drinking, bathing, agricultural, industrial and recreational needs, while maintaining ecosystems that can support all the species of plants, birds, fish and animals that live in these aquatic habitats.

While the overall objective of the WFD is to achieve good status for all waterbodies, some waterbodies require extra protection by virtue of their location in a protected area or their function as a drinking water or bathing water. In accordance with the requirements of the WFD and the associated national regulations a register of protected areas has been set out for each River Basin District in Ireland. The protected areas are identified as those requiring special protection under existing National or European legislation, either to protect the surface water resource, or to conserve habitats or species that directly depend on those waters.

The different protected areas included in this register are European drinking water protected areas, designated waters such as fish protected areas and shellfish protected areas, nitrates vulnerable zones, urban wastewater sensitive areas and bathing water protected areas.

8.2.3.2 EU 'Floods' Directive 2007

The national flood risk policy aligns with the requirement of the EU 'Floods' Directive (2007/60/EC). The Directive requires EU Member States to coordinate their flood risk management practices in shared river basins and to take account of long term developments, including climate change, and sustainable land use practices in preparing flood risk management plans. The EU "Floods" Directive is to be carried out in coordination with the WFD.

The EU 'Floods' Directive was transposed into Irish law by the European Communities (Assessment and Management of Flood Risks) Regulations 2010, S.I. No. 122 of 2010 and amended by the European Communities (Assessment and Management of Flood Risks) (Amendment) Regulations 2015, S.I. No. 495 of 2015.

8.2.3.3 Climate change

It is acknowledged by almost all scientists that average global temperatures are currently rising due to increased greenhouse gases in the atmosphere. As a result of global warming, the Earth's climate will change and it is expected that over the next 100 years, Ireland will experience significant changes in rainfall characteristics and increased sea levels around the coast. The climate also has implications for the sizing of drainage systems.

The latest climate change guidance has been considered in this study when assessing the impact of the future climate change on flood risk.

8.3 Assessment Methodology

8.3.1 Approach to Data Collection

Identification of surface water features / waterbodies, such as rivers and lakes, has been based on site walkovers, desktop data such as those detailed on Environmental Protection Agency (EPA) datasets and mapping, and consultation with statutory and non-statutory bodies.

8.3.1.1 Aquatic Ecological Assessment

Aquatic surveys of the watercourses crossed and in the vicinity of the proposed development were conducted by Triturus Environmental Ltd. on the 30 October 2023. Biological water quality sampling was conducted. All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes. Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Table 8.3: Reference Values for Q Value / WFD Status (Riverine only)

Q Value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Source: Environmental Protection Agency Ireland (epa.ie)

Notes:

* These Values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site.

** "Condition" refers to the likelihood of interference with beneficial or potential beneficial uses.

8.3.2 Approach to Impact Assessment

The following tables outline the criteria for rating site attributes, the reference values for biological water quality and WFD status, the criteria for rating flood risk receptors, the criteria for rating impact magnitude and the rating of significant environmental effects.

Table 8.4: Criteria for Rating Site Attributes (NRA, 2009)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

Table 8.5: Reference Values for Q Value / WFD Status (Riverine only)

Q Value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Source: Environmental Protection Agency Ireland (epa.ie)

Notes:

* These Values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site.

** "Condition" refers to the likelihood of interference with beneficial or potential beneficial uses.

Table 8.6: Criteria for Rating Flood Risk Receptors

Vulnerability class	Land uses and types of development which include*
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure
Water compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

Source: Table 3.1 Classification of vulnerability of different types of development, The Planning System and Flood Risk Management (2009)

Table 8.7: Criteria for Rating Impact Magnitude

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	• Loss or extensive change to a waterbody or water dependent habitat • Increase in predicted peak flood level >100mm • Extensive loss of fishery • Calculated risk of serious pollution incident >2% annually[1] • Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Increase in predicted peak flood level >50mm • Partial loss of fishery • Calculated risk of serious pollution incident >1% annually • Partial reduction in amenity value
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Increase in predicted peak flood level >10mm • Minor loss of fishery • Calculated risk of serious pollution incident >0.5% annually • Slight reduction in amenity value
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Negligible change in predicted peak flood level • Calculated risk of serious pollution incident <0.5% annually
Minor Beneficial	Results in minor improvement of attribute quality	• Reduction in predicted peak flood level >10mm • Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually
Moderate Beneficial	Results in moderate improvement of attribute quality	• Reduction in predicted peak flood level >50mm • Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually
Major Beneficial	Results in major improvement of attribute quality	• Reduction in predicted peak flood level >100mm

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

Table 8.8: Rating of Significant Environmental Effects

Importance of Attribute	Magnitude of Impact			
	Negligible	**Small**	**Moderate**	**Large**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound

[1] Refer to Annex 1 of HA216/06 Highways Agency (2006) Road Drainage and the Water Environment (HA216/06), Design Manual for Roads and Bridges (DMRB). The UK DMRB suggests that where the probability of a serious pollution incident is greater than1%/year, spill-containment measures should be considered. It also suggests that, in particularly sensitive waters, areas at lower risk of serious pollution may also warrant special measures. The formula is however tailored for road developments where increasing traffic densities and higher proportions of heavy goods vehicles (HGVs) are likely to lead to an increased risk of accidents that could give rise to hazardous spills. While the calculation is not appropriate for use on this project, having regard to the characteristics of the proposals as detailed in Section 11.3, regard has been had to the proposed mitigation as appropriate.

Importance of Attribute	Magnitude of Impact			
High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

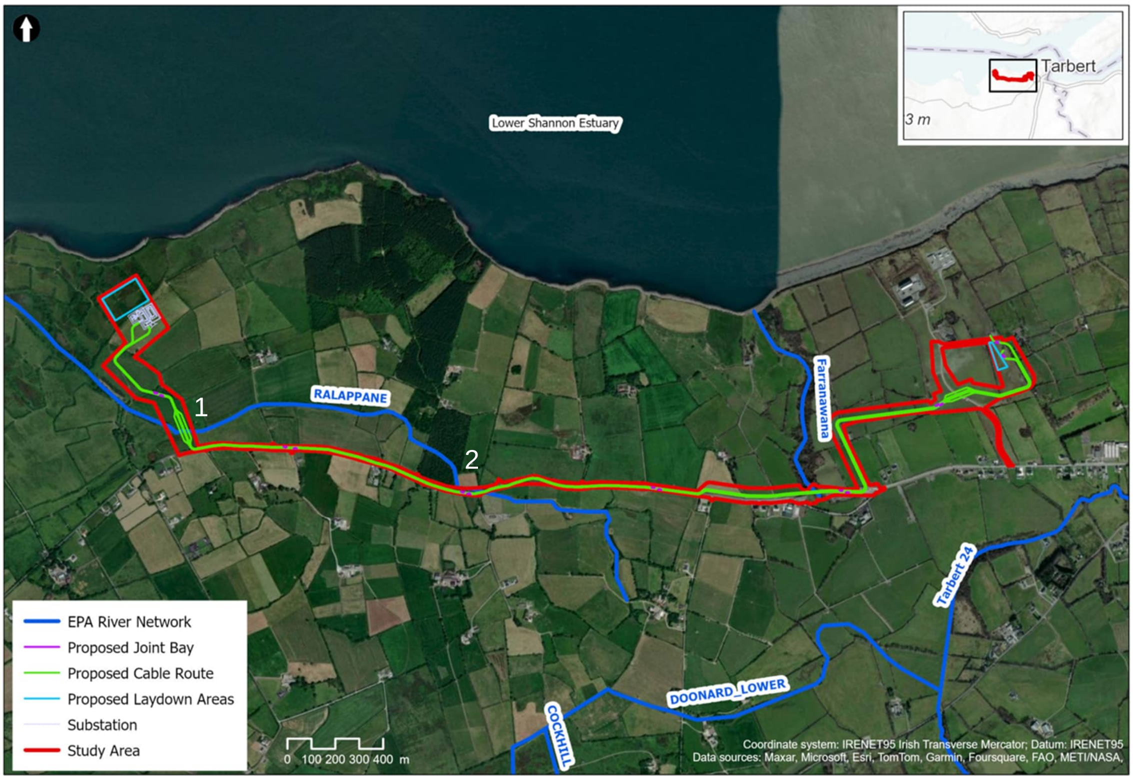
Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

8.3.3 Study Area

The study area which is assessed includes surface waters adjacent to the proposed development and surface waters which are crossed by the proposed development. Figure 8.1 illustrates the surface waters which are the basis for assessment. The zone of influence for surface waters extends downstream from works areas in terms of potential effects on surface water quality.

The surface waters within the study area are the Ralappane Stream and Farranawana Stream which discharge into the Lower Shannon estuary. The proposed development crosses the Ralappane Stream. Kerry County Council will construct crossings along the L-1010 (Ralappane and Farranwana streams) during the road widening works under an already approved Part 8 consent.

Figure 8.1: Proposed development and watercourses in the vicinity



Source: Noted on figure

8.3.4 Limitations of this EIAR

There were no limitations encountered in compiling the information required to carry out this assessment of likely significant impacts on the surface water environment as a result of the proposed development.

Mott MacDonald has followed accepted procedure in providing the FRA services but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions, Mott MacDonald takes no liability for, and gives no warranty against, actual flooding of any property (Client's or Third Party). The 229100682-ENV-0002 Flood Risk Assessment has been prepared for the purpose of supporting the proposed development.

8.4 Receiving environment

8.4.1 Hydrology, water quality and Water Framework Directive

The study area is located in hydrometric area 24 (Shannon Estuary South). The Ralappane Stream and Farranawana Stream are located within the Ralappane_010 river sub-basin. The watercourses crossed by the proposed development are small, modified lowland depositing channels located on mudstone, siltstone and sandstone geology. Land use in the area is primarily agricultural with localised coniferous forest plantations.

The latest WFD status for the River Shannon Estuary is 'Good'. The water quality status (2018 – 2020) is classified as 'unpolluted'.

Both the Ralappane Stream and Farranawana Stream are classified by the EPA as the Ralappane_10, IE_SH_24R300270 and have a 'moderate' WFD status (WFD Status 2018-2021) and the river waterbodies risk projection for both sterams is 'review'.

Based on the biological water quality sampling conducted for the proposed development, the Farranawana Stream has a Q value of Q3-4 (moderate status); the Ralappane stream was assessed at the two crossing locations and the Q values at both locations were Q3 (poor status). This aligns with the water quality sampling data conducted previously for the STEP Power Plant application.

Diffuse agricultural sources continue to be the main threat to the quality of water of these areas. Agriculture is the largest land use in the country and is the largest pressure on water quality which can be affected by diffuse nitrogen, phosphorus, sediment release, point source losses, pesticides and ammonium losses[2].

8.4.2 Protected Areas

There are no nutrient sensitive areas within the study area and neither the Ralappane Stream nor the Farranawana stream are sources of drinking water.

Neither the Ralappane Stream nor Farranawana Stream are designated as proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) or Special Protection Areas (SPAs), however the Shannon estuary is designated as a SAC (Lower River Shannon SAC) and SPA (River Shannon and River Fergus Estuaries SPA) and both streams discharge into the Shannon estuary.

8.4.3 Drainage, Water Supply and Wastewater

The site of the substations is greenfield, with no drainage, water supply or wastewater infrastructure. The cable route crosses greenfield areas and the L-1010 road.

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[2] Agriculture and Water Quality - Teagasc | Agriculture and Food Development Authority

8.4.4 Flood Risk

The cable route will be designed to not be vulnerable to flooding; this includes the avoidance of Flood Zones A and B where possible. The cable is underground and is designed to be floodable without affecting its operation. During operation the key vulnerability to the cable is its joints. All cable joint boxes are designed with watertight connections (IP68) as standard (as these installations are typically underground). Therefore, the cable is considered to be water compatible while buried underground. The cable is buried and so it will not affect flood flows.

Cable link boxes are typically located near joints. The cable link boxes are vulnerable to flooding and the locations of these have been chosen to avoid Flood Zones A and B and high potential risk from surface water.

In general, potential sources of flood risk to a development are as identified in Table 8.9

Table 8.9: Categories of Flood Risk

Source Category	Potential risk to development from category of flooding
Fluvial flooding	The Proposed Development is not at risk from fluvial flooding from Ralappane and Farranawana stream as discussed in the Flood Risk Assessment in Appendix 8.1.
Coastal and tidal flooding	The Proposed Development is outside OPW tidal flood risk areas (www.floodinfo.ie), so is not at flood risk. The Proposed Development is not at risk from coastal flooding from Ralappane and Farranawana stream as the development is at a higher level to the tide levels.
Pluvial flooding (overland flow)	Rainfall could affect the Proposed Development, but the pluvial flooding risk has been considered as minimal and addressed by the drainage design.
Groundwater flooding	OPW Groundwater flood risk maps (www.floodinfo.ie) indicate no risk of groundwater flooding on the development route. The Proposed Development is not in the area with potential for groundwater flooding
Flooding from infrastructure failure	The Proposed Development is not at risk of flooding from artificial drainage systems or infrastructure failure

A Flood Risk Assessment Stage 1 Flood Risk Identification and Stage 2 Initial Flood Risk Assessment for the Proposed Development has been carried out and is provided in Appendix 8.1. The FRA has confirmed that the proposed development has only water compatible components (cable) located in Flood Zone A and B, and any highly vulnerable components (GIS substation and cable link boxes) are entirely located in Flood Zone C. Therefore, there are not vulnerable components in Flood Zone A and B.

The remaining section of work is to install cables within ducts that will be installed by Kerry County Council. This cable installation is considered not to have a flood risk implication. In accordance with the Flood Risk Management Guidelines a Stage 3 assessment was considered not required due to sufficient available existing information.

The Flood risk assessment was undertaken in accordance with the requirement of “The Planning System and Flood Risk Management -Guidelines for Planning Authorities” to demonstrate that the Proposed Development will:

- Avoid inappropriate development in areas at risk of flooding;

- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

8.5 Likely Significant Effects

8.5.1 Construction Phase

Given the nature of the proposed development, the potential for impacts on the water environment are for the most part associated with the construction phase of the proposed development and are similar to any civil engineering project. These include:

- Impacts to surface water quality from sediment runoff, spillages and discharges;
- Impacts on drainage patterns from working in or near watercourses;
- Impacts from a new water supply and wastewater infrastructure; and
- Impacts on flood risk.

8.5.1.1 Surface Water

Vegetation clearance and excavations can pose a risk to surface water quality through surface water run-off and the release of sediment to watercourses. Ground damage from construction vehicles and machinery can also cause rutting and increased erosion of soils. Access tracks used during construction may affect surface run-off patterns, creating alternative flow paths, promoting erosion and localised flooding.

Elevated levels of sediment could impact on spawning fish, through issues including the sedimentation of spawning gravels, clogging of fish gills and reduction in dissolved oxygen.

Accidental release of potentially polluting substances such as oils (hydrocarbons) can result in significant impacts on the aquatic environment. The release of hydrocarbons can impact water dependent species resulting in disruption to neurosensors, abnormal behaviour and development issues as well as direct impacts on fertility. Oil spills can reduce the capacity of a waterbody to exchange oxygen as well as result in oil coating the gills of aquatic species causing lesions on respiratory surfaces. This can result in significant respiratory difficulties for aquatic organisms. Benthic invertebrates can be adversely affected if fractions of hydrocarbons settle and accumulate in sediments. This can result in the mortality of populations and prevent future colonisation.

Concrete and cement are highly alkali and fresh concrete has corrosive properties. Concrete wash water is a particularly severe pollutant, as it typically has a high pH (11-12) coupled with extremely high suspended sediment content. In the freshwater environment, pH levels which are elevated beyond natural conditions can have significant impacts upon water bodies.

Schedule 5 of SI 272 of 2009 (European Communities Environmental Objectives (Surface Waters) Regulations 2009) includes the following (WFD) pH limits for rivers and lakes:

- Soft water 4.5< pH < 9.0, where soft water is ≤100 mg/1 $CaCO_3$; and
- Hard water 6.0< pH < 9.0, where hard water is >100mg/l $CaCO_3$.

The sensitivity of the receiving surface water environment ranges from low (small streams) to extremely high (Lower River Shannon is a Special Area of Conservation).

There are three stream crossings along the cable route - two crossings of the Ralappane Stream (1 and 2 in Figure 8.1) and one crossing of the Farranawana stream. Crossing 2 of the Ralappane Stream and the crossing of the Farranawana Stream will not require works as part of the proposed development. Kerry County Council will undertake the cable ducting works while widening the L-1010. These works will be completed prior to the main proposed development works, as detailed in Chapter 5 Description of the Proposed Development.

With regards to crossing 1 of the Ralappane Stream this will be constructed by open cut trench. A dry area is created by damming the stream using the installation of an impermeable barrier blocking the river. Water is removed from the works area and held in settlement tanks to remove sediment prior to discharge back to the watercourse downstream of the dam area. Trenching is then undertaken and the ducting installed, the trench is then backfilled and the dam removed.

The magnitude of adverse surface water quality impacts in the absence of additional mitigation is expected to be Moderate resulting in Moderate to Significant adverse impacts of temporary duration on the Ralappane Stream and potentially downstream in the Lower Shannon estuary, prior to the implementation of mitigation measures.

8.5.1.2 Water supply, wastewater and drainage

During construction, welfare facilities will be provided at compounds and any discharges will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required. Consequently, significant adverse impacts on utility services during the construction phase are not likely and the effect will be short-term and imperceptible.

8.5.1.3 Flood Risk

The proposed cable is mostly buried underground and is designed to be floodable without affecting its operation for the design flood event. During operation, the key vulnerability to the cable is its cable link boxes. All cable link boxes shall avoid Flood Zones A and B to manage the flood risk, noting that all chambers shall be assessed at detailed design stage to ensure they are above Flood Zone B level.

Cable Construction Open Cut

The majority of the cable route will be installed by open cut method, the route is along the public road L-1010, therefore the volume of water affected by the Proposed Development is small and manageable. The significance of the effect is assessed form Slight to Significant. Duration of the effect is assessed as being temporary during construction.

Watercourse Crossings

The proposed watercourse crossing for the Ralappane Stream is open cut. An open cut crossing poses a constraint on a watercourse and could affect the flood extent, which could result in a Significant effect. Duration of the effect is assessed as being temporary during construction.

Construction Compounds and Laydown Areas

Construction compounds/Laydown areas will be located within the red line boundary of the site and will be a minimum of 50m from watercourses and not within flood zones, but could influence surface water flow paths. The significance of the effect is assessed from Slight to Significant depending on the location of the compounds with a negligible impact. Duration of the effect is assessed as being temporary during construction.

8.5.2 Operation and Maintenance Phase

8.5.2.1 Water Supply

During the operational phase, a potable water supply for the GIS building is proposed to be sourced from the existing public watermain system via a new connection to the watermain which is proposed to supply the STEP Power Plant facility. The Applicant has submitted a pre-connection agreement application to Uisce Éireann for this supply.

In addition to the potable water supply for Glansillagh GIS building, it is proposed that both substations are provided with a hydrant for fire fighting purposes.

The importance of the attribute is high and the magnitude is negligible due to the low demand for water, ca. 330l/week, resulting in the effect from water supply being long term and imperceptible Wastewater

Once the new GIS buildings are operational, domestic type wastewater will be produced by the onsite welfare facilities (toilet, wash hand basin and mess room sink). It is proposed that wastewater will be discharged by gravity sewer to a sealed foul water holding tank located adjacent to the entrance of the Glansillagh substation compound. The holding tank is proposed to have a capacity of approximately $8m^3$ to allow for an emptying frequency of once every 6 months. The holding tank will be monitored by a high-level alarm which will alert the site operators when the tank capacity is approaching full. The proposed foul water drainage layout is shown on drawing No. 229100682-MMD-00-XX-DR-2201.

As there will be no discharge of wastewater (importance low and magnitude negligible), effects will be imperceptible.

8.5.2.2 Storm Water Drainage

Storm water will be collected via a catch basin in the north eastern corner of the compound and will be conveyed to the fire water retention tank proposed as part of the STEP Power Plant application. All storm water will pass through an attenuation system including Class 1 hydrocarbon interceptors prior to discharge. The storm water will be discharged from the fire water retention tank to the Shannon Estuary via an outfall pipe (constructed as part of the STEP Power Plant project) located 5m beyond the low water mark and in a water depth of ca. 2.4m.

As the stormwater will pass through hydrocarbon interceptors as per standard design, the effect will be imperceptible.

Finally, operational discharges to the estuary will be controlled under the site's IE licence and the operational phase Environmental Management Plan, as per standard procedures for an IE licenced site.

8.5.2.3 Flood Risk

A desk-based assessment of the cable route was undertaken which concludes that the impact on flood risk is negligible at operation stage due to the cables being buried, no new obstruction to watercourses and so not influencing flood waters. In addition, the cables are characterised by being designed not to be vulnerable to flooding within Flood Zones A and B with imperceptible effect.

8.5.3 Decommissioning Phase

The SLNG substation has a predicated design life of 25 years the decommissioning effects are similar to those of construction assuming that materials are removed for disposal and the site is restored. It is not intended to decommission the proposed EirGrid substations and electricity infrastructure, however, over time elements of the proposed development, for example, cables, may need to be replaced. The activities associated with the decommissioning phase will be similar to those associated with the construction phase.

Therefore, the impacts of the decommissioning phase should be, as a worst-case scenario, similar to those at construction phase.

8.5.4 Do Nothing

Under a 'Do Nothing' scenario it is expected that the site will continue to be utilised for agricultural purposes. As is, the site potentially represents a source of contamination to the water environment, as diffuse agricultural sources continue to be the main threat to the quality of water in Ireland.

8.6 Cumulative Effects

8.6.1 Intra-project effects

The proposed development is part of the overall STEP Power Plant includes a power plant, battery storage and above ground installation. Furthermore, as part of the wider STEP Development it includes a proposed 26km gas pipeline; a data centre; and a strategic gas reserve facility. The Data Centre Campus and strategic gas reserve will form part of the overall master plan as detailed in the STEP Power Plant application. The STEP Power Plant will not be functionally dependent on both these proposed developments.

STEP Power Plant

In terms of cumulative effects on water resources, the STEP power plant application includes a new site access road and pre-cast concrete bridge over the Ralappane stream which is also to be crossed by the proposed 220kV cables. These works will not occur simultaneously and therefore are not likely to generate cumulative effects.

During the operational phase, stormwater from the proposed development will be conveyed to the fire water retention tank within the STEP Power Plant and will discharge downstream to the Lower Shannon estuary. The mitigation measures proposed as part of the STEP Power Plant application, and those detailed in Section 8.7 will minimise effects on surface waters such that no significant cumulative effects are likely to occur.

Gas Pipeline

The gas pipeline is a consented development[3] and an EIS accompanied the application (ABP Planning Reference: 08.GA0003). No significant residual effects were identified to surface waters in the EIS for the gas pipeline and following the implementation of mitigation measures, no significant cumulative effects are likely.

Data Centre

The masterplan for the STEP Power Plant includes a Data Centre Campus, however, this project will be assessed in an EIAR in the future which will accompany a planning application.

Strategic Gas Reserve

The strategic gas reserve development will be subject to EIA in the future (ABP Pre-application ref no.319245-24) and an EIAR will be prepared and will include an assessment of the potential for cumulative effects with other elements of the overall project.

[3] Shannon LNG Limited obtained consent in February 2009 for Natural Gas Pipeline under Section 182C (1) of the Planning and Development (Strategic Infrastructure) Act 2006, as amended.

8.6.2 Other Projects

The L-1010 road widening works will be constructed by Kerry County Council prior to the construction of the proposed development. As these works will not occur at the same time as the main construction works for the proposed development, cumulative effects with the proposed development will not occur.

A review of the projects detailed in Table 4.2 of Chapter 4 Methodology was undertaken to determine if there are any other projects which could act in combination with the proposed development such that cumulative effects would be likely on the Ralappane stream.

There are no other proposed projects within the vicinity of the Ralappane stream crossing within the townlands of Ralappane, Kilcolgan Lower, Carhoonakineely, Carhoonakilla or Carhoona, through which the Ralappane stream crosses, that could act cumulatively with the proposed development.

8.7 Mitigation and Monitoring

8.7.1 Construction Phase

Embedded mitigation for the crossing of the Ralappane stream is detailed in Chapter 5 Description of the Proposed Development.

The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works. These measures will also be incorporated into the Construction and Environmental Management Plan (CEMP), which the Contractor will develop based on the CEMP which accompanies this application.

- A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.
- Confirmatory pre-construction surveys will be carried out and seasonal constraints will be confirmed in agreement with IFI and National Parks and Wildlife Service (NPWS) and Kerry County Council, as appropriate.
- Works will be carried out in accordance with the guidelines set out by IFI in *'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters'* (IFI, 2016) including the programming of instream works within the period July to September.
- The IFI Biosecurity Protocol for Field Survey Works[4] will be complied with.
- In the case of a warning of a flood event, plant and materials vulnerable to flooding in 'at risk' construction compounds will be relocated to parts of the compound that are considered to be not at risk of flooding.

The following mitigation measures will be implemented prior to commencement and throughout the duration of the works:

- Activities will be planned in advance and machinery will be managed to ensure that the number of trips is limited to the minimum required at each location i.e. the more times a piece of ground is tracked, the more likely it is that vegetative cover will be removed and ruts will be created that will act as miniature rivers where dirty water will flow.
- Tracking beside streams will be avoided to avoid damage to the bankside.
- Geotextile or timber matting will be used on soft ground, and in all protected areas
- A buffer zone of 10m will be maintained between storage and working areas and watercourses, taking account of the minimum working area required to facilitate the works.

[4] file.html (fisheriesireland.ie)

- The time period over which areas of clearance are left open will be reduced insofar as is reasonably practicable.
- Re-instatement method statements will be subject to approval by the EnCoW.
- Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided.
- The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote from watercourses.
- In order to reduce the risk of contamination arising as a result of spills or leakages, measures including, but not limited to, the following will be employed.
  - All collected waste will be managed in accordance with the Waste Management Act 1996, and associated Regulations:
  - Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces;
  - Refuelling of plant, equipment and vehicles will be carried out on impermeable surfaces;
  - All tanks and drums will be bunded in accordance with established best practice guidelines; and
  - Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.
- Works will not be carried out during extreme rainfall or high flow events. An early flood warning system will be set up to allow the removal of plant and material from construction areas located in Flood Zones A and B in the event of a flood warning. The duration of works within Flood Zone A and B will be minimised to reduce the potential of impact.
- Temporary works will be designed so as not to increase flood risk elsewhere from overland flow, by limiting excavated lengths and providing suitable drainage provision.
- Silt fences (to Hy-Tex Premium specification or similar) and silt traps will be installed prior to commencement of works and will be inspected daily to inform adaptive management as required. The locations of same will be determined by the EnCoW.
- Any instream works will be conducted during the period July – September to avoid effects on fisheries, or otherwise agreed with IFI.

Silt Control Measures

- Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to larger streams and watercourses.
- Silt control measures include silt traps which can be located in small drains where flow is small and silt fences where runoff from large areas needs to be controlled.
- Silt fences must be installed in the working areas and not at the watercourse.
- Access routes will be delineated such that an appropriate set back distance from watercourses is maintained. Where works are to be undertaken adjacent to watercourses the setback distance will be delineated by the EnCoW on site.
- Where distances between the works and watercourse allow, a minimum setback distance of 30m from the watercourse will be maintained.
- Where the site is constrained, the best available set back distance will be employed taking account of the minimum working area required to facilitate the works.

Silt Fences

- Silt fences will be installed downslope of the area where silt is being generated on disturbed ground.
- To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse).

- Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh.
- The base of the silt fence will be bedded at least 15-30 cm into the ground at 2 metre intervals.
- Once installed the silt fence will be inspected by the Environmental Clerk of Works regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains.
- The integrity of the silt fencing will be checked daily by the EnCoW and after poor weather conditions (rain or wind) and any failures rectified immediately.
- Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW.
- Any build-up of sediment along the fence boundary will be removed daily.
- Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW.
- The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment).
- Silt fences will not be removed during heavy rainfall.
- The silt fence will not be pulled from the ground but cutaway at ground level and posts removed.
- A record of when it was installed, inspected and removed will be maintained by the EnCoW.

Silt Traps

The purpose of the trap is to reduce the level of solids in the slowly flowing water. The silt trap works by allowing a build-up of water behind it slowing flow and allowing solids to settle out. The following requirements will apply:

- Silt traps will only be placed in drains downstream of working areas where the volume of water flow is expected to be low.
- Silt traps will be made of terram or similar material, not mesh.
- The trap will be staked into the banks of the drain / watercourse such that no water can flow around the sides.
- The material will be bedded into the drain bed/watercourse to prevent water flowing beneath it.
- The height of the trap will be lower than the bank heights. The upper edge will be fixed to a timber cross piece. This will allow water to overtop the silt trap and not burst through or around it.
- Inspections will be carried out daily; during the proposed works, weekly on completion of the works for at least one month, and after heavy rains, and monthly thereafter until bare areas have developed new growth.
- Any build-up of solids will be carefully removed without removing any vegetation growing on the bottom.
- In sensitive areas a series of silt traps will be placed in the drain.
- The silt trap will not be pulled from the ground but cutaway at ground level and posts removed.
- A record of when it was installed, inspected and removed will be maintained by the EnCoW.

8.7.2 Operation and Maintenance Phase

Mitigation for stormwater is embedded in the design, described in section 8.4.3, and includes that surface water runoff will flow through a petrol interceptor and conveyed to the STEP Power Plant fire water retention tank before discharging to the Shannon Estuary.

As wastewater will be tankered and removed off site, no mitigation is required.

8.8 Residual Effects

Following the implementation of mitigation measures during construction and the embedded mitigation built into the design for the operational phase, residual effects in terms of water quality will be imperceptible in the Ralappane stream and downstream in the Lower Shannon estuary. The residual effect on water supply, wastewater and drainage will be imperceptible.

Table 8.10: Residual Effects

Receiving Environment	Construction Effect	Operational Effect	Residual Effect
Surface water quality	Moderate - Significant	Imperceptible	Imperceptible
Water supply, wastewater, drainage	Imperceptible	Imperceptible	Imperceptible
Flood Risk	Significant	Imperceptible	Imperceptible

8.9 Water Framework Directive Assessment

8.9.1 Introduction

The EU Water Framework Directive (Directive 2000/60/EC) establishes a framework for the protection of inland surface waters, transitional waters, coastal waters, and groundwater. It aims to prevent and reduce pollution, promote sustainable water use, protect and improve the aquatic environment and mitigate the effects of floods and droughts.

In Ireland, the WFD is transposed by the following national regulations:

- European Communities (Water Policy) Regulations (2003 and 2014) and;
- European Union Environmental Objectives (Surface Waters) Regulations (2009, 2012, 2015 and 2019)

Under the WFD, a water body is the basic management unit used to assess if the environmental objectives for that water body have been met.

River water bodies are defined as all or part of a river system within operational subcatchments which are located in larger catchments within river basin districts. Relevant examples for this study would include:

- Water body: Ralappane river water body;
- Subcatchment: Astee West;
- Catchment: Shannon Estuary South;
- River Basin Districts (RBD): Ireland’s national River Basin District.

The Irish River Basin District (RBD) covers an area of 70,273km2, with 46 catchment management units — consisting of 583 sub-catchments, with 4,829 water bodies (DHLGH, 2018).

The key environmental objectives of the WFD are set out in Article 4 of the Directive. It requires member states to use their River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs) to protect and, where necessary, restore water bodies in order to reach good status, and to prevent deterioration. Good status means both good chemical and good ecological status. RBMPs are key tools for implementing the WFD and are drawn up every six-years following extensive public consultation.

In Ireland, the Department of Housing, Local Government and Heritage leads the development and implementation of Ireland's river basin management plans. To date, there have been two cycles of river basin management planning in Ireland: the first cycle covered the period 2010-2015 and the second cycle the period 2018-2021. Ireland's third cycle RBMP for the period 2022-2027 is expected to be published shortly.

Under the requirements of the WFD member states must ensure that the requirements of Article 4 are met. Specifically, the relevant competent authorities of a member state must consider whether proposals for new schemes/development have the potential to:

1. Cause a deterioration of a water body from its current status or potential, and or,
2. Jeopardise attainment of good status or potential where not already achieved.

As a result, new schemes/developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies.

If the tests above cannot be satisfied, Article 4.7 of the Directive sets out conditions and specific situations that permit derogations.

There are three stages in a WFD assessment:

- A screening assessment which can either screen in or screen out an activity based on the available evidence;
- A no deterioration assessment which considers if the activity will result in a deterioration in the current status of a water body;
- Achievement of good status assessment which considers if the activity will jeopardise the water body from achieving good status in the future.

As the Ralappane stream is crossed by the proposed development, it cannot be screened out and must move to a 'no deterioration assessment'.

8.9.2 Proposed Development Overview

The proposed development consists of two Gas Insulated Switchgear (GIS) substations and a 220kV grid connection between the on-site substations to an existing line cable interface mast which is in proximity to Kilpaddoge substation, ca. 5km east of the main STEP site.

The proposed development includes a crossing of the Ralappane Stream in the townland of Ralappane which will be via open cut method.

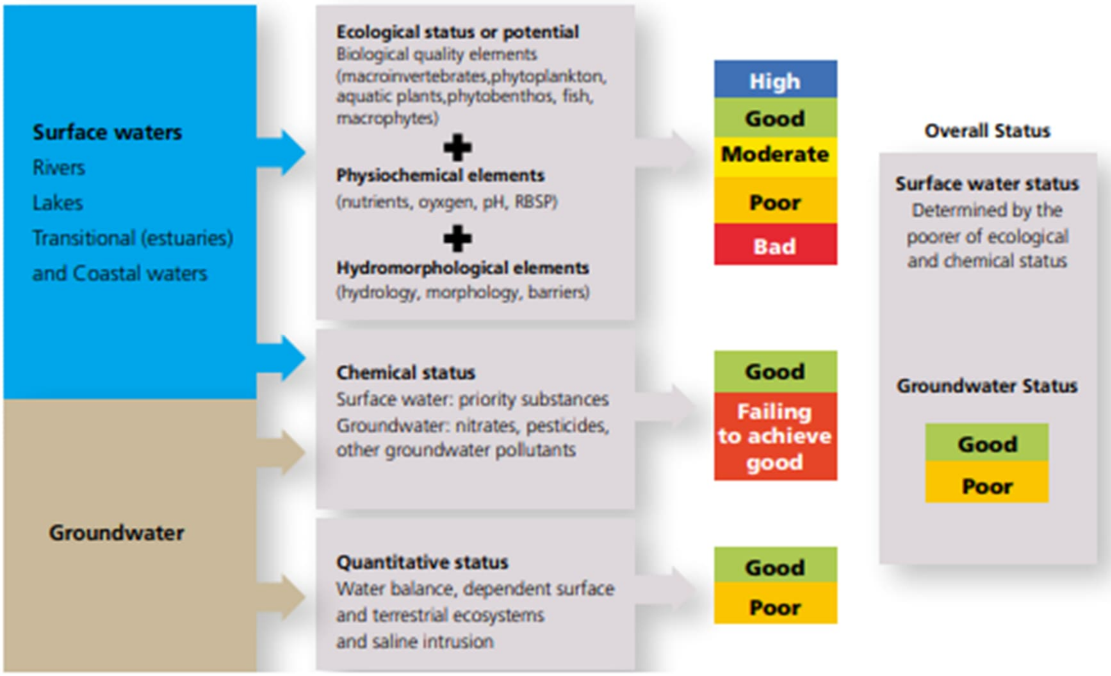
Once operational, stormwater from the proposed development will tie into the STEP Power Plant feed to a fire water retention pond in the Power Plant site which ultimately discharges to the Shannon Estuary and therefore the operational phase does not have potential to affect the Ralappane stream.

8.9.3 Waterbody Status

Surface waters are classified by their ecological status (biology, water quality and hydromorphology combined) and chemical status (level of harmful chemicals in the water). Groundwaters are classified according to their chemical status and quantitative status (the amount of water present). The way this information is combined to provide an overall status of surface waters and groundwaters is illustrated in Figure 8.2. The element with the lowest status in each step of the process determines the overall classification. This is called the 'one out, all out' principle.

The quality elements used to determine water status are detailed in Annex V of the Directive.

Figure 8.2: Figure 2. Scheme detailing how the status of a water body is derived (EPA, 2022).



The Ralappane river water body (Ralappane_010) has been assigned a moderate ecological status by the Environmental Protection Agency (EPA), the competent authority responsible for assigning water status in Ireland. According to the EPA's website the status of the Ralappane was assigned by modelling and not by monitoring (www.epa.ie).

As detailed in Section 8.4.1, based on the biological water quality sampling conducted for the proposed development, the Ralappane stream was assessed as Q3 (poor status). Environmental DNA (eDNA) testing was positive for European Eel within the Ralappane stream.

Table 8.11: Ralappane Stream (Source: www. Catchments.ie)

Attribute	Value
Name	RALAPPANE_010
Code	IE_SH_24R300270
Subcatchment	24_9 ASTEE_WEST_SC_010
Catchment	24 Shannon Estuary South
Latitude	52.5754427
Longitude	-9.4338586
Local Authority	Kerry County Council
Water body Category	River
Ecological Status	Moderate
WFD Risk	Review
Protected Area	Yes
High Status Objective	No
Heavily Modified	Unknown
Artificial	Unknown
Length (Km)	5.98

8.9.4 Assessment

Table 8.12 below assesses the potential of effects on the Ralappane Stream and the potential for effects on the hydromorphological status, physicochemical status and biological status of the stream during the construction and operational phases of the proposed development.

Table 8.12: WFD Assessment

Element	Assessment	Control measures
	Biological Assessment	
Benthic invertebrates	During construction and operation there is the potential for increased sedimentation.	Silt mitigation – see section 8.7
Phytobenthos	During construction and operation there is the potential for increased sedimentation and runoff of pollutants.	Silt mitigation and hydrocarbon interceptors – see section 8.7
Fish	During construction and operation there is the potential for increased sedimentation and runoff of pollutants.	Silt mitigation and hydrocarbon interceptors – see section 8.7
Macrophytes	In the event that an open cut crossing is used for crossing the Ralappane stream, there may be potential for directly affecting macrophytes in the river, however the area affected is limited to ca. 2m in width.	Locate open cut trench away from macrophytes if possible.
	Hydromorphological Assessment	
Quantity and Dynamics of water flow	In the event that an open cut crossing is used for the cable crossing of the Ralappane stream, there will be temporary over pumping of water.	Open Cut Trench mitigation – see section 8.7
Connection to groundwater bodies	During excavations, there is potential for groundwater to be encountered and dewatering required, however, this would be localised and minor in scale.	Should dewatering be required any discharges will be treated to remove contaminants and silt and disposed of in accordance with EPA requirements.
River Continuity	In the event that an open cut crossing is used for crossing the Ralappane stream, there will be a temporary dry area isolated for the works, however, water will be pumped/diverted for the short period of the works. There are no proposed instream structures which could act as a barrier.	N/A
River depth and width variation	There will no change to river depth or width as a result of the proposed development.	N/A
Structure and substrate of the river bed	Increased sedimentation could affect river bed substrate over time. There are no structures proposed within the river.	Silt measures – see section 8.7

Element	Assessment	Control measures
	Biological Assessment	
Structure of the riparian zone	In the event that an open cut crossing is used for crossing the Ralappane stream, there may be potential for direct effects on the riparian zone, however the area affected is limited to ca. 2m in width.	Minimise effects on the riparian zone and consult with IFI with regards to method statements for the works.
	Physico-chemical Assessment	
Thermal conditions (temperature)	There is no potential for effects on the thermal condition of the stream.	N/A
Nutrient conditions	During construction and operation there is the potential for increased sedimentation and associated phosphate and ammonia.	Silt measures – see section 8.7
Oxygenation conditions	Potential for some localised reduction in oxygenation conditions during the construction phase associated with fine sediment mobilisation (assuming it has an associated oxygen demand). During operations, wastewater will be tankered off site and therefore there will be no discharge of wastewater.	Silt measures – see section 8.7 & embedded mitigation – see section 8.5.2
Acidification (pH)	There is potential for run-off from concrete construction activities.	Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided. The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote from watercourses.

8.9.5 Conclusion

With the implementation of the mitigation measures proposed, the proposed development will not result in a change in status of any WFD quality elements or prevent any connected waterbodies from reaching good status in the future.

The assessment has shown that the proposed development upon completion will have no permanent impact on the hydromorphological (i.e. flow, continuity, morphology) and physicochemical (i.e. thermal, nutrient, oxygenation, acidification) elements of the Ralappane stream and the ability of these elements to provide a supporting environment for the river's ecology. As such the assessment has demonstrated that the potential impacts associated with the proposed development are unlikely to cause a deterioration at the water body scale.

The mitigation measures included in this assessment will be incorporated into the accompanying CEMP. The CEMP will be further developed by the appointed Contractor and will incorporate any statutory requirements that may arise during the consenting process. The CEMP will be agreed with Kerry County Council prior to works commencing at the site.

In summary the proposed development would not result in status deterioration of the Ralappane river waterbody or directly prevent the future attainment of good water status or indirectly impact measures that may be put in place by the relevant competent authorities to achieve the environmental objectives of the WFD.

8.10 References

AECOM, STEP Power Plant EIAR

AECOM, STEP Power Plant EIAR – Appendix A6.4 WFD Assessment

CIRIA 2001. Control of Water Pollution from Construction Sites - Guide to Good Practice (C532)

https://gis.epa.ie/EPAMaps/ (accessed 02 February 2024)

Inland Fisheries Ireland, 2016. Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters

Inland Fisheries Ireland, 2020. Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 9 - Biodiversity

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9 Biodiversity

9.1 Introduction

Biodiversity (or "biological diversity"), as defined at the United Nations Convention on Biological Diversity (CBD), is *'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes genetic diversity within species, between species and of ecosystems'.*

This chapter assess the likely significant effects from the proposed Shannon Technology and Energy Park (STEP) 220KV grid connection on biodiversity and the wider ecological environment which could potentially be affected by the proposed development. The following assessment is based on the development parameters as described in Chapters 1 & 5 of this EIAR.

Statements of authority and team credentials are listed in Chapter 1 Appendix 1.1

Mitigation measures are provided to avoid / reduce significant effects on biodiversity receptors and residual effects are determined. This is done by following the sequential steps of the mitigation hierarchy:

- Avoidance – the first step of the mitigation hierarchy which comprises measures taken to avoid creating impacts from the outset, such as careful spatial placement of infrastructure, or timing construction sensitivity to avoid disturbance.
- Minimisation – measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided. Effective minimisation can eliminate some negative impacts, such as measures to reduce noise and pollution.
- Rehabilitation/restoration – to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Both generally occur towards the end of a projects lifecycle but may be possible within certain areas during the construction phase.
  - Restoration aims to return the area to the original ecosystem that was present before the impacts occurred.
  - Rehabilitation aims to restore basic ecological functions and/or ecosystem services.
- Offset – aims to compensate for any residual, adverse impacts after full implementation of the previous three steps of the mitigation hierarchy. Biodiversity offsets are of two main types.
  - Restoration offsets which aim to rehabilitate or restore degraded habitat.
  - Averted loss offsets which aim to reduce or stop biodiversity loss in areas where it is predicted to occur.

9.1.1 Legislation, Policy and Guidance

9.1.1.1 Legislation

In assessing the likely significant effects on biodiversity arising from the proposed development, due regard has been given to relevant legislation and guidance, including the following:

- EIA Directive (2011/92/EU as amended by 2014/52/EU);
- Planning and Development Acts 2000, as amended and the Planning and Development Regulations 2001, as amended;
- Electricity Regulations Act, 1999;

- Wildlife Act 1976, as amended;
- EU Habitats Directive (92/43/EEC)
- EU Birds Directive 2009/147/EEC
- Flora (Protection) Order 2022;
- EU Water Framework Directive 2000/60/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended);
- Ireland's 4th National Biodiversity Action Plan 2023–2030.

9.1.1.2 Policies

Relevant national and local policies and objectives from various plans have been reviewed and are detailed below.

Kerry County Development Plan 2022-2028

Relevant policies from the Kerry County Development Plan (KCDP) 2022-2028 include:

European/National Designations

- KCDP 11-1: Ensure that the requirements of relevant EU and national legislation, are compiled with by the Council in undertaking its functions, including the requirements of the EU Birds and Habitats Directives.
- KCDP 11-2: Maintain the nature conservation value and integrity of Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). This shall include any other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies.
- KCDP 11-3: Work with all stakeholders in order to conserve, manage and where possible enhance the County's natural heritage including all habitats, species, landscapes and geological heritage of conservation interest and to promote increased understanding and awareness of the natural heritage of the County.
- KCDP 11-4: Promote nature-based solutions to meet national objectives towards achieving a carbon neutral economy by 2050.
- KCDP 11-5: Support and facilitate the actions in the National Biodiversity Action Plan and Kerry County Councils Biodiversity Action Plan 2022 – 2028.
- KCDP 11-8: Support the recording of biodiversity data in the county and its referral to National Biodiversity Data Centre.

Invasive Species

- KCDP 11-14: Ensure invasive species are managed in compliance with the provisions of the EC (Birds and Habitats) Regulations (SI 477 of 2011), as amended, particularly Sections 49, 50 and the Third Schedule. Best practices, as produced and updated by relevant authorities, are to be adhered to in the management of invasive species particularly on sites proposed for development.
- KCDP 11-15: Facilitate, in collaboration with relevant stakeholders increased awareness and the implementation of biosecurity measures to prevent the spread of invasive species, particularly along watercourses.
- KCDP 11-16: Facilitate the provision of an appropriate site in the County for the disposal and management of invasive species and contaminated soil, further to best practice guidelines and the provisions of the EC (Birds and Habitats) Regulations (SI 477 of 2011), as amended.

All Ireland Pollinator Plan 2021-2025

- KCDP 11-17: Support actions from the All-Ireland Pollinator Plan including the plan's recommendations for grassland management and pollinator friendly species.

Green and Blue Infrastructure – Ecological/Urban Blue Corridors

- KCDP 11-18: Require, where necessary, proposals to be accompanied by a habitat map prepared in accordance with the Heritage Councils Best Practice Guidance for Habitat Survey and Mapping, 2011.
- KCDP 11-19: Encourage and facilitate the retention and creation of features of local biodiversity value, ecological corridors and networks that connect areas of high conservation value such as watercourses, woodlands, hedgerows, earth banks and wetlands.
- KCDP 11-20: Identify key areas in the County, in collaboration with other relevant bodies, where habitat mapping would be of particular benefit to record existing features of local biodiversity and where applicable to integrate this information in the development management and plan preparation process.
- KCDP 11-21: Promote the integration and improvement of natural watercourses in development proposals having regard to the IFI's guidance Planning for Watercourses in the Urban Environment.

Woodlands and Trees

- KCDP 11-23: Facilitate and support the actions of the tree management strategy for the respective municipal districts.
- KCDP 11- 24: Support the preservation and enhancement of the general level of broadleaf tree cover throughout the County in both urban and rural areas and ensure that development proposals satisfactorily retain existing trees and/or provide additional native planting. A Tree Survey Report shall inform applications where appropriate.
- KCDP 11-25: Encourage the provision of locally provenanced native tree species including those recommended by the All-Ireland Pollinator Plan as part of development landscaping schemes.
- KCDP 11-26: Work with stakeholders to protect and sustainably enhance the biodiversity and where appropriate the landscape and recreational interests of woodlands in the County.

Light Pollution

- KCDP 11-38: Require proposals for development that include the provision of external lighting, to clearly demonstrate that the lighting scheme is the minimum needed for security and working purposes and also to ensure that external lighting and lighting schemes are designed so that the incidence of light spillage is minimised ensuring that the amenities of adjoining properties, wildlife and the surrounding environment are protected.

Lights and Biodiversity

- KCDP 11-40: Take into consideration the Bat Conservation Trust 2018 Note 08/18 *Bats and Artificial Lighting in the UK Guidelines* when choosing lighting specifications for developments and/or Bat specialist advice, so as to ensure the requirements of the Habitats Directive are adhered to, including Article 10.

Kerry County Council Biodiversity Action Plan (KBAP) 2022-2028

Kerry County Council, like all local authorities, interacts with biodiversity through its many roles, responsibilities, and functions. These include, but are not limited to:

- Land use planning, particularly designating land use zoning and development objectives.
- Development management (i.e., planning permission).
- Environment protection functions, including licensing and permitting of waste, air emissions and water discharges.
- Community engagement across a range of stakeholders.
- Climate Action – mitigation and adaptation.
- Local Authority Works (including development, upgrade and maintenance of roads, greenways, bridges, amenity areas; public green spaces and public tree management).

- Through these activities the local authority places biodiversity and ecosystem services as a core value. It seeks to exemplify best practices in undertaking its own works and in the management and/or control of other works that fall under its remit.
- Kerry County Council has linked six strategic objectives to the above functions/roles and responsibilities. However, as the KBAP will operate at a more local level several objectives are specifically focused on a county led approach with several targets following on from the objectives.
- Objective 1 – Mainstreaming biodiversity into decision making within the Local Authority.
  - Local authority decisions on own plans/projects/programmes informed by possible effects on biodiversity.
  - Ensure effects on biodiversity is a key consideration for proposed land use developments in the proper planning and sustainable development of the county.
- Objective 2 - To conserve, protect and enhance biodiversity and ecosystem services in the county.
  - Optimise opportunities for the local authority to provide best practices in the protection and enhancement of biodiversity.
  - Optimise opportunities for the local authority to improve status of all waterbodies through its responsibilities under the Water Framework Directive (WFD).
  - Optimise the opportunities for the local authority to support other biodiversity initiatives being undertaken in the country.
- Objective 3 - That biodiversity underpins KCC’s responses to the challenges of climate change.
  - Local authority leads by example in the use of nature-based solutions in responding to the challenges of climate change and moving towards the “national 2050 climate objective”.
  - Local authority provides policy/objectives that seek to protect soils that sequester carbon.
  - Local authority supports initiatives/actions from community that focus on biodiversity as a way to mitigate/adapt to climate change.
- Objective 4 – Work with a range of stakeholders to ensure protection and enhancement of biodiversity in the county.
  - Enhanced co-operation with other stakeholders that oversee the protection of relevant nature conservation legislation in the county.
  - Works with the community and other groups in the protection and enhancement biodiversity including the provision of locally produced food.
- Objective 5 – Increase awareness and appreciation of biodiversity within KCC and the community.
  - An enhanced appreciation of the value of biodiversity and ecosystem services amongst local communities, other local stakeholders and the general public.
- Objective 6 – Support the strengthening of the knowledge base; information and data on biodiversity in the county.
  - Data and information on the county’s biodiversity is increased.

Kerry County Council Local Authority Climate Action Plan 2024-2029

Relevant strategic goal objectives from the Kerry County Council Local Authority Climate Action Plan 2024-2029 include:

- EG8 - Support opportunities to improve ecological connectivity of non-designated habitats and sites to improve overall ecosystem resilience and functioning while supporting climate action within the county.

- EG9 - Ensure all projects supported by the council have taken the necessary precautions to identify and manage invasives species, particularly with regard to Schedule III species. no climate action related development project that is likely to cause the spread of invasives species listed in Schedule III shall be supported.

9.1.2 Guidance

This assessment has been carried out having regard to relevant guidance documents including the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: terrestrial, Freshwater, Coastal and Marine. Version 1.1. [Chartered Institute of Ecology and Environmental Management (CIEEM), 2018, updated 2019.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (EPA 2022).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, May 2022).
- Biodiversity Net Gain. Good practice principles for development. A practical guide. (CIRIA C776a, 2019).
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union, 2013).
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009).
- Ecological Surveying Techniques for Protected Flora and Fauna during the planning of National Road Schemes (National Roads Authority, 2009).
- Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (National Roads Authority, 2005).
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (National Roads Authority, 2008).
- Guidelines for the Treatment of Bats During the Construction of National Road Schemes (National Roads Authority, 2005).
- A Guide to Habitats in Ireland (Fossitt, 2000).
- Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011).
- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- Countryside Bird Survey (2012) CBS Manual Guidelines for Countryside Bird Survey participates.
- Bat Surveys for Professional Ecologists: Good Practice Guidelines, 4th Edition (Bat Conservation Trust, 2023).
- Kilroy G, Dunne F, Ryan J, O'Connor A, Daly D, Craig M, Coxon C, Johnston P and Henning M (2008). A Framework for the Assessment of Groundwater Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre Report. Environmental Protection Agency Ireland.
- Department of Arts, Heritage and the Gaeltacht – National Parks and Wildlife Service (DAHG NPWS) (2012) Marine Natura Impact Statements in Ireland Special Areas of Conservation, A Working Document.

9.2 Assessment Methodology

9.2.1 Desktop Assessment

A desktop assessment was carried out to identify features of ecological importance that have the potential to be affected by the proposed development. The assessment included an interrogation of aerial imagery and available GIS datasets to investigate potential for connectivity to designated and ecologically sensitive areas. Habitats that might be affected by the development were identified and their suitability to support sensitive, rare and protected species was assessed (having regard to the typical ranges known to occur in the locality). A desktop study was also conducted, which made use of reports from surveys undertaken by subcontractors in conjunction with data from the National Biodiversity Data Centre (NBDC) and National Parks and Wildlife Service (NPWS) websites.

9.2.2 Sources of Data Collection

Principal sources of information utilised for the desktop assessment included:

- Existing relevant mapping and databases e.g., species (protected and rare) and habitat distribution etc. (sourced from the Environmental Protection Agency (EPA), the National Biodiversity Data Centre (NBDC) and the National Parks and Wildlife Services (NPWS).
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual Reports, Article 17 Reports, Species Action Plans and Conservation Management Plans.
- Existing studies, EIAR, Natura Impact Statements and other publications in relation to habitats and potential works on these habitats in Ireland.
- Published data from Bat Conservation Ireland
- Published data from Birdwatch Ireland
- Published data from the Botanical Society of Britain and Ireland Database
- EPA maps (https://gis.epa.ie/EPAMaps)

Table 9.1: Data Sources and Contents

Data Source	Date	Data Contents
National Biodiversity Data Centre	23rd of April 2024 (downloaded)	Protected species records
National Parks and Wildlife Service	29th of April 2024 (email received)	Protected species records
National Parks and Wildlife Services	11th of April 2024 (accessed on-line)	Article 17 Habitats Conservation Assessments 2019 Volume 2
National Parks and Wildlife Services	11th of April 2024 (accessed on-line)	Article 17 Species Conservation Assessments 2019 Volume 3

9.2.2.1 Historic Survey Data

A review of findings of previous ecological surveys undertaken in proximity to the proposed development site was also carried out. Inclusion of these historic survey reports develop baselines for the subsequent surveys carried out more recently by Mott MacDonald ecologists, they form a part of a long-term on-going survey effort with regards to the proposed development's application. Information reviewed included data included in the Shannon Technology and Energy Park (STEP) Proposed Power Plant and Terminal planning submission, namely:

- Badger surveys carried out by DixonBrosnan Environmental Consultants in 2007, 2019-2021 and 2023-2024 which included bait marking surveys.

- Otter surveys were carried out by DixonBrosnan Environmental Consultants in 2007, 2011 2019-2021 and 2022-2024.
- Bat surveys (bat roost potential and activity) were carried out by DixonBrosnan Environmental Consultants in 2007, 2020, 2021, 2023, 2024.
- Seabird surveys were carried out during the periods June 2021 to May 2022 and September 2022 to August 2023 by Irish Whale and Dolphin Group (IWDG).
- Estuarine bird surveys (winter and summer) were carried out by Dixson Brosnan in 2018 to 2023 at the main STEP site which partially includes the proposed site.
- Breeding bird surveys were conducted by DixsonBrosnan during the 2023 period.

9.2.3 Likely Significant Effects Assessment Methodology

Annex III of Directive 2011/92/EC (as amended by 2014/52/EU) requires that the EIAR should assess:

- Magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected).
- The nature of the impact.
- The transboundary nature of the impact.
- The probability of the impact.
- The expected onset, duration, frequency and reversibility of the impact.
- The cumulation of the impact with the impacts of other existing and/or approved projects.
- The possibility of effectively reducing the impact.

The assessment is such that the receptors are defined in the context of their geographic scale (i.e.at an international, national, county or local level) that outlines their importance.

Table 9.2: Valuation and Selection of Ecological Receptors

Geographic scale of significance (NRA, 2009; CIEEM, 2022)	Ecological Receptor
International Importance	• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfills the criteria for designation as a 'European Site' • Features essential to maintaining the coherence of the Natura 2000 Network • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site • World Heritage Site • Biosphere Reserve • Site hosting significant species populations under the Bonn Convention • Site hosting significant populations under the Berne Convention • Biogenetic Reserve under the Council of Europe.

	• European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities
National Importance	• Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts. • National Park. • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level)7 of the following: – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. • Site containing 'viable areas'8 of the habitat types listed in Annex I of the Habitats Directive
County Importance	• Area of Special Amenity • Area subject to a Tree Preservation Order • Area of High Amenity, or equivalent, designated under the County Development Plan • Resident or regularly occurring populations (assessed to be important at the County level)10 of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. • County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP,11 if this has been prepared. • Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. • Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; • Resident or regularly occurring populations (assessed to be important at the Local level)12 of the following: – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;

	• Sites or features containing non-native species that are of some importance in maintaining habitat links.

When discussing the potential changes/activities and impacts brought about by proposed develops on an ecosystem structure and function it is important to consider:

- Positive/negative.
- Extent.
- Magnitude.
- Duration.
- Frequency.
- Timing.
- Reversibility.

Sections 3.7 of the *Guidelines on the information to be contained in Environmental Impact Assessment Reports'*, (EPA 2022) provides standardised definitions to classify the effects in respect of ecology.

Table 9.3: EPA Impact Classification Scheme

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative	A change which reduces the quality of the environment
Significance	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	An effect which causes noticeable changes in the character of the environment without affecting it sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends
	Significant	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	An effect which obliterates sensitive characteristics.
Duration and frequency	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 lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone
	Frequency	Describe how often the effect will occur. (Once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.

Impact Characteristic	Term	Description
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail

According to the EPA (2022), significance of effects is usually understood to mean the importance of the outcome of the effects and is determined by a combination of objectives (scientific) and subjective (social) concerns.

The EPA further notes that:

"*while guidelines and standards help ensure consistency, the professional judgement of competent experts plays a role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood*".

With this in mind, the geographic frame of reference applied to determining impact significance by the NRA (2009) in Ireland and CIEEM (2022) in Ireland and the UK, has been adopted in this report in tandem with the EPA's qualitative significance criteria.

Table 9.4: Defining the significance of effects utilising a geographic vs qualitative scale of reference

Geographic scale of significance (NRA, 2009; CIEEM, 2022)	Qualitative scale of significance of effects (EPA 2022)
Negligible or Local Importance (Lower Value). No significant effects predicted to significant ecological features	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
Local Importance (Higher Value), County, National, Regional, or International.	Slight / Moderate / Significant / Very Significant / Profound i.e., effects can be slight, moderate, significant, very significant, or profound at local scale, subject to the proportion of the local population/habitat area affected.

9.3 Field Study

9.3.1 Field Study Methodology

Site surveys were conducted during the spring/summer period in 2023 and 2024 by Mott MacDonald ecologists.

A habitat survey was carried out with regard to 'Best Practice Guidance for Habitat Survey and Mapping' (Heritage Council, 2011).

Habitats were classified to Fossitt level three in accordance with 'A Guide to Habitats in Ireland' (Fossitt, 2000). Fossitt habitat classifications are not directly comparable to the descriptions of Annex I habitats, e.g., CW2 - Tidal Rivers under Fossitt are linked to Estuaries (1130) under the

EU Interpretation Manual for EU Habitats. Thus, the habitat classification system and the corresponding European Annex I habitats was informed with reference to the EU Interpretation Manual for EU Habitats (European Commission, 2013) having regard to the Irish Vegetation Classification where relevant.

The area was searched for evidence of invasive plant species listed in Part 1 of the Third Schedule of European Communities (Birds and Natural Habitats) Regulations 2011 (S.I No. 477 of 2011). Species protected under Flora (Protection) Order, 2015 (S.I. No. 356 of 2015) were also searched for.

The habitat survey had regard for habitats which may offer supporting habitat for Qualifying Interests and Special Conservation Interests associated with European Sites.

Equipment used for this survey included base maps, binoculars, and vegetative keys.

9.3.1.1 Mammal Surveys

Badger

Badger surveys were carried out by Mott MacDonald ecologists on the 4th and 5th of July 2023, 29th and 30th of August 2023 as well as the 5th and 6th of March 2024.

Badger survey followed Surveying Badgers (Harris et al.1989). The extent of survey area was defined with regard to Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2005). Signs for Badger searched for included:

- Latrines & dung pits.
- Hair.
- Paths and footprints.
- Scrapes.
- Snuffle holes; and
- Setts (including a description of the sett location: hedgerows, earth banks, woodland, or scrub habitat. Type of sett and level of usage: main, maternity, ancillary, abandoned etc. Signs of activity: discarded bedding, spoil heaps etc.)

Otter

Otter surveys were also carried out by Mott MacDonald ecologists on the 4th and 5th of July 2023, 29th and 30th of August 2023 as well as the 5th and 6th of March 2024.

The survey followed Monitoring the Otter *Lutra lutra* (Chanin, 2003). The extent of survey area was defined with regard to '*Guidelines for the Treatment of Otters during the Construction of National Road Schemes*' (NRA, 2008) and therefore included survey of accessible watercourses plus riparian habitat 200m upstream and downstream of the proposed crossing of the Ralappane Stream. Signs of Otter searched for included:

- Individual otters
- Holts
- Couches/resting sites
- Spraints (categorised as dried fragmented, dried intact; not fully dry) and gland secretions.
- Footprints and paths
- Slides
- Feeding remains

Bats

A bat roost potential survey was carried out by Mott MacDonald ecologists on the 4th and 5th of July 2023, 29th and 30th of August 2023 as well as the 5th and 6th of March 2024.

A daytime bat survey of the road culvert and trees was carried out in accordance with "*Bat Surveys for Professional Ecologists: Good Practice Guidelines*" (4th edn) (Collins, 2023). The visual assessment was carried out in line with *Bat Tree Habitat Key* (Andrews, H et al., 2013) to determine potential roost features. Trees which might be affected by the works were examined for potential roost features which included:

- Horizontal / vertical cracks along tree limbs / trunk.
- Knot holes and cankers in trees.
- Voids in trees; and
- Crevices including lifting bark or thick ivy growth (where stems are a minimum of 50mm diameter).

The suitability of habitat features for bats, within the survey area, were assessed in accordance with Collins (2023) as described in Table 9.5 below.

Table 9.5: Guidelines for Assessing Potential Bat Roosts in Structures

Suitability	Description/Roosting Habitats	Commuting and Foraging Habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevice/suitable shelter at all ground/underground levels)	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/protection for flight lines or generate/shelter insect populations available to foraging bats).
Negligible	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious features on site likely to be used as flight paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site but could be used by individual hibernating bats).	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective3 of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for flight paths such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.
High	A structure with one or more potential roost sites that could be used that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g. maternity or classic cool/stable hibernation site.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses, and grazed parkland. Site is close to and connected to known roosts.

Source: Collins 2023

Table 9.6: Guidelines for Categorising the Potential Suitability of Potential Roost Features (PRF) on a Proposed Development Site for Bats, to be Applied Using Professional Judgement

Suitability	Description
PRF-I	PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats.
PRF-M	PRF is suitable for multiple bats and may therefore be used by a maternity colony.

Source: Collins 2023

Trees and buildings / structures which were assessed as having a Moderate or High suitability for bats (structures) or viable PRF features (PRF-I or PRF-M) were examined further for evidence of bat activity using an endoscope. Evidence of bat activity includes:

- Bat droppings.
- Signs of bat use, such as polishing / smoothing of potential roost features and oily marks (from fur) around possible access points and roost areas.
- Feeding remains such as moth wings or other insect parts.
- Urine stains (staining / blackening of entrance to potential roost feature and below the feature); and
- Direct evidence including dead bats and squeaking noises.

9.3.1.2 Aquatic Surveys

Aquatic surveys were carried out by Triturus Environmental Ltd. who were commissioned by Mott MacDonald to prepare and assessment on the aquatic ecological environment to inform on constraints regarding the proposed development.

Three small streams are crossed by the proposed cable route and are considered as part of the current aquatic and fisheries assessment, however, it is only one crossing of the Ralappane stream which could be affected by the proposed development. Works at a second location on the Ralappane stream and at the Farranawanna stream will be conducted by Kerry County Council under a Part 8 consent and only cable pulling through this section of ducting forms part of the proposed development. While not within the boundary of a European site there is potential downstream hydrological connectivity between the proposed development and the River Shannon and River Fergus Estuaries SPA and the Lower River Shannon SAC.

Aquatic Site Surveys

Aquatic surveys of the watercourses within the vicinity of the proposed development were conducted on the 30th October 2023. Survey effort focused on both instream and riparian habitats at each aquatic sampling location.

Surveys at each of these sites included a fisheries assessment (habitat appraisal), white-clawed crayfish (*Austropotamobius pallipes*) survey, macrophyte and aquatic bryophyte survey and biological water quality sampling (Q-sampling). This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed development and ensured that any aquatic habitats and species of high conservation value would be detected to best inform aquatic ecological constraints.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc) including associated evidence of historical drainage;
- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.);
- Flow type by proportion of riffle, glide and pool in the sampling area;
- An appraisal of the macrophyte and aquatic bryophyte community at each site;
- Riparian vegetation composition.

Fisheries Appraisal

A fisheries habitat appraisal survey of the three stream sites was undertaken to establish their fisheries value. The surveys focused on evaluating the spawning, nursery and/ or holding habitat for salmonids and lamprey species, but also considered European eel and other fish species. The appraisals of salmonids and lamprey were cognisant of species-specific habitat requirements and preferences as outlined in O'Grady (2006), Hendry et al. (2003), Armstrong et al. (2003), Harvey & Cowx (2003), Maitland (2003) and Hendry & Cragg-Hine (1997). River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the riverine sites (i.e., channel profiles, substrata etc.).

Environmental DNA (eDNA)

To validate site surveys and to detect potentially cryptically low populations within the study area, eDNA samples were collected from the Ralappane Stream (2 locations) and Farranawana Stream (single). These were analysed for white-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) and European eel (*Anguilla anguilla*) environmental DNA (eDNA).

White-clawed Crayfish

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken at the aquatic survey sites in August 2023 under a National Parks and Wildlife (NPWS) open national licence (no. C24/2023), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2023), to capture and release crayfish to their site of capture. As per Inland Fisheries Ireland aquatic (2010) biosecurity recommendations, the crayfish sampling started at the uppermost site(s) of the catchment/sub-catchments in the survey area (moving downstream) to minimise the risk of upstream transfer of invasive species or pathogens.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). An appraisal of white-clawed crayfish habitat at each site was conducted based on physical habitat attributes (Gammell et al., 2021; Peay, 2003), water chemistry and incidental records in mustelid spraint.

Biological Water Quality (Q-sampling)

The 3 no. stream sites were assessed for biological water quality through Q-sampling in October 2023. All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes. Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Macrophytes and Aquatic Bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the 3 stream survey sites, with specimens identified onsite. An assessment of the aquatic vegetation community helped to identify any rare macrophyte species (Flora Protection Order or Wyse-Jackson et al., 2016) or habitats corresponding to the Annex I habitats, e.g., 'Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]' (more commonly referred to as 'floating river vegetation').

See Appendix: 9.6 for further details.

9.4 Approach to Impact Assessment

The evaluation of the key ecological receptors and the criteria used to assess the significance of effects are derived from the Guidelines for Assessment of Ecological Impacts on National Road Schemes (National Roads Authority, June 2009), Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022) and the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018).

Effects were considered to be either significant or not significant at a geographic scale equivalent to, or less than, the conservation importance of the ecological feature being assessed (CIEEM, 2018). Duration of significant effects is considered according to Environmental Protection Agency (EPA) guidance (EPA, 2022). The magnitude of an effect will depend on the nature and sensitivity of the ecological features and will be influenced by intensity, duration (temporary/permanent), timing, frequency and reversibility of the significant likely effect (Chartered Institute of Ecology and Environmental Management, 2018).

The criteria used for assessment of the value of the ecological resources sets out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor.

9.4.1 Study Area/Zone of Influence

The current guidance on ecological assessments states that: "The 'zone of influence' (ZOI) for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries," and that "the zone of influence will vary for different ecological features depending on their sensitivity to an environmental change."

The ZoI varies depending on the construction and operational activity and the sensitivity of the receptor (e.g., flora, birds, terrestrial mammals) to the effect encountered.

The ZoI identified for the various ecological receptors are as outlined below:

- The footprint of the proposed development for direct damage to habitats.
- 150m for breeding otter holts, (NRA, 2006).
- 150m for breeding badgers, (NRA, 2006).
- 6km for foraging Lesser Horseshoe bats (Bat Conservation Ireland, 2012).
- Catchment wide ZoI for surface waterbodies
- 250m for groundwater dependant terrestrial ecosystems (GWDTEs) (Kilroy et al. 2008)

- No significant dust effects are likely based on the proposed development. However localised dust deposition may occur during construction. Dust effects to ecological receptors was identified as 50m. As such, the ZoI is taken as 50m for dust effects within this Biodiversity Chapter.
- High noise effects (70dB and higher) are restricted to within 50m of the proposed development. Cutts *et al.* (2013) note that noise levels of below 55dB is often below background noise levels in estuaries. Noise modelling carried out indicates that the noise levels drop to below 55dB within approximately 230m of the proposed development (worst case scenario based on noise levels at construction compounds). As such 230m is taken as a worst-case scenario noise effect ZoI.

9.4.2 Consultations

Pre-application consultations were carried out with prescribed bodies as detailed Table 9.7 below. Key queries of relevance to this report are outlined.

Full list of consultations and responses are provided in Chapter 3 of this EIAR.

Table 9.7: Summary of Stakeholder Engagement

Consultee	Nature of Engagement	Key Responses/Comments
Development Applications Unit (DAU)	A consultation letter was sent on the 8th of May 2024 providing an overview of the proposed development.	Comments relevant to the assessment process: Request for the inclusion of mitigation to prevent deterioration of water quality. Request for otter surveys to ensure prevention of impacts to same. A note that any works likely to damage breeding and resting places of otters and bats will require derogation licences.
Kerry County Council	A consultation letter was sent on the 8th of May 2024 providing an overview of the proposed development.	Comments relevant to the assessment process Selection of site compound locations should be informed by ecological survey. Areas of particular ecological / environmental sensitivity or in close proximity to sensitive watercourses, should be avoided; Invasive species protocols should be provided for, as part of the proposal. As part of this, 'Ireland's invasive alien species soil and stone pathway action plan 2023 – 2027' should be taken into account. Proposals including construction related lighting should have regard to the 'Lesser Horseshoe Bat Species Action Plan 2022-2026'. As part of this, the connectivity of lesser horseshoe bat populations in Kerry and Clare should not be adversely impacted. Should an NIS be required, any mitigation measures contained therein should be presented in a clear and specific manner, compatible with the recommendations of S3.2.4 of the

Consultee	Nature of Engagement	Key Responses/Comments
		following EC Commission Notice 2021/C 437/01 guidance document 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'
		Crossing of watercourses, including the Ralappane Stream, should have regard to the requirements of Inland Fisheries Ireland and flood risk management principles. In addition, care should be given to protect riparian vegetation
		'Soil and stone' generated from the proposal should be disposed of authorised places of disposal. Procedures / protocols should be put in place so as to ensure excavated material is not used to fill wetlands, or other lands of ecological value or semi-natural areas which may support protected species – unless the necessary consents have first been obtained.

9.4.3 Ecological Value

The Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) were adopted as part of this methodology for the purpose of evaluating the importance of ecological features within the survey area. The site evaluation criteria from this assessment methodology are reproduced in Table 9.8 below.

In accordance with NRA guidelines (2001) and CIEEM (2018), impact assessment is only undertaken of Key Ecological Receptors (KERs). These are features within the zone of influence of the proposed scheme that are "*both of sufficient value to be material in decision making and likely to be affected significantly*". According to the NRA guidelines (NRA, 2009), KERs are of local importance (higher value) or higher as per NRA value criteria. Features of local importance (lower value) are not considered in the guidance to be KERs and are therefore excluded from impact assessment.

Table 9.8: Site Evaluation Criteria (NRA, 2009)

Ecological Value	Description
Internationally Important	'European Site' including Special Area of Conservation (SAC), Special Protection Area (SPA) or Site of Community Importance (SCI)
	Proposed Special Area of Conservation
	Proposed Special Protection Area
	Site that fulfils the criteria for designation as a 'European Site' (see Annex iii of the Habitats Directive, as amended).
	Features essential to maintaining the coherence of the Natura 2000 Network
	Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive
	Resident or regularly occurring populations (assessed to be important at the national level) of the following:

Ecological Value	Description
	– Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive
	Ramsar Sites
	World Heritage Sites
	Biosphere Reserves
	Sites hosting significant species populations under the Bonn Convention
	Sites hosting significant populations under the Berne Convention
	Biogenetic Reserves
	European Diploma Sites
	Salmonid Waters
National Importance	Site designated or proposed as a Natural Heritage Area (NHA)
	Statutory Nature Reserve
	Refuge for Fauna and Flora protected under the Wildlife Acts
	National Park
	Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve, Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park
	Resident or regularly occurring populations (assessed to be important at the national level) of the following: • Species protected under the Wildlife Acts; and/or • Species listed on the relevant Red Data list Site containing 'viable' areas of the habitat types listed in Annex I of the Habitats Directive
County Importance	Area of Special Amenity
	Area subject to a Tree Preservation Order
	Area of High Amenity, or equivalent, designated under the County Development Plan
	Resident or regularly occurring populations (assessed to be important at the County level) of the following: • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; • Species of animal and plants listed in annex II and/or IV of the Habitats Directive • Species protect under the Wildlife Acts; and/or • Species listed on the relevant Red Data list
	Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
	County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared
	Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of

Ecological Value	Description
	naturalness, or populations of species that are uncommon within the county.
	Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (Higher Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
	Resident or regularly occurring populations (assessed to be important at the Local level) of the following: ● Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; ● Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ● Species protected under the Wildlife Acts; and/or ● Species listed on the relevant Red Data list.
	Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
	Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
	Sites or features containing non-native species that are of some importance in maintaining habitat links.

9.4.4 Limitations of this EIAR

No significant limitations were experienced when carrying out site surveys for the proposed development. No constraints were experienced during the habitat mapping and site investigations, however; it should be noted that ecological habitats can change over time and season. This includes temporal changes in flora and fauna assemblages, and these changes can be augmented or induced by alterations of land use within any given site. While it is considered that this report can only provide a snapshot of the ecological activities at the time the surveys were undertaken, further information provided by historic survey reports carried out by DixsonBrosnan Ltd and Irish Whale and Dolphin Group (IWDG) have helped to provide further detail over a longer period of time across multiple seasons.

9.5 Receiving Environment

The development is located in County Kerry, on the West Coast of Ireland, adjacent to the Shannon Estuary, west of Tarbert.

The substations associated with the proposed development will be located adjacent to the proposed power plant facility, adjacent to the Shannon Estuary, approximately 4.5 km to the west of Tarbert and approximately 3.5 km to the east of Ballylongford. The proposed development occupies part of the following townlands: Ralappane, Kilcolgan Lower, Kilcolgan Upper, Carhoonakineely, Carhoonakilla, Cockhill,Carhoona, Coolnanoonagh Farranawana and Kilpaddoge.

At the westerly point of the proposed development, the Lower River Shannon Special Area of Conservation (SAC) is approximately 87m to the north of the substation/cable route. The River

Shannon and River Fergus Estuaries SPA is approximately 87m to the north, Ballylongford Bay Natural Heritage Area is approximately 229m to the west. At the easterly point of the proposed development, where the connection to the existing network is proposed, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are approximately 406m away.

The proposed development substation site is located in agricultural pastural lands which comprise primarily of improved agricultural grassland GA1, dry calcareous and neutral grassland GS1, scrub WS1, hedgerows WL1 and drainage ditches FW4 and FW2 lowland rivers immediately to the southwest and northwest of the proposed EirGrid/ESBN and SLNG substation site.

The underground cable route crosses the Ralappane Stream at two points and the Farranawana Stream at one point. It is only one crossing of the Ralappane stream that forms part of the proposed development, as Kerry County Council are constructing the second crossing of the Ralappane stream and the crossing of the Farranawana stream as part of the L1010 road widening as detailed in Chapter 5 Project Description. Both streams discharge into the Shannon Estuary and are fed by smaller drainage ditches along their course.

The topography of the land along the proposed development cable route is generally undulating and there are multiple occupied properties as well as abandoned dwellings in various states of disrepair, along and adjacent to the L1010 carriageway.

9.5.1 Designated Sites

Designated sites in the vicinity of the proposed development are detailed below.

9.5.1.1 Sites of International Importance

European Sites

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network. The Natura 2000 network comprises sites of high biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SAC) and Special Protection Areas (SPA). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. These are collectively referred to as “European sites”.

European sites identified as present in the study area and potentially within the 500m Zone of Influence of the proposed development, include:

- Lower River Shannon SAC (Site Code: 002165) approximately 86.7m north of the proposed development area at it’s closest point.
- River Shannon and River Fergus Estuaries SPA (Site Code: 004077) approximately 86.7m north of the proposed development area at it’s closest point.

Assessment of the proposed development and other nearby European sites shows that no other European designated sites are considered to be at risk of impact. No other European designated sites are located within the Zone of Influence of the proposed development with the nearest one being approximately 7km southeast of the proposed development with no pathway for impacts identified.

Table 9.9:European Sites – QI's and SCI's

Site Name	Qualifying Interests (SACs) (*Indicates priority habitat)
Lower River Shannon SAC (Site Code: 002165)	[1110] Sandbanks which are slightly covered by sea water all the time
	[1130] Estuaries
	[1140] Mudflats and sandflats not covered by seawater at low tide
	[1150] Coastal Lagoons
	[1160] Large shallow inlets and bays
	[1170] Reefs
	[1220] Perennial vegetation of stony banks
	[1230] Vegetated Sea cliffs of the Atlantic and Baltic coasts
	[1310] Salicornia and other annuals colonising mud and sand
	[1330] Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
	[1410] Mediterranean salt meadows (*Juncetalia maritimi*)
	[3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Bartrachion* vegetation
	[6410] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
	[91E0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
	[1029] Freshwater pearl mussel (*Margaritifera margaritifera*)
	[1095] Sea lamprey (*Petromyzon marinus*)
	[1096] Brook lamprey (*Lampetra planeri*)
	[1099] River lamprey (*Lampetra fluviatilis*)
	[1106] Salmon (*Salmo salar*)
	[1349] Common bottlenose dolphin (*Tursiops truncatus*)
	[1355] Otter (*Lutra lutra*)
River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	[A017] Cormorant (*Phalacrocorax carbo*)
	[A038] Whooper swan (*Cygnus cygnus*)
	[A046] Light-bellied brent goose (*Branta bernicla hrota*)
	[A048] Shelduck (*Tadorna tadorna*)
	[A050] Wigeon (*Anas Penelope*)
	[A052] Teal (*Anas crecca*)
	[A054] Pintail (*Anas acuta*)
	[A056] Shoveler (*Anas acuta*)
	[A062] Scaup (*Aythya marila*)
	[A137] Ringed plover (*Charadrius hiaticula*)
	[A140] Golden plover (*Pluvialis apricaria*)
	[A141] Grey plover (*Pluvialis squatarola*)
	[A142] Lapwing (*Vanellus vanellus*)
	[A143] Knot (Calidris canutus)
	[A149] Dunlin (*Calidris alpina*)

Site Name	Qualifying Interests (SACs) (*Indicates priority habitat)
	[A156] Black-tailed godwit (*Limosa limosa*)
	[A157] Bar-tailed godwit (*Limosa lapponica*)
	[A160] Curlew (*Numenius arquata*)
	[A162] Redshank (*Tringa totanus*)
	[A164] Greenshank (*Tringa nebularia*)
	[A179] Black-headed gull (*Chroicocephalus ridibundus*)
	[A999] Wetland and Waterbirds

RAMSAR

Ramsar sites are wetland sites designated to be of international importance under the Ramsar Convention. The Ramsar Convention is an intergovernmental environmental treaty established in 1971 by UNESCO and that came into force in 1975.

There are no Ramsar sites identified within the Zone of Influence of the proposed development. The closest Ramsar site to the Proposed Development is located approximately 40km to the southwest. No Ramsar sites have been identified with connectivity to the proposed development.

9.5.1.2 Sites of National Importance

Natural Heritage Areas

Natural Heritage Areas (NHA) are the basic wildlife designation in Ireland. These areas are considered nationally important for the habitats present, or which that holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation (source: www.npws.ie).

No sites of national designation occur within or in proximity to the proposed development site. The closest NHA to the proposed development is the Bunnaruddee Bog NHA (001352), located approximately 5.5km to the south of the proposed development.

Proposed Natural Heritage Areas

Proposed NHAs, (pNHAs), are sites which were published on a non-statutory basis in 1995 (and again in the 2010s) but that have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and,
- A recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

Four pNHAs were identified outside of the proposed development boundaries, but with connectivity to the proposed development: Ballylongford Bay, Tarbert Bay, Scattery Island, and Poulnasherry Bay. These sites are all coincident with one or more European designated sites as outlined below in Table 9.10.

Table 9.10: Proposed National Heritage Areas

Proposed Natural Heritage Area Name (Site Code)	Distance from Proposed Development	Corresponding European Sites	Key Features
Ballylongford Bay (Site Code: 001332)	0.22km West (Within the 500m ZoI)	Lower River Shannon SAC (Site Code: 002165) River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	Site synopsis (NPWS 1995) notes that the scientific interest of the area lies in the large concentrations of waterfowl that feed on the mudflats there. The site synopsis also notes that the Ballylongford Bay NHA makes up a valuable part of the SPA associated with the Shannon Estuary and "*cannot be considered out of context of the whole Shannon Estuary*".
Tarbert Bay (Site Code: 001386)	0.61km East (approximately 0.11km east beyond the ZoI)	Lower River Shannon SAC (Site Code: 002165) River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	The site synopsis notes that the pNHA is a "sandy intertidal bay fringed by saline vegetation, which is best developed at Tarbert Village. Some deciduous woodland is included in the site and this comes down to the estuary edge in places." The synopsis also notes that the site is of importance for wintering waterfowl and forms part of the large Shannon-Fergus Estuarine complex.
Scattery Island (Site Code: 001911)	5.5km to the northwest	Lower River Shannon SAC (Site Code: 002165) River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	The site synopsis (NPWS 1995) notes a variety of habitat types associated with the pNHA including sea cliffs, tidal lagoon, and saltmarsh. In addition, 41 bird species were recorded within the pNHA.

Proposed Natural Heritage Area Name (Site Code)	Distance from Proposed Development	Corresponding European Sites	Key Features
Poulnasherry Bay (000065)	9km to the northwest	Lower River Shannon SAC (Site Code: 002165) River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	Site synopsis NPWS (1995) notes that "This site is primarily of ornithological importance but is also a good example of an estuarine habitat. " And "Poulnasherry Bay is an important ornithological site, forming part of the Shannon and Fergus estuarine complex."

As outlined in Table 9.10, the pNHA identified with connectivity to the proposed development are included within European sites. As such, the potential for effects to these specific pNHAs are considered further under the relevant European designation at the impact stage.

9.5.1.3 Other Nature Conservation Sites

No Nature Reserves, Wildlife Sanctuaries, or Biosphere Reserves occur within the proposed development boundary, or with connectivity to the proposed development.

9.5.2 Desktop Results for Rare and Protected Species

The proposed development area is located within the 10km grid square R04 from the Irish grid co-ordinate mapping system. Information from the National Biodiversity Data Centre downloaded from Biodiversity Maps on 23/04/2024.

9.5.2.1 Birds

National Biodiversity Data Centre Records

Scientific conservation interests (SCIs) for the nearby European Sites are outlined above in Section 9.5.1.1. As described above, a Screening Statement for AA and NIS has been prepared for the proposed development considering potential effect on SCIs of nearby European sites where they may occur in proximity to the proposed development.

Annex I of the Birds Directive lists species which are:

- In danger of extinction;
- Vulnerable to change in their habitat;
- Considered rare due to small population sizes or a restricted local distribution; and,
- Require attention due to the nature of their habitat.

The National Biodiversity Data Centre (NBDC) contains records of bird species recorded in the 10km grid squares within which the proposed development is located (R04). Records of Annex I listed species are provided below in Table 9.11.

Table 9.11: Protected Bird Species Records from NBDC

Species Name	Reason for Protection/Inclusion of the Species (EC 2020)	BOCCI Status
Bar-tailed godwit (*Limosa lapponica*)	The species is vulnerable due its concentration at a few suitable coastal wetlands outside the breeding season.	Amber
Common kingfisher (*Alcedo atthis*)	Its range has expanded this century, but populations have recently fallen in several countries.	Amber
Common tern (*Sterna hirundo*)	The major threat for the species is deterioration of habitat.	Amber
Corn crake (*Crex crex*)	Habitat loss and high mortality caused by the intensification and mechanization of hay and silage making.	Red
Dunlin (Calidris alpina)	. The main threats to this species are habitat loss and modification primarily through drainage, overgrazing or inappropriate developments and increased human activity	Amber
Great Northern diver (*Gavia immer*)	The main threat to the species is water pollution, mainly from oil, which means declining food stocks and deterioration of habitat.	Amber
Hen harrier (*Circus cyaneus*)	The widespread loss of breeding habitats and the occurrence of localized persecution and destruction of nests.	Amber
Little egret (Egretta garzetta)	The loss and deterioration of habitats due to drainage and to agricultural and development projects are the major threats that the species is now facing.	Amber
Mediterranean gull (*Larus melanocephalus*)	Loss of habitat, disturbance and tourism development on coastal areas are the major threats for the species. In winter and during migration, Mediterranean Gulls are threatened by illegal hunting, oil pollution and changes in fishing practices.	Amber
Merlin (Falco columbarius)	The main threats to this species are loss of habitats, contamination of birds with organochlorines from agriculture, human disturbance and nest-robbing by falconers.	Amber
Peregrine falcon (*Falco peregrinus*)	The widespread post-1960 decline in Peregrine numbers were caused by food-chain contamination with persistent toxic chemical residues, mainly of agricultural organochlorines insecticides. The restrictions and later bans on the majority of persistent organochlorines over most of Europe were followed by the general recovery in Peregrine numbers. Today, some nests are robbed by egg-collectors and to supply a clandestine trade for falconry.	Green
Ruff (Philomachus pugnax)	The main threats for the species are the loss of habitat due to changes in agricultural and livestock practices and shooting.	Amber

Species Name	Reason for Protection/Inclusion of the Species (EC 2020)	BOCCI Status
Sandwich tern (Sterna sandvicensis)	EU numbers and trends are generally increasing. Main threats include the loss and deterioration of habitat, disturbance, predation by foxes at breeding sites and fluctuation in fish stocks.	Amber

Historic Estuarine Bird Surveys

Estuarine bird surveys (winter and summer) were carried out by DixsonBrosnan in 2018 to 2023. The surveys focussed on the shoreline to the north of the proposed development and identified foraging areas to the south of this. Vantage point B was the closest to the proposed development and was located approximately 400m to the west of the proposed development, while point C, E and F were all located along the shoreline to the north of the proposed development.

Figure 9.1: Vantage Point Locations and Subsites for Winter Bird Counts

Source: DixsonBrosnan (2021) STEP Estuarine Bird Report

The surveys recorded highest numbers of birds in estuary areas to the west of the proposed development. The vantage points in proximity to the proposed development (Point B, Bay, Point C, Point E and Point F) recorded ten SCI species in 2018-2020 (Table 9.9) and nine SCI species in 2021-2023 (Table 9.10), in low numbers. The survey report notes that the shoreline adjacent to the proposed development lacks significant intertidal habitats, with some limited foraging habitat for wading birds along the stony shoreline. Far more significant intertidal habitat is located to the west of the proposed development (at Point A and Point D) which is reflected in the survey results. Of note, however, is that low numbers (max 10) of Curlew and snipe (max 8) were recorded foraging in wet grassland habitats adjacent to Ralappane point. This area of wet grassland intersects with the proposed development boundary.

A summary of peak counts at the vantage points relevant to the proposed development are summarised below in Table 9.12 and Table 9.13.

Table 9.12: Peak Counts of SCI Species (Low and High Tide Counts) Recorded 2018-2020

Peak Count					**Figure of National Significance (Lewis *et al.*2019)**	**SCI Species of the River Shannon and Fergus Estuaries SPA**
Species	Point B	Point C	Point E	Point F		
Black guillemot (*Cepphus grille*)	1	1	1	0	Not available	No
Black headed gull	64	300	45	193	Not available	Yes
Common guillemot (*Uria aalge*)	1	1	0	0	Not available	No
Common gull (*Larus canus*)	14	7	0	2	Not available	No
Cormorant	3	4	0	0	110	Yes
Curlew	10	2	0	0	350	Yes
Dunlin	0	0	0	0	460	Yes
Golden plover	0	0	0	0	920	Yes
Great black backed gull (*Larus marinus*)	3	4	0	1	Not available	No
Great crested grebe (*Podiceps cristatus*)	2	1	0	0	30	No
Great northern diver (*Gavia immer*)	3	2	0	0	20	No
Greenshank	1	1	0	1	20	Yes
Grey heron (*Ardea cinerea*)	2	0	0	1	25	No
Grey plover	0	0	0	0	30	Yes
Herring gull (*Larus argentatus*)	9	0	1	0	Not available	No
Lapwing	0	0	0	0	850	Yes
Lesser black backed gull (*Larus fuscus*)	1	0	1	7	Not available	No
Light-bellied Brent geese	0	0	0	0	Not available	Yes
Little egret (*Egretta garzetta*)	1	0	1	2	20	No
Mallard (Anas platyrhynchos)	2	2	8	0	280	No
Moorhen	0	0	0	2	Not available	No
Mute swan	0	0	0	0	90	no

Peak Count					**Figure of National Significance (Lewis *et al.*2019)**	**SCI Species of the River Shannon and Fergus Estuaries SPA**
Oystercatcher (Haematopus ostralegus)	9	9	12	15	610	No
Razorbill (*Alca torda*)	0	1	0	0	Not available	No
Red-throated diver (*Gavia stellata*)	2	2	0	1	20	No
Redshank	1	1	0	0	Not available	Yes
Ringed plover	1	0	0	0	120	Yes
Sandwich tern (Sterna sandvicensis)	0	0	0	0	Not available	No
Shag (Gulosus aristotelis)	0	0	0	0	Not available	No
Shelduck	0	0	2	0	100	Yes
Snipe (Gallinago gallinago)	8	0	8	0	Not available	No
Teal	2	0	0	70	360	Yes
Turnstone (Arenaria interpres)	23	7	12	0	95	No
Water rail (Rallus aquaticus)	0	0	0	0	Not available	no
Whimbrel (Numenius phaeopus)	0	1	80	1	Not available	Yes
Wigeon	10	12	4	0	560	Yes

Table 9.13: Peak Numbers of Wildfowl, Gulls and Raptors Recorded May 2021 to August 2023

Peak Count					**Figure of National Significance (Lewis *et al.*2019)**	**SCI Species of the River Shannon and Fergus Estuaries SPA**
Species	Point B	Point C	Point E	Point F		
Black guillemot (*Cepphus grille*)	0	5	0	0	Not available	No
Black headed gull	65	300	85	193	Not available	Yes
Chough (Pyrrhocorax pyrrhocorax)	0	0	0	0	Not available	No

Peak Count					Figure of National Significance (Lewis *et al.*2019)	SCI Species of the River Shannon and Fergus Estuaries SPA
Common guillemot (*Uria aalge*)	1	1	0	0	Not available	No
Common gull (*Larus canus*)	5	2	15	0	Not available	No
Cormorant	12	10	3	3	110	Yes
Curlew	6	10	40	6	350	Yes
Dunlin	0	0	0	0	460	Yes
Gannet	0	0	0	0	Not available	No
Great black backed gull (*Larus marinus*)	2	1	0	2	Not available	No
Great crested grebe (*Podiceps cristatus*)	0	0	3	0	30	No
Great northern diver (*Gavia immer*)	3	1	2	2	20	No
Greenshank	0	0	0	1	20	Yes
Grey heron (*Ardea cinerea*)	2	1	1	1	25	No
Grey plover	0	1	0	0	30	Yes
Herring gull (*Larus argentatus*)	15	12	10	5	Not available	No
Lapwing	0	4	0	0	850	Yes
Lesser black backed gull (*Larus fuscus*)	2	2	4	4	Not available	No
Light-bellied Brent geese	40	1	0	0	Not available	Yes
Little egret (*Egretta garzetta*)	3	0	0	0	20	No
Mallard (Anas platyrhynchos)	2	0	8	12	280	No
Moorhen	0	0	0	2	Not available	No
Mute swan	0	2	0	0	90	no
Oystercatcher (Haematopus ostralegus)	10	9	0	15	610	No
Razorbill (*Alca torda*)	0	0	0	0	Not available	No
Red breasted merganser	0	0	1	0	Not available	No

Peak Count					Figure of National Significance (Lewis *et al.*2019)	SCI Species of the River Shannon and Fergus Estuaries SPA
Red-throated diver (*Gavia stellata*)	0	1	0	1	20	No
Redshank	1	0	1	1	Not available	Yes
Ringed plover	4	0	1	2	120	Yes
Sandwich tern (Sterna sandvicensis)	0	4	0	0	Not available	No
Shag (Gulosus aristotelis)	0	1	0	0	Not available	No
Shelduck	2	9	3	0	100	Yes
Snipe (Gallinago gallinago)	0	0	8	0	Not available	No
Tufted duck	0	0	14	13	270	No
Teal	0	0	0	70	360	Yes
Turnstone (Arenaria interpres)	2	1	12	0	95	No
Whimbrel (Numenius phaeopus)	0	1	80	0	Not available	Yes
White tailed sea eagle	1	0	0	0	Not available	No
Wigeon	7	10	4	0	560	Yes

The full report is provided in Appendix 9.5.

Historic Breeding Bird Survey

As outlined previously DixonBrosnan carried out breeding bird surveys in the area during the 2023 breeding bird season. The full report is provided in Appendix 9.5.

Transect T1 intersects with the western end of the proposed development. Transects T2 and T3 run in close proximity to the boundary at this location. A summary of results pertaining to these transects are presented below.

Transect 1

- Breeding barn owl confirmed approximately 178m west of proposed development boundary
- Skylark and chiffchaff showing breeding signs
- Overflying/foraging swallows
- Singing willow warbler

Transect 2

- Records of skylark, linnet, willow warbler, starling and meadow pipit

Transect 3

- Records of skylark and snipe

It is noted from the STEP Power Plant EIAR that four juvenile White-Tailed Sea Eagles (*Haliaeetus albicilla*) have been released in the Tarbert area to date and a further eight birds were released in 2021 (Allan Mee, personal communication). White-Tailed Sea Eagle have a foraging range of up to 250km2 (Evans *et al*. 2011). During the February 2023 winter bird surveys, a single bird was observed overflying the estuary from a vantage point at Knockfinglas Point. While the waters of the Shannon Estuary are likely to provide valuable foraging habitat for this species, there is no suitable foraging or breeding habitat for Sea Eagle within the proposed development.

9.5.2.2 Mammals

National Biodiversity Data Centre and NPWS Records

The NBDC compiles records of species across Ireland. Within the database they collect records of protected mammals, both marine and terrestrial.

Records from the NBDC were interrogated for records of protected mammals within 10km grid square the proposed development is located in (R04). The species recorded are presented below in Table 9.14. Marine mammals in Table 9.14 could occur downstream of the proposed development in the waters of the Shannon Estuary.

Table 9.14: Protected Mammal Records from NBDC and NPWS

Species Name	Designated Status	10km Grid Square
Bottlenosed dolphin (*Tursiops truncatus*)	Listed in Annex II and IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Common dolphin (*Delphinus delphis*)	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive Annex IV Protected Species: Wildlife Acts	R04
Common pipistrelle (Pipistrellus pipistrellus)	Listed in Annex IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Common seal (*Phoca vitulina*)	Listed in Annex II and V of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Daubenton's bat (Myotis daubentoniid)	Listed in Annex IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Eurasian badger (*Meles meles*)	Protected under the Wildlife Acts	R04
Eurasian Red squirrel (*Sciurus vulgaris*)	Protected under the Wildlife Acts	R04
European otter (*Lutra lutra*)	Listed in Annex II and IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Grey seal (Halichoerus grypus)	Listed in Annex II and V of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Irish hare (Lepus timidus subsp. hibernicus)	Protected under the Wildlife Acts	R04
Irish Stoat (Mustela erminea subsp.hibernica)	Protected under the Wildlife Acts	R04
Leisler's Bat (Nyctalus Leisleri)	Listed in Annex IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Pipistrelle (Pipistrellus pipistrellus sensu lato)	Listed in Annex IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
Soprano pipistrelle (*Pipistrellus pygmaeus*)	Listed in Annex IV of the EU Habitat's Directive, protected under the Wildlife Acts	R04
West European hedgehog (*Erinaceus europaeus*)	Protected under the Wildlife Acts	R04
Whiskered bat (Myotis mystacinus)	Protected under the Wildlife Acts	R04

Historic Badger Survey

Historic badger surveys had been carried out by DixsonBrosnan as part of the STEP Power Plant development proposal in 2007, 2011, 2019, 2021, 2023 and 2024 which encompassed the proposed GIS sub-station locations for the application to which this report concerns.

These surveys identified three separate badger setts in 2007 with a follow up survey in 2011 observing that these setts had remained in place and untouched with similar activity levels to the 2007 survey results. Details relating to these setts are provided below in Table 9.15.

Table 9.15: Summary of Dixson Brosnan Badger Survey Results

Sett Number	Sett Type	Location Relative to the Proposed Development
1	Active sett in 2007, however, usage very limited in 2019. Considered to be a probable outlier sett.	480m northeast of the proposed development.
2	Active in 2007 and in 2019. Considered to be a smaller subsidiary sett.	Located within the Red Line Boundary
3	A very large main sett with numerous entrance holes.	228m west of the proposed development
4	Considered to be a main sett.	630m east of sett 1 (approximately 1.17km north east of the proposed developments red line boundary (RLB)

The full report is provided in Appendix 9.2.

Historic Otter Surveys

Surveys carried out by DixsonBrosnan (2019-2021) recorded the following evidence of otter activity within and in close proximity to the proposed development:

- An otter sprainting site identified along the tidal section of the Ralappane Stream
- Live otter was recorded foraging along the shoreline near Knockfinglas Point west of the site
- Live otter recorded in a field above the upper shoreline west of the site
- Live otter recorded foraging close to the lagoon west of the proposed development
- Dead female otter was observed within the coastal waters east of the site
- Two otters recorded via trail camera close to the confluence of the stream and the shoreline outside of the proposed development area to the west, indicating potential breeding behaviour. However, despite this no holts were identified or recorded within 150m of the proposed development site.

The full report is provided in Appendix 9.2.

Historic Bat Surveys

Surveys carried out in 2007, 2020/2021, and 2023 identified suitable foraging habitat along the Ralappane Stream, field boundaries (treelines and hedgerows), grassland areas, and shorelines.

No trees which would be considered to potentially support bat roosts were noted in the 2007, 2020/2021 or 2023 site surveys.

No structures were identified within the proposed development RLB . Structures examined during these surveys and survey results are presented below in Table 9.16.

Table 9.16: Summary of Bat Survey Results

Location Name	Years Surveyed	Location Relative to Proposed Development	Results
Location 1 / Location A	2007, 2020/2021, 2023	Approximately 162m from RLB at closest point	2007, 2020/2021, 2023: Small common pipistrelle roost identified 2020: Small common pipistrelle roost confirmed 2023: Small lesser horseshoe bat night roost identified in second building.
Location 2	2007	Approximately 523m from RLB at closest point	Small common pipistrelle roost
Location 3 / Location B	2007, 2020/2021, 2023	Approximately 14m from RLB at closest point	No bats recorded
Location 4 / Location D	2007, 2020/2021	Approximately 408m from RLB at closest point	No suitable roosting features
Location 5 / Location C	2007 / 2020/2021	Approximately 627 from RLB at closest point	No suitable roosting features identified

The full report is provided in Appendix 9.2.

9.5.2.3 Rare and Protected Flora

National Biodiversity Data Centre (NBDC) and NPWS Records

Records from the NBDC were interrogated for records of rare and protected flora species within 10km grid squares the proposed development is located in; R04. The species recorded within the last 50 years are presented below in Table 9.17, along with rare/protected flora records received from NPWS, but excluding extinct, and so-called 'Waiting List' species, species that are found to be warranted for rare/protected status but have yet to be confirmed.

Table 9.17: Protected and Rare Flora Records

Species Name (Common)	Species Name (Scientific)	Protected FPO (2022)
Bog Moss	Sphagnum	No
Cladonia ciliata var. tenuis	Cladonia ciliata var. tenuis	No
Cladonia portentosa	Cladonia portentosa	No
Large white moss	Leucobryum glaucum	No
Pennyroyal	Mentha pulegium	Protected
Shepherd's-needle	Scandix pecten-veneris	No
Smooth Brome	Bromus racemosus	No

9.5.2.4 Fisheries

No NBDC or NPWS records for rare or protected fish species were recorded within R04.

9.5.2.5 Other Species of Note

NBDC records for amphibians, reptiles and invertebrates were interrogated for records of note within 10km grid squares the proposed development is located in; R04**.**

Protected species identified are listed in Table 9.18 below.

Table 9.18: Other Species of Note (NBDC and NPWS Records) in the Vicinity of the Proposed Development

Species Name	Scientific Name	Designation
Common frog	Rana temporaria	Protected under the Wildlife Act
Common lizard	Lacerta vivipara	Protected under the Wildlife Act
Marsh fritillary	Euphydryas aurinia	EU Habitats Directive Annex II and IV
Smooth newt	Lissotron vulgaris	Protected under the Wildlife Act

9.5.2.6 Invasive Species

Records of invasive species listed under the Third Schedule to the Birds and Natural Habitats Regulations were interrogated from the NBDC within the 10km grid squares the proposed development is located in; R04**.** Species recorded are listed in Table 9.19 below.

Table 9.19: Invasive Species Records from NBDC

Species Name	10km Grid Square
American mink (*Mustela vison*)	R04
Brown rat (Rattus norvegicus)	R04
Common cord-grass (*Spartina anglica*)	R04
Giant-rhubarb (Gunnera tinctoria)	R04
Himalayan balsam (Impatiens glandulifera)	R04
Japanese knotweed (*Fallopia japonica*)	R04
Rhododendron (Rhododendron ponticum)	R04
Ruddy Duck (Oxyura jamaicensis)	R04
Spanish Bluebell (Hyacinthoides hispanica)	R04
Three-cornered Garlic (*Allium triquetrum*)	R04

9.5.3 Field Survey Results

The following summarises results from surveys carried out on site for the proposed development. Results are presented in full in the Appendix section, with the corresponding appendix stated for each survey below.

9.5.3.1 Habitat Description

A description of the habitats located within the proposed development site is presented hereunder. Habitats were described in accordance with Fossitt (2000). An assessment of the habitats was undertaken in accordance with the NRA Guidance (2009) and CIEEM Guidelines (2018).

The proposed development site was also searched for evidence of invasive plant species listed in Part 1 of the Third Schedule of S.I No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011. Species protected under Flora (Protection) Order, 2015 (S.I. No. 356 of 2015) were also searched for.

A habitat map of the proposed development and surrounding areas is provided in Appendix 9.1. The ecological value of habitats has been defined using the classification scheme outlined in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat I the surrounding landscape.

- Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance.
- Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance.
- Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value).
- Sites containing small areas of semi-natural habitat, or which maintain connectivity between habitats are considered to be of Local Importance (lower value).

A summary of the habitats encountered within the Proposed Development RLB is presented below in Table 9.20 along with their ecological valuation. Further details relating to each habitat is then discussed below.

Table 9.20: Habitats Recorded Within the Site Boundary

Habitat	Comment	Ecological Value (NRA 2009 Guidelines)
BL3 Buildings and Artificial Surfaces	Scattered habitat type with structures located both outside of and adjacent to the proposed development site boundary with artificial surfaces present within and throughout the proposed development site in the form of current roads and/or access routes	Local Importance (Lower Value)
GA1 Improved Agricultural Grassland	Dominant habitat type throughout the proposed development area and the primary habitat type within the proposed site boundary	Local Importance (Lower Value)
WL2 Treelines	Dominant habitat type throughout the proposed development area and the primary habitat type within the proposed site boundary	Local Importance (Higher Value)
WL1 Hedgerows	Dominant habitat type throughout the proposed development area and the primary habitat type within the proposed site boundary	Local Importance (Higher Value)
WS1 Scrub	Pocketed areas of this habitat type located at both the east and west ends of the proposed development route, primarily located within fields of GA1 habitat types near linear feature field boundaries where succession has begun to occur subject to soil fertility and management practices	Local Importance (Higher Value)
WL2/WS1 Treelines/Scrub	Localised pocket of habitat located at both the east and west ends of the proposed development route bordering the far east boundary of the proposed development's RLB enclosed by GS4, BL3 and WL2 habitat types	Local Importance (Higher Value)
WS1/ED3 Scrub/Recolonising Bare Ground	Localised strip of habitat towards the eastern end of the proposed route along the access road leading north from the L1010 to the Tullahennel Wind Far Substation	Local Importance (Lower Value)
GS1 Dry Calcareous and Neutral Grassland	Pocketed habitat type located at several locations throughout the proposed development restricted to specific fields separated by field boundaries such as treelines and hedgerows	Local Importance (Lower Value)
GM1 Marsh	Pocketed areas of this habitat type located at both the east and west ends of the proposed development route, primarily located within fields of GA1 habitat types near linear feature field boundaries subject to soil moisture level and rainwater retention	Local Importance (Higher Value)
GS4 Wet Grassland	Pocketed areas of this habitat type located at both the east and west ends of the proposed development route, primarily located within fields of GA1 habitat types near linear feature field boundaries subject to soil moisture level and rainwater retention	Local Importance (Higher Value)

Habitat	Comment	Ecological Value (NRA 2009 Guidelines)
WD1 (Mixed) Broadleaved Woodland	Pocketed area of this habitat located towards the far western end of the proposed development site located outside of the proposed development site boundary just north of the L1010 road	Local Importance (Higher Value)
ED2 Spoil and Bare Ground	Pocketed area of habitat located towards the eastern end of the proposed development towards the northern portion of this area near the Tullahennel Wind Far Substation.	Local Importance (Lower Value)
ED3 Recolonising Bare Ground	Pocketed area of habitat located towards the eastern end of the proposed development route bordering the northern side of the L1010 road	Local Importance (Lower Value)
ED5 Refuse and Other Waste	Pocketed area of habitat located towards the eastern end of the proposed development in the northeast corner of this area near the Tullahennel Wind Far Substation.	Local Importance (Lower Value)
FW2 Lowland Depositing Stream	Two watercourses of this habitat type intersect through the proposed development site, the Ralappane and Faranawana Streams. Both start outside of the proposed development site boundary before travelling through the proposed development site flowing towards the Shannon Estuary.	Local Importance (Higher Value)
WN5 Riparian Woodland	Localised habitat area along the banks of the Ralappane Stream	Local Importance (Higher Value)
WN6 Wet willow-alder-ash Woodland	This habitat type is localised towards the far northwestern corner of the proposed development site near the GIS substations and compound area. The proposed development encompasses a small portion of this habitat type within the curtilage of the proposed compound location.	Local Importance (Higher Value)
FW4 Drainage Ditch	Drainage ditches flow along hedgerows at a number of locations within the proposed development site	Local Importance (Higher Value)
GS2 Dry Meadows and Grassy Verge	Highley localised pockets of this habitat type located at the far western end of the proposed development route bordering the Ralappane Stream and also towards the eastern end of the proposed route along the access road leading north from the L1010 to the Tullahennel Wind Far Substation	Local Importance (Lower Value)
WD5 Scattered Trees and Parkland	Small, pocketed area of this habitat located towards the far eastern end of the proposed development site. This habitat is located outside the proposed development site boundary	Local Importance (Higher Value)

Buildings and Artificial Surfaces (BL3)

This habitat was recorded throughout the proposed development site in the form of agricultural and private residence properties along the proposed route. Along with residential, maintenance, service and abandoned structures as well as access roads, lanes and yards. The L-1010 road is also present which the main body of the proposed development travels along before turning north at the western end for the GIS substations and north at the eastern end for the Grid Connection.

Improved Agricultural Grassland within the footprint of the proposed development is assessed as of Local Importance (Lower Value).

Improved Agricultural Grassland (GA1)

This is a dominant habitat type within the proposed development area located at both ends of the proposed development near the substations and grid connection. This habitat type (Photo 9.1) dominates along the proposed route of the development with the fields consisting of this habitat type intersected/separated by treelines/hedgerows (WL2/WL1), public roads such as the L-1010 (BL3) and the Ralappane stream (FW2). This habitat appeared to be highly managed, with variations in moisture levels resulting in 'wetter' areas transitioning into or bordering wet grassland (GS4) or marsh (GM1) within the same field boundaries. The species recorded within improved agricultural grassland included Yorkshire fog (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*), broad leaved dock (*Rumex obtusifolius*), soft rush (*Juncus effusus*), sorrel (*Rumex acetosa*), sharp flowered rush (*Juncus acutiflorus*), white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*), ragwort (*Jacobaea vulgaris*) and common bent (*Agrostis capillaris*).

Improved Agricultural Grassland within the footprint of the proposed development is assessed as of Local Importance (Lower Value).

Photo 9.1: Improved Agricultural Grassland (GA1) Habitat

Treelines (WL2)

The proposed development area and cable route is intersected by treelines (Photo 9.2) acting as field boundaries separating parcels of land within the proposed development area. This habitat type is important for local wildlife providing suitable habitat for potential roosts, nests, foraging and commuting routes throughout the wider area and development site. The species composition of this habitat varied throughout the site. Typical species recorded included willow (*Salix sp.*), hawthorn (*Crataegus monogyna*), elm (*Ulmus procera*), ash (*Fraxinus excelsior*), holly (*Ilex aquifolium*) and sycamore (*Acer pseudoplatanus*).

Treelines within the footprint of the proposed development were assessed as Local Importance (Higher Value). This is due to the provision of local biodiversity, their potential as habitat for nesting birds and roosting bats, and ecological corridors for animals in the locality.

Given their value, and presence within the ZoI of significant effects, treelines are assessed as being a KER**.**

Photo 9.2: Treeline (WL2) Habitat

Hedgerow (WL1)

The proposed development area and cable route is intersected by hedgerows (Photo 9.3) acting as field boundaries separating parcels of land within the proposed development area. Similarly, to treelines (WL2), this habitat type is important for local wildlife providing suitable habitat for potential roosts, nests, foraging and commuting routes throughout the wider area and development site. The species composition of this habitat varies along the proposed route depending on what species had previously been planted for form the hedgerow but primarily species consist of willow (*Salix sp.*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), dog rose (*rosa canina*), bramble (*Rubus fruticosus*), gorse (*Ulex europaeus*), elder (*Sambucus nigra*), ivy (*Helix hedera*), oak sapling (*Quercus robur*), honeysuckle (*Lonicera sp.*) and ash sapling (*Fraxinus excelsior*).

Hedgerows within the footprint of the proposed development were assessed as Local Importance (Higher Value). This is again due to the provision of local biodiversity, their potential as habitat for protected species, and their use as ecological corridors for animals in the locality.

Given their value, and presence within the ZoI of significant effects, hedgerows are assessed as being a KER**.**

Photo 9.3: Hedgerow (WL1) Habitat

Scrub (WS1)

Scrub habitat (Photo 9.4) was recorded throughout the site. Areas of scrub identified were largely associated with treeline/hedgerow habitats along the borders of individual fields. The species composition of this habitat varied throughout the RLB. Typical species recorded within this habitat included willow (*Salix sp.*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), bramble (*Rubus fruticosus*), gorse (*Ulex europaeus*) and hazel (*Corylus avellana*).

Scrub within the footprint of the proposed development was assessed as Local Importance (Higher Value)**.** This is again due to the provision of local biodiversity, and potential as habitat for protected species. As such, scrub is assessed as being a KER.

Photo 9.4: Scrub (WS1) Habitat

Dry Calcareous and Neutral Grassland (GS1)

This habitat type (Photo 9.5) was recorded towards the western end of the proposed route near the GIS substation compound. Species recorded within this habitat included Yorkshire Fog (*Holcus lanatus*), sorrel (*Rumex acetosa*), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum sp.*), knapweed (*Centaurea nigra*), lesser celandine (*Ficaria verna*), white clover (*Trifolium repens*), pignut (*Conopodium majus*) and meadow buttercup (*Ranunculus acris*).

This habitat was relatively species poor and does not correspond to the Annex I type grassland including *Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)*.

Given the low species diversity encountered, dry calcareous and neutral grassland within the footprint of the proposed development is assessed as of Local Importance (Lower Value).

Photo 9.5: Dry Calcareous and Neutral Grassland (GS1) Habitat

Marsh (GM1)

This habitat type (Photo 9.6) was recorded towards the western end of the proposed route near the GIS substation compound. It is present in areas of improved agricultural grassland (GA1) where the ground has been subject to longer periods of water retention/increased moisture levels just north of the Ralappane stream. Species recorded within this habitat type included yellow flag (*Iris pseudacorus*), marsh forget-me-not (*Myosotis scorpioides*), marsh bedstraw (*Galium palustre*), soft rush (*Juncus effusus*), water cress (*Nasturtium officinale*) and marsh pennywort (*Hydrocotyle vulgaris*).

Given the modified nature of the surrounding lands, the marsh habitat encountered was relatively species poor and did not correspond to Annex I habitat including *Hydrophilous tall herb fringe communities of plains and the montane to alpine levels (6430).*

This habitat is assessed as being of Local Importance (Higher Value) given its potential as a supporting habitat for protected species. As such, marsh habitat is assessed as being a KER**.**

Photo 9.6: Marsh (GM1) Habitat

Broadleaved Woodland (WD1)

This habitat (Photo 9.7) was recorded towards the western end of the route just north of the L1010 and west of where the proposed route turns north. Species recorded within this habitat included ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), elm (*Ulmus procera*) and willow (*Salix sp.*). Undergrowth species present consisted of nettle (*Urtica dioica*), broad leaved dock (*Rumex obtusifolius*), ivy (*Helix hedera*), Yorkshire fog (*Holcus lanatus*) and creeping buttercup (*Ranunculus repens*) where the woodland borders improved agricultural grassland habitat.

Broadleaved woodland within the footprint of the proposed development was assessed as being of Local Importance (Higher Value). This is due to the provision of local biodiversity, and potential as supporting habitat for protected species. As such, the broadleaf woodland is assessed as being a KER**.**

Photo 9.7: (Mixed) Broadleaved Woodland (WD1) Habitat

Spoil and Bare Ground (ED2)

This habitat type is predominantly located towards the eastern end of the proposed development near the grid connection where the route ends near the Tullahennel Wind Farm Substation. The habitat in this area consists of hard standing with no notable species observed. Spoil and bare ground habitat within the footprint of the proposed development was assessed as of Local Importance (Low Value).

Recolonising Bare Ground (ED3)

This habitat type is predominantly located towards the eastern end of the proposed development near the grid connection where the route turns north off of the L1010. It appears to be an active storage yard connected to one of the neighbouring properties with access to some of the fields. Species composition of this habitat type consisted of gorse (*Ulex europaeus*), foxglove (*Digitalis purpurea*), Yorkshire fog (*Holcus lanatus*), creeping buttercup (*Ranunculus repens*), marsh ragwort (*Jacobaea aquatica*), marsh thistle (*Cirsium palustre*), bramble (*Rubus fruticosus*) and nettle (*Urtica dioica*).

Recolonising Bare Ground within the footprint of the proposed development is assessed as of Local Importance (Lower Value).

Photo 9.8: Recolonising Bare Ground (ED3) Habitat

Refuse and Other Waste (ED5)

Pocketed area of habitat located towards the eastern end of the proposed development in the northeast corner of this area near the Tullahennel Wind Far Substation. This area consists again of hardstanding used for storage of silage bales. This is assessed as being of Local Importance (Lower Value).

Lowland Depositing Stream (FW2)

There are two streams of this habitat type that intersect through the proposed development site, the Ralappane and Faranawana Streams. The Faranawana stream flows north towards the Shannon Estuary from Woodview Place under the L-1010 and is bordered by a woodland corridor forming a riparian habitat (WN5). The Ralappane stream also flows towards the Shannon Estuary initially west parallel to the L1010 underground before emerging to run along treelines/hedgerows on field boundaries, towards the western end of the proposed route near the GIS substations it again forms a riparian habitat (WN5) as it flows out to the estuary. Species composition of this habitat type consisted of reed (*Phragmites australis*), canary grass (*Phalaris canariensis*), nettle (*Urtica dioica*), purple loosestrife (*Lythrum salicaria*), branched burreed (*Sparganium erectum*), willow (*Salix sp.*), elm (*Ulmus procera*), blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), hemlock water dropwart (*Oenanthe crocata*), yellow flag (*Iris pseudacorus*), wild angelica (*Angelica sylvestris*), herb Robert (*Geranium robertianum*) and broad buckler fern (*Dryopteris dilatata*).

Further details relating to instream aquatic habitat is presented in Section 9.5.3.4.

Photo 9.9: Lowland Depositing Stream (FW2) and Riparian Woodland (WN5) Habitat

Riparian Woodland (WN5)

Riparian woodland (Photo 9.9) was recorded towards the western end of the proposed development route near the proposed GIS substation locations, approximately 60m west of the proposed developments RLB at its closest point. This habitat type was restricted to its location along the Ralappane stream. Species composition of this habitat type consisted of grey willow (*Salix cinerea*), crack willow (*Salix fragilis*) elm (*Ulmus procera*), aspen (*Populus tremula*), blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), harts tongue fern (*Asplenium scolopendrium*), remote sedge (*Carex remota*), hemlock water dropwort (*Oenanthe crocata*), yellow flag (*Iris pseudacorus*), wild angelica (*Angelica sylvestris*), herb Robert (*Geranium robertianum*), broad buckler fern (*Dryopteris dilatata*).

The riparian woodland is assessed as being of Local Importance (Higher Value). As the habitat is located outside of the ZoI, it is not identified as a KER.

Photo 9.10: Riparian Woodland (WN5) Habitat

Wet Willow-Ash-Alder Woodland

This habitat type is localised towards the far northwestern corner of the proposed development site near the GIS substations and compound area. The proposed development encompasses a small portion of this habitat type within the curtilage of the proposed compound location. This habitat is dominated by willow sp. such as Goat Willow (*Salix caprea*) with some older trees present due to extensive periods of water logging of the surrounding wet grassland habitats.

The wet willow-ash-alder woodland is assessed as being of Local Importance (Higher Value) due to the species diversity often associated with this habitat type as well as the suitability of this habitat for other fauna species and biodiversity.

Drainage Ditch (FW4)

Several drainage ditches (Photo 9.11) were identified across the proposed development, these were observed to generally be flowing towards the Shannon Estuary similarly to the lowland depositing river (FW2) habitats. As such the drainage ditches on the western end of the proposed development route ultimately drain into the Ralappane Stream, due to the nature of drainage ditches and inconsistent periods and levels of moisture and water flow the drainage ditches are not considered to be suitable habitat to support aquatic species such as fish and are not suitable to provide significant foraging habitat for otter. The surrounding habitat species consisted of typical riparian, aquatic and field flora species such as soft rush (*Juncus effusus*), willow (*Salix sp.*), nettle (*Urtica dioica*), water crowfoot (*Ranunculus aquatilis*), yellow flag (*Iris pseudacorus*), marsh ragwort (*Jacobaea aquatica*), common bent (*Agrostis capillaris*), marsh foxtail (*Alopecurus geniculatus*), pondweeds such as *potamogeton sp.* and water starwort (*Callitriche stagnalis*).

Given their connectivity to sensitive habitats drainage ditches are assessed as being of Local Importance (Lower Value) and a KER**.**

Photo 9.11: Drainage Ditch (FW4) Habitat

Dry Meadows and Grassy Verges (GS2)

This habitat type (Photo 9.12) has been identified along various points of the proposed development area. Species recorded within the habitat included Yorkshire fog (*Holcus lanatus*), ragwort (*Senecio jacobaea*), spear thistle (*Cirsium vulgare*), false oat grass (*Arrhenatherum elatius*), cleavers (*Galium aparine*), creeping buttercup (*Ranunculus repens*), lesser celandine (*Ficaria verna*), *persicaria sp.* and nettles (*Urtica dioica*).

Dry Meadows and Grassy Verge type habitat within the footprint of the proposed development is assessed as of Local Importance (Lower Value) given the species poor nature of the habitat**.**

Photo 9.12: Dry Meadows and Grassy Verges (GS2) Habitat

Wet Grassland (GS4)

This habitat type (Photo 9.13) is mainly present towards the western end of the proposed route near the GIS substation compound. It is present in areas of improved agricultural grassland where the ground has been subject to longer periods of water retention/increased moisture levels in the vicinity of FW4 and FW2 habitats. Species recorded within this habitat type included soft rush (*Juncus effusus*), great willowherb (*Epilobium hirsutum*), Yorkshire fog (*Holcus lanatus*), meadow buttercup (*Ranunculus acris*), marsh foxtail (*Alopecurus geniculatus*), nettles (*Urtica dioica*), purple moor grass (*Molinia caerulea*), marsh willowherb (*Epilobium palustre*), celery leaved buttercup (*Ranunculus sceleratus*), yellow flag iris (*Iris pseudacorus*) and sharp flowered rush (*Juncus acutiflorus*).

The wet grassland encountered did not correspond to the Annex I habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410)*.

The wet grassland recorded within the RLB is a low diversity example of this habitat type. Given the potential for the habitat to support other species, it is assessed as Local Importance (Higher Value).

Photo 9.13: Wet Grassland (GS4) Habitat

Scattered Trees and Parkland (WD5)

This habitat type (Photo 9.14) was recorded on the far eastern side of the proposed development site. The species present consisted of ash (*Fraxinus excelsior*), sitka spruce (*Picea sitchensis*) and scots pine (*Pinus sylvestris*) with an understory habitat consisting of hawthorn (*Crataegus monogyna*), and rye grass (*Lolium perenne*) with some sparse gorse (*Ulex europaeus*) growth.

Scattered trees and parkland within the footprint of the proposed development was assessed as being of Local Importance (Higher Value) and a KER**.** This is due to the provision of local biodiversity, and potential as supporting habitat for protected species.

Photo 9.14: Scattered Trees and Parkland (WD5) Habitat

A key comment made in a letter provided by the DAU on the 8th of May 2024 requested consideration for protected plant species penny royal (*Mentha pulegium*). Records from the 1890's showed the plant to be present in the Tarbert area. July and August 2023 and March 2024 field surveys did not identify or locate this plant species or suitable pond habitat for it to occur. As such, no further consideration has been given to this plant species.

9.5.3.2 Mammals

Badger

Evidence of badger presence and activity was confirmed throughout the proposed development.

A large sett was recorded/confirmed within the ZoI of the proposed development. This sett consisted of entrances located in three areas as follows:

- Main Sett: Located at ring fort, approximately 55m from the proposed development RLB. The sett showed clear signs of activity (including removed bedding at one entrance), with seven entrances recorded.
- Active Sett: A second active sett also located within the ring fort approximately 71m south of the proposed development RLB. The sett consisted of three entrances with signs of recent badger activity from the presence of cleared ground and fresh spoil. Due to the proximity of this sett to the identified main sett (approximately 18m), these entrances may be connected to the main sett as alternative entrances/exits.
- Disused Sett Entrances: Another two sett entrances were identified on the southern edge of the ring fort approximately 25m from the main sett entrances and approximately 73m south of the proposed development RLB. These entrances did not exhibit any signs of recent use due to the presence of cobwebs and vegetation growth at the entrances. Due to their proximity to the previously mentioned sett entrances, they are also considered likely to be a part of one large sett system associated with the main Sett.

Photos 9.15 and 9.16 show examples of active sett entrances recorded within the ring fort.

Photo 9.15: Main Sett Entrance Within Ring Fort 55m from RLB

Photo 9.16: Main Sett Entrance Within Ring Fort 55m from RLB

Badger breeding or resting sites are protected from wilful disturbance under the Wildlife Acts. The sett recorded is within the ZoI of the proposed development. As such badger are assigned Local Importance (Higher Value) and identified as a KER**.**

Otter

- More recent surveys carried out by Mott MacDonald ecologists in March 2024 confirmed otter activity was still present with a potential otter slide and bed with a mammal trail leading down to the Ralappane Stream via a drainage ditch. Evidence of recent activity was observed as bedding was present along the mammal trails, in the ditch and by the potential bed area, this trail was identified outside of the proposed development site, approximately 72m from the RLB.

While not much evidence of otters or otter activity was identified during the Mott MacDonald surveys, due to the close proximity of the designated SAC. It is considered that the local otters on site are of International Importance as a qualifying interest (QI) of the designated Lower River Shannon SAC.

Photo 9.17: Potential otter bed with bedding

Photo 9.18: Potential otter slide

Bats

Mott MacDonald ecologists also conducted external bat roost assessments within the proposed development site during site surveys in March 2024 following ‘Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th end)’ (Collins, J. (ed.), 2023).

These surveys included the structures previously surveyed by DixsonBrosnan. Details relating to these structures are presented below in Table 9.21 hereunder.

Table 9.21: Field Survey Results from Bat Roost Potential Assessment by Mott MacDonald Ecologists

Structure	Description	Bat Roost Potential	Location Relative to RLB
Structure 1 (Historic bat report survey location 1 outbuilding)	Structure 1 (Photo 9.19) is a derelict single story farmstead structure with old stonework walls and a peaked gabled roof comprised of blue slate tiles with sections of corrugated metal. A large, exposed hole in the roof on the western side of the structure was noted. The external structure walls contained potential roost features due to the stonework with numerous gaps, cracks and crevices noted. No intrusive internal survey was conducted. Therefore, no licence was procured for this survey Throughout the survey, no bats were identified nor was any evidence of bat activity found internally or externally.	Moderate	Approximately 189m west of the proposed development's RLB
Structure 2 (Historic bat survey report Location A, Building 2)	Structure 2 (Photo 9.20) is a derelict single-story structure with pebble dashed walls. The roof was noted as being a gabled structure with corrugated metal and chimney stack structures. The windows of the structure were open and exposed. No intrusive internal survey was conducted. Therefore, no licence was procured for this survey Throughout the survey, no bats were identified nor was any evidence of bat activity found. This structure was identified as the lesser horseshoe bat roost (Location A) in historic bat surveys.	High	Approximately 178m west of the proposed development's RLB
Structure 3	Structure 3 (Photo 9.21) is a derelict single story farmstead structure with pebble dashed rendering.	High	Approximately 161m west of the proposed development's RLB

Structure	Description	Bat Roost Potential	Location Relative to RLB
(Historic bat survey report Location A, Building 1)	The roof is a gabled structure with blue slate tiles and chimney stack structures. The windows and doorways were noted as being open and exposed. Some of the tiles observed on the roof appeared to be broken, missing or raised. There was also a portion of dense vegetative growth from an ash sapling obscuring the northwestern corner of the roof and structure. Evidence of bat presence/activity was identified with droppings noted on a windowsill at one of the opened/exposed windows. This structure has been classified as offering high roosting potential due to the presence of broken, raised or missing tiles in the roof, the presence of droppings on a windowsill and due to this being the structure that was confirmed to exhibit common pipistrelle with eight Common pipistrelles emerging from the structure in 2020.		
Structure 4 (Historic bat survey report Location A, outbuilding)	Structure 4 (Photo 9.22) is a derelict single story farmstead structure with stonework walls with rendering which has come away and exposed the underlying stonework walls. The roof was noted as being a gabled structure with corrugated metal. Numerous potential roosting features were recorded in the form of gaps, cracks and crevices in the exposed stonework. The structure also exhibits some areas of vegetation (ivy) growth which may obscure additional roosting features.	Moderate	Approximately 179m west of the proposed development's RLB

Structure	Description	Bat Roost Potential	Location Relative to RLB
	No intrusive internal survey was conducted. Therefore, no licence was procured for this survey. Throughout the survey, no bats were identified nor was any evidence of bat activity found. Structure 4 has been classified as offering moderate roosting potential.		
Structure 5 (New structure surveyed by Mott MacDonald ecologists not previously assessed under overall STEP Power Plant by DixsonBrosnan due to it's location from STEP Power Plant RLB)	Structure 5 (Photo 9.23) is an abandoned single story residential structure. The structure consisted of red brick walls with a hip roof structure with standard roof slates, and a single chimney with a broken chimney pot. The windows of the structure had been blocked off using concrete bricks. Potential roosting features were noted in the form of some broken or raised tiles and rotted areas of the fascia and soffit. No intrusive internal survey was conducted. Therefore, no licence was procured for this survey Throughout the survey, no bats were identified nor was any evidence of bat activity found. Structure 5 has been classified as offering Moderate roosting potential.	Moderate	Approximately 287.5m east of the proposed development's RLB
Structure 6 (New structure surveyed by Mott MacDonald ecologists not previously assessed under overall STEP Power Plant by DixsonBrosnan due to it's location from STEP Power Plant RLB)	Structure 6 (Photo 9.24) is a low single story farm structure of old stonework construction. The structure was found to offer roosting potential due to the presence of gaps, cracks and crevices present in the stonework. No intrusive internal survey was conducted. Therefore, no licence was procured for this survey	Moderate	Approximately 13.4m east of the proposed development's RLB

Structure	Description	Bat Roost Potential	Location Relative to RLB
	Throughout the survey, no bats were identified nor was any evidence of bat activity found. Structure 6 has been classified as offering Moderate roosting potential.		

Photo 9.19: Bat Roost Structure 1

Photo 9.20: Bat Roost Structure 2

Photo 9.21: Bat Roost Structure 3

Photo 9.22: Bat Roost Structure 4

Photo 9.23: Bat Roost Structure 5

Photo 9.24: Bat Roost Structure 6

The results from the bat roost potential assessment survey carried out in 2024 by Mott MacDonald ecologists did not identify any roosts within the footprint of the proposed development RLB. No roosts will require removal as a result of the proposed development.

Potential bat roost structures with the exception of structure 2 are assessed as being of Local Importance (Higher Value). Structure 2 is assessed as being of County Importance as it is a confirmed roost for lesser horseshoe bat species. The roost features identified are not identified as KERs as they are outside of the ZoI of the proposed development. However, there is potential for roosts to become established in trees within the ZoI for the proposed development in the time between survey and construction. These hypothetical roost features are identified as being KERs.

There is also potential for bats to make use of treelines and hedgerows within the proposed development footprint as foraging or commuting routes. Foraging habitat for bats is identified as being of Local Importance (Higher Level) and a KER.

9.5.3.3 Birds

No specific breeding bird surveys were conducted by Mott MacDonald ecologists. Incidental records were kept during the site walkovers undertaken in 2024. Species recorded included snipe, meadow pipit, hooded crow and wood pigeon.

- Woodland, hedgerow, treeline and scrub habitat recorded within the RLB likely provides suitable nesting habitat for populations of breeding birds locally. These habitats have previously been valued as Local Importance (Higher Value) and are also identified as a KER for breeding birds.

9.5.3.4 Aquatic Ecology Surveys

A summary of the survey results is presented below in Table 9.22. The full survey report relating to these results is provided in Appendix 9.6.

Table 9.22: Aquatic Survey Site Descriptions (Triturus 2023)

Site no.	Watercourse and EPA code	Location (closest to survey point)	Site Description	Ecological Valuation
1	Farranawana Stream 24F33		The Faranawana Stream is a small lowland depositing watercourse (FW1) 1m wide and between 0.05-0.15m deep with moderate flows. The channel had had bank heights of 1.5-2m and had been historically deepened. The stream had a bed of mixed angular boulder, cobble and gravels with moderate siltation pressures (silt plumes underfoot). The stream supported scattered fool's watercress in the margins. The Farranawana Stream had dense bramble (*Rubus fruticosus*) with scattered hogweed (*Heracleum mantegazzanium*), wild angelica (*Angelica sylvestris*), nettle (*Urtica dioica*), hedge bindweed (*Calystegia sepium*) and rank grasses in the riparian areas that graded into mixed broadleaved woodland (WD1) in the valley slopes downstream of the proposed cable crossing. Given the channel was very shallow and small, its value for salmonids was low near the proposed crossing. However, the semi-natural profile of shallow glide and riffle with a stoney bed offered some low value nursery value for brown trout. However, no brown trout (*Salmo trutta*) or Atlantic salmon (*Salmo salar*) were recorded in the eDNA sample collected at the site. The stream was of too high energy for lamprey, and none were recorded from the eDNA sample. The stream had some lower value as an eel nursery given a stoney bed and localised shallow pools and the species was recorded from the eDNA sample. Biological water quality was calculated as Q3-4 (moderate status). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling. This included an absence of crayfish during targeted sweep sampling and hand searching of refugia. No rare or protected macrophytes or aquatic bryophytes were recorded and no examples of Annex I aquatic habitats were present in the survey areas	Local Importance (Higher Value)
2	Ralappane Stream 24R30		The Ralappane Stream at site 2 is a very small lowland depositing watercourse (FW2), 1m wide and between 0.1-0.2m deep with very slow flowing water. The channel had had bank heights of 1-1.5m and had been historically deepened and realigned north along the L1010 local road. The stream was of similar character upstream and downstream of the local road with a slow, shallow glide dominated profile. The bed had gross siltation with silt up to 0.2m deep on the bed with very limited coarse substrata.	Local Importance (Higher Value)

Site no.	Watercourse and EPA code	Location (closest to survey point)	Site Description	Ecological Valuation
			The channel had no macrophytes apart from fool's watercress upstream of the proposed cable crossing. The channel was bordered by an earthen embankment along the roadside with scattered mature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), ivy (*Hedera helix*) and bramble. The Ralappane Stream was bordered by heavily improved pasture (GA1). Given the channel suffered from both heavy siltation and enrichment pressures (based on its physical condition), it was considered a poor salmonid habitat. As the coarse gravels were blocked with silt given historical hydromorphological pressures (i.e., drainage), and from soil erosion, the nursery and spawning value were also poor. Also, the low autumnal flows and its diminutive size would preclude salmonid presence as validated by the eDNA sampling results. While the stream supported some lower quality lamprey ammocoete habitat given widespread depositional areas, the poor flows, small size of the stream and absence of spawning habitat indicated created conditions were unsuitable for the species. The Ralappane Stream was considered a poor-quality eel nursery given the absence of coarse substrata refugia and limited deeper water. The eDNA results supported the absence of eel, lamprey or salmonids. However, eel were recorded downstream at site 3. Biological water quality was calculated as Q3 (poor status) (see Appendix 9.8 for further details). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling. This included an absence of crayfish during targeted sweep sampling and hand searching of refugia. No rare or protected macrophytes or aquatic bryophytes were recorded and no examples of Annex I aquatic habitats were present in the survey areas.	
3			Survey site 3 was situated on the Ralappane Stream was a small lowland depositing watercourse (FW2), 1.5m wide and between 0.1-0.4m deep. The channel had bank heights of 1-1.5m and had been historically deepened. The flow profile comprised of shallow glide with localised riffle and pool. The bed had very heavy siltation and much of the bed was covered with flocculent silt up to 0.3m deep. Patches of cobble and mixed coarse gravel were present in localised riffle areas. The soft sediment dominated bed supported abundant fool’s watercress with locally frequent brooklime (*Vernoica beccabunga*), while hemlock water-dropwort (*Oenanthe aquatica*) was recorded as rare. No submerged macrophytes were present apart from common water-starwort (*Callitriche stagnalis*). The instream cobble supported the moss species *Leptodictyum riparium*, a species that is indicative of enrichment pressures.	Local Importance (Higher Value)

Site no.	Watercourse and EPA code	Location (closest to survey point)	Site Description	Ecological Valuation
			The south bank of the river was open and did not support trees while the north bank supported mature hawthorn (*Crataegus monoygna*), grey willow (*Salix cinerea sp. Oleifolia*), ivy, bramble and gorse (*Ulex europaeus*). The channel was bordered by heavily improved pasture (GA1) with evident cattle poaching pressures on the south bank. Given the channel suffered from both heavy siltation and enrichment pressures it was considered a poor salmonid habitat. As the coarse gravels were blocked with silt given historical hydromorphological pressures (i.e., drainage) and from soil erosion, the nursery and spawning value were poor. The poor stream condition supported the absence of salmonids in the eDNA result. While the stream supported some low-quality lamprey ammocoete habitat, poor flows, small size, and the absence of spawning habitat precluded the presence of the species, as supported by the eDNA results. The Ralappane Stream was, however, a moderate quality eel nursery given the species often buries in silt and under cobbles and gravels. The presence of suitable nursery habitat and good food resources would support eel and a single elver was recorded during Q-sampling. The eDNA results also detected European eel. Biological water quality was calculated as Q3 (poor status) (see Appendix 9.8 for further details). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling. This included an absence of crayfish during targeted sweep sampling and hand searching of refugia. No rare or protected macrophytes or aquatic bryophytes were recorded and no examples of Annex I aquatic habitats were present in the survey areas	

9.5.3.5 Other Terrestrial Mammals

Several mammal trails were identified during the site surveys throughout the proposed development site. Nine other species of terrestrial mammal have been recorded within R04, the grid square within which the proposed development is located, NBDC (Sourced 23/04/2024) and NPWS (Sourced 29/04/2024). Five of these are protected under the Wildlife Act 1976, as amended, primarily red squirrel (*Sciurus vulgaris*), fallow deer (*Dama dama*), Irish hare (*Lepus timidus subsp. hibernicus*), Sika deer (*Cervus nippon*) and hedgehog (*Erinaceus europaeus*).

Red Squirrel

Red squirrel is known to occur in the wider area according to the species records from NBDC. The closest record for Red Squirrel is approximately 1km south-east from the proposed development site in 2017. While red squirrel has been recorded in the wider surrounding area, according to the records, no evidence of red squirrel or red squirrels were identified during the July and August 2023 and March 2024 site surveys within the proposed development area. There are no significant woodland habitat areas which would be considered suitable to sustain red squirrels within the proposed development site.

Red squirrel are assigned as being of Local Importance (Higher Value). As there is no requirement for clearance of woodland habitat suitable for supporting red squirrel, they are not identified as being a KER.

Hedgehog

While there are records for hedgehog from both the NBDC and NPWS no definitive signs of hedgehog or hedgehogs were identified during any of the site surveys undertaken in July and August 2023 and March 2024 for the proposed development. However, there is an abundance of suitable habitat present on site with numerous mammal trails some of which could be due to hedgehog activity.

The breeding and resting sites of hedgehog is protected under the Wildlife Acts. Hedgehogs are presumed to breed and/or hibernate within grassland and scrub/woodland within the ZoI of the proposed development. There may be numerous hedgehog territories within the ZoI of the proposed development site.

Hedgehog are assigned as being of Local Importance (Higher Value) and a KER**.**

Irish Hare

Two Irish hare were observed on site during site surveys undertaken in July and August 2023 and March 2024 located in the south west corner of the proposed site just north of the L-1010 road. There are also eight records of Irish hare from NBDC and NPWS records for the 10km square R04. There is an abundance of suitable habitat for Irish Hare within the proposed development site and as such the site is considered to be suitable for Irish hare.

Irish hare are assigned as being of Local Importance (Higher Value) and a KER.

Fallow Deer

While there are records of fallow deer from the NBDC no signs of evidence of fallow deer or fallow deer were observed within the proposed development area during the site surveys undertaken in July and August 2023 and March 2024. While they are protected under the Wildlife Act 1976, as amended, they are also designated as an invasive species. The site is considered to be of negligible ecological value for fallow deer due to the lack of suitable habitat present on site for this species.

Fallow deer are assigned as being of Local Importance (Higher Value). As there is no requirement for clearance of woodland habitat suitable for supporting fallow deer, they are not identified as being a KER.

Sika Deer

While there are records of sika deer from the NBDC no signs of evidence of sika deer or sika deer were observed within the proposed development area during the site surveys undertaken in July and August 2023 and March 2024. While they are protected under the Wildlife Act 1976, as amended, they are also designated as an invasive species. The site is considered to be of negligible ecological value for sika deer due to the lack of suitable habitat present on site for this species.

Sika deer are assigned as being of Local Importance (Higher Value). As there is no requirement for clearance of woodland habitat suitable for supporting fallow deer, they are not identified as being a KER.

9.5.3.6 Amphibians and Reptiles

Amphibians

The species records show there are records for common frog from both NBDC and NPWS and smooth newt from NBDC within the 10km grid square R04. During the site surveys undertaken in July and August 2023 and March 2024, no signs of amphibians or amphibians were recorded within the proposed development area. Suitable habitat was identified for frog in the form of wet grassland, marsh and drainage ditches. No habitat suitable for newts was recorded.

Due to their protection status, it is considered that the common frog and smooth newt are of Local Importance (Higher Value). Given that suitable habitat was identified for common frog, and they are considered to potentially be within the proposed development site they have been identified as being a KER.

Reptiles

The species records show there are records for common lizard (*Zootoca vivipara*) from both NBDC and NPWS within the 10km grid square R04. During the site surveys, no signs of reptiles were recorded within the proposed development area despite the records for the species in the wider area. Due to their protection status common lizard are assessed as being of Local Importance (Higher Value)**.** The habitat within the proposed development area is not considered to be suitable to support common lizard. As such, they are not brought forward as KER species.

9.5.3.7 Invasive Species

While there are records of invasive plant species such as Japanese knotweed and Himalayan balsam from the NBDC within the 10km grid square R04 no signs of evidence of invasive plant species were observed or identified within the proposed development area during the site surveys undertaken in July and August 2023 and March 2024.

Invasive plant species are not identified as KERs, however, as they can negatively impact ecosystems and native species precautionary mitigation is set out in 9.7.2.

9.5.3.8 Summary Valuation of Key Ecological Receptors

Significant ecological features, also known as key ecological receptors (KERs), are considered to be valued at Local Importance (Higher Value) or higher as per NRA (2009) and CIEEM(2022) definitions. Table 9.23 Summarize all key ecological receptors identified within the ZoI of potentially significant impacts.

Table 9.23: Summary Valuation of Key Ecological Receptors

Feature		Ecological Valuation	At risk of significant effects	Key Ecological Receptor (KER) Status
Designated Sites	Lower River Shannon SAC	International	Yes	Yes
	River Shannon and River Fergus Estuaries SPA	International	Yes	Yes
	Ballylongford Bay pNHA	National	Yes – assessed further under European designation	Yes
	Tarbert Bay pNHA	National	Yes – assessed further under European designation	Yes
	Scattery Island pNHA	National	Yes – assessed further under European designation	Yes
	Poulnasherry Bay pNHA	National	Yes – assessed further under European designation	Yes
Birds	Wintering birds	International	Yes	Yes
	Breeding	Local Importance (Higher Value)	Yes	Yes
Habitats	GA1 Improved agricultural grassland	Local Importance (Lower Value)	Yes	No
	WL2 Treelines	Local Importance (Higher Value)	Yes	Yes
	WL1 Hedgerows	Local Importance (Higher Value)	Yes	Yes
	WS1 Scrub	Local Importance (Higher Value)	Yes	Yes
	WL2/WS1 Treelines/Scrub	Local Importance (Higher Value)	Yes	Yes
	WS1/ED3 Scrub/Recolonising Baare Ground	Local Importance (Lower Value)	Yes	No
	GS1 Dry calcareous and neutral grassland	Local Importance (Lower Value)	Yes	Yes
	GM1 Marsh	Local Importance (Higher Value)	Yes	Yes
	GS4 Wet grassland	Local Importance (Higher Value)	Yes	Yes
	BL3 Buildings and artificial surfaces	Local Importance (Low Value)	Yes	No
	WD1	Local Importance	No - not within the footprint of the	No

Feature		Ecological Valuation	At risk of significant effects	Key Ecological Receptor (KER) Status
	(Mixed) Broadleaved woodland	(Higher Value)	proposed development	
	ED2 Spoil and bare ground	Local Importance (Lower Value)	Yes	No
	ED3 Recolonising bare ground	Local Importance (Lower Value)	Yes	No
	ED5 Refuse and other waste	Local Importance (Lower Value)	Yes	No
	FW2 Lowland depositing stream	Local Importance (Higher Value)	Yes	Yes
	WN5 Riparian woodland	Local Importance (Higher Value)	No – not within the footprint of the proposed development	No
	WN6 Wet willow-alder-ash Woodland	Local Importance (Higher Value)	Yes	Yes
	FW4 Drainage ditch	Local Importance (Higher Value)	Yes	Yes
	GS2 Dry meadows and grassy verge	Local Importance (Higher Value)	Yes	Yes
	WD5 Scattered trees and parkland	Local Importance (Lower Value)	No - not within the footprint of the proposed development	No
Non-Volant Mammals	Badger	Local Importance (Higher Value)	Yes	Yes
	Otter	International Importance	Yes	Yes
Bats	Bat roosts	Local Importance (Higher Value) (common pipistrelle roost) County importance (lesser horseshoe bat roost)	No – no roosts were recorded within the RLB	No
	Bat foraging habitat	Local Importance (Higher Value)	Yes	Yes
Other Terrestrial Mammals	Red squirrel	Local Importance (Higher Value)	No – No suitable habitat within the footprint of the proposed development	No
	Fallow deer	Negligible	No - No suitable habitat within the footprint of the proposed development	No

Feature		Ecological Valuation	At risk of significant effects	Key Ecological Receptor (KER) Status
	Sika deer	Negligible	No - No suitable habitat within the footprint of the proposed development	No
	Hedgehog	Local Importance (Higher Value)	Yes	Yes
	Irish hare	Local Importance (Higher Value)	Yes	Yes
Amphibians	Common frog	Local Importance (Higher Value)	Yes	yes
	Smooth newt	Local Importance (Higher Value)	No - No suitable habitat within the footprint of the proposed development	yes
Reptiles	Common lizard	Local Importance (Higher Value)	No - No suitable habitat within the footprint of the proposed development	No
Aquatic Species	European eel	Local Importance (Higher Value)	Yes	Yes

9.6 Likely Significant Effects

The evaluation and assessment of impacts on Biodiversity within the chapter is carried out as per '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*' (NRA, 2009). The description of effects is as outlined in the draft "*Guidelines on the on the Information to be Contained in Environmental Impact Assessment Reports*" (EPA, 2022).

All elements of the proposed development, (as outlined in the description of the development) during the construction, operational and decommissioning phase have been considered in terms of their potential for likely significant adverse effects on ecological receptors.

The assessment of effects from the proposed development (in the absence of mitigation), is undertaken under the following headings, separately for Construction, Operation and Decommissioning Phases:

- Assessment of effects on European Designated sites (Special Areas of Conservation and Special Protection Areas).
- Assessment of effects on Nationally Designates sites (including Natural Heritage Areas and proposed National Heritage Areas).
- Assessment of effects to other SERs (County and local (higher) importance).

The "Do Nothing" effect is then assessed.

9.6.1 Construction Phase

Construction phase activities, as they relate to potential impacts on biodiversity are discussed below. Regard is had to the potential for direct and indirect damage and disturbance of species, noise related effects, and deterioration of surface water quality. The full description of the development is provided in Chapter 5.

9.6.1.1 Off-road Cable

Off-road sections of cable (approximately 2.5km in length) will require a 30m wide working strip with a 1m wide cable trench.

The construction of the cable route has potential to cause direct impacts to habitats, noise and disturbance effects and surface water run-off.

9.6.1.2 HDD Crossing

A HDD crossing under the Kilpaddoge substation access road is required. The launch and reception pits (approximately 3m x 5m) for the drilling rig requires the temporary installation of a level hardstanding area on a geotextile base.

There is potential for direct impacts to habitats during the installation of the HDD crossing.

9.6.1.3 Construction Compounds

A site construction compound is proposed for the north western end of the proposed development. Three temporary laydown areas are required, one to the south of the main site compound and two in proximity to the LCIM connection point.

There is potential for direct impacts to habitats, along with surface water run-off associated with these compounds and laydown areas.

9.6.1.4 Open Cut Trenching

Open cut trenching methodology is proposed as a crossing option for the Ralappane stream along the access track of the STEP Power Plant. In the absence of mitigation, there is potential to result in degradation to the watercourse, damage to habitats and species therein, and downstream mobilisation of surface water pollutants.

9.6.1.5 Substations

As outlined within the description of the development, two substations will be constructed as part of the proposed development. The proposed 220kV substations are approximately 50m by 18.5m. The proposed layout is shown in Figure 5.2. Access to the site will be via the STEP Power Plant site access road from the junction of the L-1010 to the site, detailed under the STEP Power Plant Planning Application ABP-PA08.319566.

As set out in the drawing number 229100682-MMD-04-XX-DR-E-0100, the key components of the each of the two proposed 220 kV substations and compounds comprise:

- 220kV GIS building
- Lightning Protection Rods;
- Lighting Poles;
- Interface kiosks (1 No.);
- Property Fence/gates;
- Palisade Fence/gates;
- Distribution System Operator (DSO) Compound; and

The EirGrid/ESBN Substation includes external Air Insulated Switchgear (AIS) equipment comprising:

- Cable Sealing End
- Surge Arrestors
- Shunt Reactors

- Current Transformers
- Lightning Masts
- Lighting Poles

The external electrical equipment will not exceed 10m in height with the exception of the lightning protection monopoles which are approximately 18.5m in height.

Details relating to these substations is provided in Chapter 5.

The construction of these substations will result in a permanent loss of habitats within the footprint of the works and has potential to result in surface-water and noise emissions.

9.6.1.6 Air Emissions

The construction of substations and underground cables phase will increase the number of HDV traffic movements to the area. It is expected that construction traffic movement during other construction phases (such as electrical works) would be insignificant. As presented in Chapter 5, works are required during the substation and underground cabling phases. As outlined in Chapter 10 Air Quality, during the 10-week site preparation and civil construction of the substation phase, the average daily flow is predicted to be approximately 16 HDV vehicles. Whereas during the 20-week underground cabling phase, the average daily flow is predicted to be approximately 48 HDV vehicle movements. These phases are not expected to overlap, however if this were to occur, the traffic movements would still be well below the 100 HDV movement threshold for the proposed development. Given the construction traffic generated is well below the EPUK/IAQM criteria, effects of construction traffic emissions on local air quality are considered to be low and not significant. On This basis, no further consideration has been given to the effects of construction road traffic on ambient air quality and ecological receptors.

9.6.1.7 Assessment of Effects on European Designated Sites (Special Areas of Conservation and Special Protection Areas)

The location of the proposed development is such that the footprint of the development does not fall within the boundaries of any European sites. However, a number of watercourses were identified which provide hydrological connectivity to a number of European sites. Further, mobile Qualifying Interests/Special Conservation Interests associated with these and other designated areas were identified as having potential to occur in close proximity to the works, in 'ex-situ' habitats.

A Screening for Appropriate Assessment for the proposed development was carried out to achieve compliance with Article 6(3) of the Habitats Directive. This report considered the potential for significant effect on European sites, caused by the proposed development, in combination with other plans and projects. The report concludes that:

"*Likely Significant Effects on European sites cannot be excluded on the basis of objective evidence, from the project alone, and in combination with other plans or projects*."

Potential project-related impacts likely to negatively affect the site integrity of the following European sites, in the absence of mitigation, were identified in the Natura Impact Statement as follows:

Lower River Shannon SAC:

- Potential for noise disturbance to otter
- Potential for surface water emissions to cause degradation to:
  - Estuaries
  - Reefs

- Potential for surface-water to cause impact to:
  - Sea lamprey
  - River lamprey
  - Salmon
  - Otter

River Shannon and River Fergus Estuaries SPA:

- Potential for noise disturbance to ex situ curlew
- Potential for direct impact to ex situ curlew foraging area
- Potential for degradation to wetland habitat caused by surface water emissions

The predicted impacts on these European Sites are fully described in the NIS which is submitted as part of the planning application. The conclusions of the NIS are:

"*Based on the assessment of the proposed development alone and in combination with other projects and plans, including the implementation of mitigation measures, it can be concluded that no adverse effects on the integrity of any European sites will arise, in view of the site's conservation objectives.* "

9.6.1.8 Assessment of Effects on Nationally Designated Sites

National Heritage Areas (NHAs)

No NHAs were identified within the footprint of the proposed development. No NHAs were identified with potential connectivity to the proposed development. Given the lack of connectivity to any NHAs, there is no potential for impact on same.

Proposed Natural Heritage Areas (pNHAs)

As outlined in section 9.5.1.2, four pNHAs were identified with potential connectivity to the proposed development. The site boundaries for these pNHAs is contiguous with that of the Lower River Shannon SAC and the River Shannon and Fergus Estuaries SPA. These sites are therefore assessed under the relevant European designated site.

9.6.1.9 Potential for Effect to Habitat KERs

The proposed development involves the construction of a cable route, access routes, grid connection and GIS substations all of which will result in direct, both temporary and permanent, effects on the habitats present at those locations.

The impact on habitat KERs is presented below in Table 9.24.

Table 9.24: Impact on Habitats Within the Site Boundary

Habitat Type	Extent of habitat within site boundary (ha)	Total habitat loss (ha)	Permanent habitat loss (ha)	Temporary habitat loss (ha)	Habitat Value	Potential Impacts	Key Ecological Receptor (KER) Status
WL2 Treelines	0.65	0.65	0.04	0.61	Local Importance (Higher Value)	This habitat will experience localised portions of loss both permanent and temporary causing the habitat type to become fragmented and modified as a result of the proposed development. The impacts are considered to be negative, moderate and long term at a local level	Yes
WL1 Hedgerows	0.79	0.79	0.09	0.7	Local Importance (Higher Value)	This habitat will experience localised portions of loss both permanent and temporary causing the habitat type to become fragmented and modified as a result of the proposed development. The impacts are considered to be negative, moderate and long term at a local level	Yes
WS1 Scrub	1.22	1.22	0.03	0.19	Local Importance (Higher Value)	This habitat will experience localised portions of loss both permanent and temporary causing the habitat type to become fragmented and modified as a result of the proposed development. The impacts are considered to be negative, moderate and long term at a local level	Yes
GS1 Dry Calcareous and Neutral Grassland	5.52	5.52	0.73	4.79	Local Importance (Lower Value)	This habitat will experience loss both temporary (in areas of habitat reinstatement) and permanent from the proposed development route/works. The habitat is present throughout the proposed development area within the site boundaries and is considered to be the dominant habitat type. As such the habitat will experience, loss, fragmentation and modification. The impacts are considered to be negative, moderate and long term at a local level	Yes
GM1 Marsh	0.11	0.11	0	0.11	Local Importance (Higher Value)	This habitat will experience localised portions of temporary loss causing the habitat type to become fragmented in the short term and modified as a result of the proposed development. The impacts are considered to be negative, slight and short term at a local level	Yes
GS4 Wet Grassland	1.90	1.90	0	1.90	Local Importance (Higher Value)	This habitat will experience localised portions of loss both permanent and temporary causing the habitat type to become fragmented and modified as a result of the proposed development. The impacts are considered to be negative, moderate and long term at a local level	Yes
FW2 Lowland Depositing Stream	0.03	0.03	0	0.03	Local Importance (Higher Value)	The proposed cable route will cross the Ralappane Stream near the site entrance for the GIS substations just off the L-1010 road. The proposed works may cause temporary impacts such as bank destabilisation or stream bed destabilisation. Indirect impacts on water quality through the generation of excessive silt levels or spillage of cement or hydrocarbons during construction. The impacts are considered to be negative, moderate and temporary at a local level	Yes
FW4 Drainage Ditch	0.01	0.01	0	0.01	Local Importance (Lower Value)	Several drainage ditches are present throughout the proposed development site. This will lead to minor habitat loss due to the necessity for works such as temporary roads to facilitate the proposed development works and work areas. Indirect impacts on water quality through the generation of excessive silt levels or hydrocarbons during construction. The impacts are therefore considered to be negative, moderate and long term at a local level.	Yes

Habitat Type	Extent of habitat within site boundary (ha)	Total habitat loss (ha)	Permanent habitat loss (ha)	Temporary habitat loss (ha)	Habitat Value	Potential Impacts	Key Ecological Receptor (KER) Status
GS2 Dry Meadows and Grassy Verge	0.38	0.38	0	0.38	Local Importance (Higher Value)	This habitat will experience localised portions of temporary loss to facilitate works for the installation of the proposed cable route causing the habitat type to become fragmented and modified as a result of the proposed development. The impacts are considered to be negative, slight and short term at a local level.	Yes
WN6 Wet Willow-Ash-Alder Woodland	0.02	0.02	0	0.02	Local Importance (Higher Value)	This habitat will experience a localised portion of temporary habitat loss to facilitate temporary works compound area in the northwest portion of the proposed development near the GIS substation location. While the amount of this habitat to be lost if small, due to the reliance on wet conditions for this habitat, the works may cause a slight extension of impacts beyond the initial RLB as ground conditions change and dry in response to the proposed works, causing a slight degradation of the habitat type. The impacts are considered to be negative, slight and short term at a local level.	Yes
WL2/WS1 Treeline/Scrub	0.01	0.01	0	0.01	Local Importance (Higher Value)	This habitat will experience localised temporary loss to facilitate work activities/movements for permanent wayleave works in the far eastern portion of the proposed development site near the grid connection and Tullahennel Wind Far Substation.	Yes

Due to the nature of the proposed development and the need for a flexible approach to works, all habitats located within the RLB are considered to experience some temporary loss during the construction phase within the RLB. The total area of KER habitats identified within the RLB equals 10.64ha, of this it is expected that due to the nature of the proposed development and need for works along both sides of the proposed cable route all 10.64ha will experience a loss. Of this loss, however, only 0.89ha (8.37%) will be a permanent loss while 9.75ha (91.64%) of the total habitat area will be only temporarily lost during the construction phase.

9.6.1.10 Potential for Effect to Species KERs

The potential for effects on all other KERs is discussed hereunder in Table 9.25.

Table 9.25: Potential for Effect to Key Receptors

Feature		Importance	Potential for Effect in the Absence of Mitigation	Effect Magnitude in the Absence of Mitigation
Birds	Wintering birds	International	Vegetation clearance has the potential to result in a loss of foraging and roosting habitat for wintering bird species in the local area. In addition, the disturbance of these species during the construction phase has potential to result in temporary movement out of the ZoI and is assessed to be a temporary moderate negative effect at an international scale as the wintering bird species of concern are SCI's of the nearby River Shannon and Fergus Estuaries SPA. The loss of potential foraging habitat has potential to result in a permanent slight negative effect on local bird populations.	Permanent slight negative effect at a local scale.
	Breeding	Local Importance (Higher Value)	Vegetation clearance has potential to result in a loss of nesting habitat for breeding bird species in the local area. In addition, should clearance be carried out during the nesting season (1st March-31st August) there is potential for direct impact to nesting birds within scrub, treeline, and hedgerow habitats within the study area. The disturbance of these species during the construction phase has potential to result in temporary movement out of the ZoI and is assessed to be a temporary moderate negative effect at local scale. The loss of potential nesting habitat has potential to result in a permanent slight negative effect on local bird populations.	Permanent slight negative effect at a local scale.
Non-Volant Mammals	Badger	Local Importance (Higher Value)	Badger have been historically recorded on site particularly towards the western end of the proposed development route as well as more recent badger evidence identified towards the eastern end of the route in 2024. While most of the badger activity has been observed both within and outside of the proposed development area and RLB it has been determined that only one badger sett is at immediate risk of impact from the proposed development. In addition, there is potential for additional direct impacts and disturbance effects should additional badger setts become established within the ZoI in the time period following the survey and prior to construction. In the absence of mitigation, these impacts are assessed as permanent significant negative effect at a local scale, in the absence of mitigation.	Permanent significant negative effect at a local scale.
	Otter	International Importance	No otter holts or couches were recorded within the ZoI during the field surveys. There is potential, however, for otter holts and couches to become established prior to the commencement of construction. There is also potential for degradation of water quality to cause a reduction in prey species for otter. Potential for impact to aquatic species is discussed in the context of aquatic habitats and below in the context of aquatic species. Loss of holts, and associated injuries to otter therein would result in a permanent significant negative effect on otter populations at a local scale, in the absence of mitigation.	Short-term moderate negative effect at a local geographic scale
Bats	Foraging habitat	Local Importance (Higher Value)	There is potential for a loss of 2.67ha of foraging habitat associated with the proposed development. Loss of treeline, hedgerow, and scrub habitat has the potential to result in loss and/or degradation of foraging habitat for bat species in the wider landscape. The loss of foraging habitat, has the potential to result in a permanent slight negative effect at a local scale due to the potential loss of linear woodland type forage habitat.	Permanent slight negative effect at a local scale
	Roosts	Local Importance (Higher Value)	No roosts were identified within the ZoI of the proposed development. There is potential, however, for potential roost features to become established in trees within the ZoI in the time between survey and construction. The loss of trees with potential roost features therein has the potential to result in a permanent slight negative effect at a local scale due to the potential loss of linear woodland type forage habitat.	Permanent slight negative effect at a local scale
Other Terrestrial Mammals	Hedgehog	Local Importance	Hedgehog are presumed to be present within the ZoI of the proposed development. There is, therefore, the potential for hedgehog territories to be present within the proposed development site. There is potential for direct habitat loss impacts on hedgehog. This is assessed as a temporary slight negative effect on hedgehog populations at a local scale.	Temporary slight negative effect at a local scale
	Irish hare forms	Local Importance (Higher Value)	There is potential for hares to make forms within ZoI of the proposed development. Irish Hare which are impacted will readily move to another location during construction. There is therefore potential for a short-term slight effects at a local scale.	Short-term slight effects at a local scale
Amphibians	Common frog	Local Importance (Higher Value)	There is potential for a permanent loss of habitat for amphibians in the footprint of the works. The habitat available within the site is generally ephemeral and not significant long-term habitat for frogs. As such, there is potential for a permanent slight negative effect on local population of amphibians, in the absence of mitigation.	Permanent slight negative effect on local scale
Aquatic Species	European eel	Local Importance (Higher Value)	There is potential for direct impact to European eels within the footprint of the watercourse crossing. There is potential, therefore for a short-term moderate negative effect on eel populations at a local scale.	Short-term moderate effects at a local scale

9.6.2 Operational and Maintenance Phase

The proposed development will be operational 24 hours a day, seven days a week. In the absence of mitigation measures, significant operation phase impacts likely to occur include light spill onto retained vegetation outside the Site boundary (it is assumed that all habitats within the site would be removed) used for feeding or breeding by protected species. Disturbance to protected species could occur from noise associated with human use of the operational site.

Section 10.5.2 of Chapter 10 Air Quality presents the frequency of maintenance with regards to road traffic and air emissions. It is considered that given the frequency of maintenance, the effects of operation road traffic contributions from the proposed development are considered to be low and as such are not considered to be contributary to impacts when associated with the operational phase of the proposed development. As such operational phase traffic impacts are no longer considered.

A new storm water drainage is required to collect and manage runoff from hardstanding areas, building roofs, internal access roads and landscaped surfaces within the substation compounds. This will then be connected to the STEP Power Plant drainage system and discharged to the Shannon Estuary via an outfall pipe (constructed as part of the STEP Power Plant project) located 5m beyond the low water mark. Potential impacts from this storm water discharge has been mitigated through the proposals design as all storm water will be collected via a catch basin in the northeastern corner of the compound and will be conveyed to the fire water retention tank. All storm water will pass through an attenuation system including a silt trap and Class 1 hydrocarbon interceptors prior to discharge.

Lighting will be necessary at the GIS Substations with regards to nighttime operations and health and safety for any on site staff. Modelling of light spillage from the power plant shows that light spillage onto the estuary during operation will be negligible i.e. largely 0.0lux to 0.6lux. It is noted that artificial light may have a positive impact on waterbirds in intertidal habitats by enhancing the efficiency of nocturnal foraging (Dwyer et al. 2013) and may also reduce predation risk to roosting birds (cf. Gorenzel and Salmon, 1995). Night-time photomontages show that the light levels from the proposed development will be low. While there may be short term impacts from operational lighting, despite the additional lighting it is considered that foraging rates will return to pre-construction levels for bird species.

Potential impacts from lighting on nearby habitats and protected/priority species such as bats has also been mitigated through the proposals design by the use of directional light fittings to minimise light pollution in the surrounding area.

The cable route will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement or repairs if a failure occurs.

Given the proposal’s design has taken certain impacts such as the storm water discharge and lighting into consideration and incorporated mitigation as part of the design; the only potential impact is in relation to repairs to the cable, should they be required. As such given the infrequent nature of this requirement, mainly restricted to if a failure occurs, the impacts are considered to be temporary slight effects at a local scale but will persist throughout the lifetime of the proposed development.

9.6.3 Decommissioning Phase

Subject to the granting of statutory approval, the substations and grid connections will form part of the national electrical grid infrastructure. The design life of the SLNG substation is approximately 25 years and will be decommissioned as part of the overall STEP development. With regards to the Eirgrid substation it is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

It is not intended to decommission the proposed electricity cabling. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

The impacts are therefore considered to be neutral.

9.6.4 "Do Nothing"

As outlined in the EIAR Guidelines, 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'.

Where no development is planned it is expected that the lands within the proposed development site would largely remain under the same management regimes they are currently subjected to. Pockets of semi-natural habitats within the proposed site boundary are likely to continue to experience the general pattern of succession from grassland to scrub to woodland.

9.6.5 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 EIAR Guidelines, 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. In the case of the proposed development, there is potential for intra-project effects with the main STEP project and there are also 'other developments' which may act cumulatively. Both intra-project and 'other developments' are considered in each technical assessment.

9.6.5.1 Overall STEP Facility

The proposed development will form a part of the larger STEP Facility development. This wider development includes additional projects for the facility as outlined below:

- Strategic Gas Reserve Facility – this is the subject of a SID pre-application (ABP-319245-24) comprising of a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works.
- STEP Power Plant Development: Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works - a planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566).
- Shannon Gas Pipeline - planning permission exists for the development of a 26km natural gas pipeline which will facilitate connection from the STEP facility to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.
- Data Centre Campus as part of the Masterplan, a data centre campus is proposed to the west of the STEP Power Plant site.

In the case of the Strategic Gas Reserve Facility, and the Data Centre Campus, these projects have not been submitted for planning at the time of writing. These projects will be subject to the provisions of Article 6(3), i.e., requiring screening for Appropriate Assessment as a minimum, and having their own impact assessment carried out. These projects will be assessed for the potential for cumulative effects in their own rights as part of this process. Currently, however, it is considered that following the implementation of the proposed mitigation within Section 9.7 of this report and the development design, that there will not be significant cumulative impacts.

The gas pipeline referenced above was subject to environmental assessment in 2008 but it has yet to be constructed. A NIS was produced in support of the application for the Combined Cycle Gas Turbine Power Plant application. This report identified the potential for effects on the Lower River Shannon SAC and the River Shannon and Fergus Estuaries SPA through noise effects and surface water degradation associated with the development. Mitigation measures were prescribed to ameliorate these effects. A biodiversity chapter was also produced in support of this application and identified potential impacts to the site's biodiversity including badgers, bats, birds, otters and aquatic species/watercourses. There was an added impact identified as a small area of terrestrial elements overlap with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA which would generate more significant direct impacts upon these designated sites. Mitigation measures were prescribed to ameliorate these effects. However, given the location of these projects and the nature of potential impacts from same, there is potential for cumulative effects should the construction phase of the projects run concurrently to that of the proposed development.

There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.

9.6.5.2 Planned and Permitted Development

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. A planning search for applications was conducted in July 2024 (including An Bord Pleanála, Kerry County Council websites). Projects which initially were identified that may have the potential for effects are detailed in Table 9.26. The full list of projects considered is available in Chapter 4, only those that are relevant to biodiversity were brought forward for assessment – as detailed in Table 9.26.

Table 9.26: Plans, projects and proposals that might act in-combination with the proposed development

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
Project	18878	Kilpaddoge, Tarbert, Co. Kerry	23.09.2019	This project comprises a 10-year permission for a proposal that would entail the construction of a 30 MW Battery Energy Storage System (BESS) Facility to provide grid balancing services to the Irish Electrical Grid. The BESS would include the following elements: • Up to 26 self-contained battery container units with associated Heating • Ventilation and Air Conditioning (HVAC) Systems, • Power Conversion Systems (PCS), • Step-up transformers, • Control systems and ancillary electrical components, • A single storey electricity control building (104.8 sqm), • A 110kV ESB sub-station, • A single storey sub-station control building (178.3 sqm) and associated electrical infrastructure, • A 110kV Generator Transformer, • All necessary ground and foundation works, • Associated compound cabling and ducting, • Palisade security fencing and lighting, • CCTV cameras, • New site access from existing private road, • Temporary construction compound, and • All associated ancillary infrastructure and site development works The proposal would also entail earthworks to the site, whereby it would be dug-out to provide a lower and a higher level. The former level would be over the northern and central portions of this site and it would be laid out to accommodate the control buildings and accompanying equipment. The on-site access road would pass on N/S axis through these portions of the site. The latter level would be over the southern portion, and it would accommodate the battery containers. A retaining wall would be constructed between these levels and a further one adjacent to the southern boundary of the site.	Yes **-** The report identified potential for surface water emissions into the River Shannon SAC and the River Shannon and Fergus Estuaries SPA causing impacts to QI and SCI species due to water degradation. Mitigation measures were proposed within the report to ameliorate this risk. Given the location of the development relative to the proposed development, should works be carried out concurrently there is potential for in-combination effects due to degradation in water quality which could impact aquatic species. Consequentially this could also produce direct and indirect impacts to breeding, winter non-breeding and water bird species present in the local and wider area. Proposed works would

[1] Guidance of the nature of a plan or project is provided in Section 2.1 of the document Department of Environment, Heritage and Local Government (2009), Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					also result in the loss of terrestrial habitats used by protected and priority species such as badgers and bats. There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.
Project	19115	Kilpaddoge, Tarbert Co. Kerry	07.02.2020	The development will consist of a grid stabilisation facility comprising of: the construction up to 4 no. Rotating stabilisers, 5 no. Battery storage containers, 1 no. Control room, 2 transformers and ancillary equipment within a site area of approx. 1.46 hectares. It is proposed to connect the proposed development to the adjacent EirGrid substation by underground cable which will traverse the permitted and under construction peaking plant. The rotating stabilisers will be supported by 10 no. Electrical equipment rooms which will contain ancillary power supply products including a static frequency convert (sfc), mv switchgear, exciters and lv distribution, and step-up / down transformers. A heating ventilation and air conditioning system (hvac) will be attached to each	No –The report identified potential for surface water emissions into the River Shannon SAC and the River Shannon and Fergus Estuaries SPA causing impacts to QI and SCI species due to

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
				rotating stabiliser, 4 no. Auxiliary transformers are also proposed. The battery containers will house individual battery components with 2 no. Fitted external hvac system for each. 13 no. Inverter stations and 14 auxiliary transformers are proposed for the battery containers. The entire site will consist of various underground cables and ducts, boundary securing fence, compound lighting and palisade gates and fencing, new internal access track, security lighting, cctv, hardstanding areas and all necessary foundation works. Permission is also sought for 2 electrical transformers (up to 220kv), associated hv equipment and underground electrical grid connection cabling and ducting connecting the development to the national grid at the adjacent ESB/EirGrid substation. Planning permission is sought for a period of 10 years. A natura impact statement (nis) accompanies this application	water degradation. Mitigation measures were proposed within the report to ameliorate this risk to both designated sites as well as terrestrial habitats used by protected and priority species. At the time of writing, this project has been constructed and has entered the operational phase of the development. As such, no potential for in-combination effects associated with this development have been identified.
Project	ABP 304807-19	Townlands of Aghanagran Middle, Aghanagran Lower, Ballyline West, Tullahennell South Ballylongford Co. Kerry	06.01.2020	Construction of a windfarm of six turbines, with a blade tip height of 126.5m, battery units, upgrading of the existing access track and the provision of new internal roads, the development and improvement of existing entrances onto the public road, an 80m wind anemometry mast, a peat deposition area, underground electricity cables, an electricity substation with control room, a temporary construction compound, all on a site of 21.45ha. The applicant is seeking a 10-year planning permission and an operational period of 25 years. The application was accompanied by an EIAR and appendices which includes a Landscape and Visual Assessment Photomontages and Zone of Theoretical Visibility Maps and a Natura Impact Statement.	Yes –The report identified potential for surface water emissions into the River Shannon SAC and the River Shannon and Fergus Estuaries SPA causing impacts to QI and SCI species due to water degradation. Mitigation measures were proposed within the report to ameliorate this risk. Given the location of the development relative to the proposed development, should works be carried out

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					concurrently there is potential for in-combination effects due to degradation in water quality which could impact aquatic species. Consequentially this could also produce direct and indirect impacts to breeding, winter non-breeding and water bird species present in the local and wider area. Proposed works would also result in the loss of terrestrial habitats used by protected and priority species such as badgers and bats.
Project	VA03.307798	Townland of Carrowdotia South Co.Clare and Kilpaddoge Co. Kerry.	04.06.2021	Installation of 400kV electricity transmission cables, extension to the existing Kilpaddoge Electrical Substation and associated works, between the existing Moneypoint 400kV Electrical Substation in the townland of Carrowdoita South County Clare and existing Kilpaddoge 220/110kV Electrical Substation in the townland of Kilpaddoge County Kerry. The development includes work in the foreshore.	Yes –The report identified the potential for impact to the Lower River Shannon SAC, and the River Shannon and River Fergus Estuary SPA. These are through impacts to water quality, and through disturbance to QI/SCI species during the construction phase. Given the location of this development relative to the proposed development, should works be carried out concurrently there is potential for in-combination effects due

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					to degradation in water quality, and through disturbance to wintering bird species.
Project	20850	Kilpaddoge, Tarbert, Co. Kerry	12.11.2020	For changes to the previously permitted peaker power plant development (planning ref. 13/138). It is proposed to change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment based on the consequence of the proposed change in energy source at an area located within the permitted development. It is also proposed to include a small metering enclosure adjacent to the constructed substation building within the permitted development. A five year planning permission is being sought for the proposed development	No - The planning application report for the project notes that as the application is for change of use to an existing facility the compound had already been constructed. As such, given the nature and scale of the development no potential for in-combination effects is identified. There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					considered that the impact from air emissions will be significant and will be imperceptible.
Project	21549	Kilpaddoge, Tarbert, Co. Kerry	20.08.2021	(A) A high inertia synchronous compensator (HISC) compound containing 1 no. HISC unit enclosed within a steel clad framed style structure (12.1m max height) and supported by 8 no. Electrical equipment containers (containing ancillary power supply products including a static frequency converts, mv switchgear, exciters, lv distribution, control room, welfare and office), main auxiliary and start-up electrical transformers, generator circuit breaker, switchgear equipment, external cooler units and 1 no. Back up diesel generator and associated diesel storage tank; (b) a 220kv high voltage gas insulated switchgear (GIS) substation compound containing a GIS substation building with all control and hv equipment within a single storey building (13.2m max height). The building will be surrounded by a compound road and contained within a 2.6m high galvanised steel palisade fence; (c) a battery storage compound containing 5 no. Battery storage containers, enclosed in steel containers of dimensions approximately 13m by 2.5m by 3m, housing individual battery components with 2 no fitted external HVAC systems for each unit and supported by 13 no. Inverter stations, 14 no. Auxiliary transformers and control container; (d) 220kv underground cable to the existing adjoining EirGrid substation; (e) associated elements comprising various underground cables and ducts, equipment plinths, boundary security fence, compound lighting and palisade gates and fencing, security lighting, CCTV, internal access roads, hardstanding areas and all necessary foundations works for the above compounds. The planning application is on lands where grid stabilisation facility was previously permitted under planning register no 19/115. Planning permission to construct the development is sought for a period of 10 years. A natura impact statement (NIS) has been prepared in respect of the proposed development and accompanies the application	Yes –The application noted the potential for impacts associated with water quality and habitat alteration, as well as noise and disturbance/displacement of key species. Mitigation has been proposed to ameliorate these impacts, however, given the location of this development relative to the Proposed Development, should works be carried out concurrently there is potential for in-combination effects. There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.
Project	21305 and ABP 310521	Kilpaddoge, Tarbert, Co. Kerry	29.11.2021	Retain an existing telecommunications support structure (previously granted under Reg. Ref. 11/969 and ABP Ref. PL08.240232) together with associated ground equipment, security fencing and access track at Kilpaddoge, Tarbert, Co. Kerry.	No – given the nature, scale and location of this development no potential for in-combination impacts is identified.
Project	20438 and ABP appeal Ref. 308643	Meelcon, Carhoona, Farranawana, Tarbert, Doonard upper and lower, Kilpaddoge, Ballyline west, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig Co Kerry	21.06.2021	Amendment to previous granted permission which related to change in connection grid route for wind farm. A NIS was submitted with this application. The revised route will entail the construction of approximately 12.1km of 38kV underground electric cable connecting the existing permitted windfarm (19/381) to the 38Kva/110Kva substation at Kilpaddoge, Tarbert, County Kerry. The underground cables will be located along the public roads R-551, R552 and L-1010 and along 2 sections of private property. The development will also consist of the connection of the permitted windfarm (19/381), via existing permitted underground electricity cable.	Yes –The application noted the potential for impacts associated with water quality and disturbance/displacement of species. Mitigation has been proposed to ameliorate these impacts, however, given the location of this development relative to the proposed development, should works be carried out concurrently there is potential for in-combination effects through impacts through disturbance to wintering bird species.
Project	19381 and ABP appeal	Townlands of Aghanagran Middle,	06.01.2020	Construction of a windfarm of six turbines, with a blade tip height of 126.5m, battery units, upgrading of the existing access track and the provision of new internal roads, the development and improvement of existing entrances onto the public road, an 80m wind anemometry mast, a peat	No – This development is located a significant distance from the

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
	Ref. PL08.304807	Aghanagran Lower, Ballyline West, Tullahennell South Ballylongford Co. Kerry		deposition area, underground electricity cables, an electricity substation with control room, a temporary construction compound, all on a site of 21.45ha. The applicant is seeking a 10-year planning permission and an operational period of 25 years. The application was accompanied by an EIAR and appendices which includes a Landscape and Visual Assessment Photomontages and Zone of Theoretical Visibility Maps and a Natura Impact Statement	proposed development, approximately 5.9km southwest of the proposed Shannon LNG development, and has been constructed. No potential for in combination effects is identified.
Project	302681-18	Tullamore, Drombeg and Coolkeragh Listowel Co. Kerry	22.05.2019	The proposed development comprises a ten-year planning application for: ● A solar pv farm with an operational lifespan of 35 years to export up to 50mw of electricity to the national grid. ● The development will comprise approx. 357,500 sq. m. of solar panels together with all ancillary cabling and electrical infrastructure including approx. 25 no. Combined inverter / transformer stations (with option to provide these as separate inverter transformer units); ● Provision of new access tracks and upgrading of existing agricultural access tracks; (approx. 5,936 m of internal access tracks) ● Landscaping; ● Temporary construction compound; ● Battery storage and control units; ● Boundary and security fencing; cctv security system on poles; ● New vehicular access point to the L-1009 (at site of existing agricultural gate to be used for construction and operational traffic); ● Approx. 4m telecommunications mast and ● All ancillary site development works all on a site of approximately 99.2ha. A Natura Impact Statement (NIS) was submitted to the planning authority with the application.	No – This development is located a significant distance from the proposed development. Given the nature of the project and its location relative to the proposed development no potential for in-combination effects is identified.
Project	1825	Beal East, Ballybunion Co. Kerry	19.01.2019	For the development of a solar pv farm on a site. The development will consist of a solar PV array consisting of approximately 12.5 ha of solar panels within a total RLB of 14.16 ha on ground mounted steel frames, 1 no. Single story delivery substation, 2 no. Single story inverter / transformer units, 2 no. Single story battery storage containers, underground cable ducts on site, temporary construction compound (including site offices, portable toilets and parking area), boundary security fence, site entrance, access tracks, CCTV and all associated site works. This planning application is accompanied by an environmental report stage 1, screening for appropriate assessment, ecology report, archaeological impact assessment and photomontages	No – A screening for Appropriate Assessment was carried out in relation to this project which concluded that "…*the proposed Beale Hill Solar Project will not cause adverse direct impacts on the*

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					conservation objectives and qualifying interests of any SACs or SPAs…" Given the nature, scale and location of this development no potential for in-combination effects is identified. There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.
Project	309156-21	Townlands of Ballyline West, Coolkeragh,	27.09.2022	A detailed description of the proposed development is provided in the public notices and the EIAR submitted with the application. It includes the following:	No – outside RLB and no pathway for in-combination impacts

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
		Dromalivaun and Tullamore Co. Kerry		• 12 no. turbines (maximum tip height of 150m) with associated foundations and hard stand areas. • Permanent meteorological mast (90m) and associated foundation and hardstand area. • New (6.85km) and upgraded (4.43km) internal site service and access tracks. • Underground 33 kV electric cabling between turbines within the wind farm and wind farm substation. • 6 no. peat deposition areas located across the windfarm site. • 2 no. site entrances, one permanent and one temporary. • 225m underground cable connection from the 110kV wind farm substation to the existing 110 kV transmission line due east of the windfarm. • 110 kV substation. • New junction off the L6021 at the north-east of the site to facilitate construction and access. • New junction off the L1009 on the west side of the site to facilitate construction and access. • 2 no. temporary construction compounds. • Associated surface water management systems. • Tree felling of c 3.15 ha of conifer trees to facilitate site development. • Temporary works on sections of the public road along the turbine delivery route (including hedge/tree cutting, relocation of power lines/poles, lampposts, signage and local road widening).	6.7km south of proposed development
Project	318540	At Tarbert Island, Tarbert Co. Kerry	Case is due to be decided by 05.06.2024	10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works	Yes –There is potential for in-combination impacts via pollution to watercourses and/or by disturbance impacts to ex-situ SPA SCI bird species as well as other protected and priority species and their terrestrial habitats in the surrounding lands
Project	23284	Ballymacasy, Coolnagraigue, Ballyline East, Ballyline West,	17.10.2023	Apply for a 10 year permission and 40 year operation for a solar farm of 146.6 hectares, on 3 no. Land parcels consisting as described herin: west parcel(Ballymacasy, Ballyline east and Ballyline west townlands) c 58.48 hectares, central parcel (Coolnagraigue townland) c. 53.8 hectares and east parcel (Leanamore and Dromalivaun townlands) c 34.32 hectares, a route corridor for an	No – Given the location of this project relative to the proposed development (located

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
		Leanamore and Dromalivaun Co Kerry		under ground internal electrical cable connecting the west and central parcels to the east parcel consisting of c 3772 meters in length.	4.5km to the south east) and the nature of the development, no potential for in-combination effects is identified. There is a potential risk for cumulative effects from increased traffic movements, during the construction phase, causing air emission deposits of nitrogen oxides and ammonia on ecological receptors which could impact the integrity of nearby designated sites. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.
Project	318912	Tullamore Listowel Co. Kerry	Case is due to be decided by 27.05.2024	Substation and associated works to reduce quantum of solar panels required for solar farm. An NIS accompanies this application.	No – Given the location of this project relative to the proposed development (located 10km away) and the nature of the development, no

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					potential for in-combination effects is identified.
Project	2360050	Townlands Of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh and Tullamore Co. Kerry	Decision Date: 23.01.2024	A new grid connection route connecting the permitted Ballylongford windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanala ref- PL08.304807) at Aghanagran Middle And Lower, Ballyline West And Tullahennel South, Ballylongford, to the proposed 38kVsubstation (Kerry County Council planning ref 23/431) at Tullamore, Listowel, Co Kerry. The route will entail the installation of approximately 7.3km of 38kv underground electric cable passing through townlands of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh, and Tullamore in County, Kerry The proposed grid route is proposed to be via underground cables located along the public roads : L10028, R552, and L-1009, and private property. The new grid route is a change a previously granted permission for a 12.1km grid connection route (Kerry County Council planning ref 20/438) (An Bord Pleanala ref- PL08308643) from the permitted wind farm to the 38kva /110kva substation at Kilpaddoge, Tarbert. The proposal includes alterations to the permitted windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanala ref- PL08.304807), the permitted 38 kV substation at the wind farm is to be relocated and redesigned. The altered substation proposal will be located in a new substation compound that includes a control building, and all associated electrical plant and apparatus, fencing, and an access track within the townland of Aghanagran Lower. The proposed substation at the windfarm will be connected to the windfarm via underground cabling from Turbine T4. The project includes all ancillary and associated works necessary to facilitate the development, including three temporary construction compounds. A Natura Impact Statement has been prepared in respect of the proposed development and accompanies this application.	No – Given the location of this project relative to the proposed development (located 5km away) and the nature of the development, no potential for in-combination effects is identified.
Project	Pre app consultation ABP 319245	In the townlands of Kilcolgan Lower and Ralappane, Tarbert County Kerry	Pre application – yet to be concluded	Proposed development of a strategic gas emergency reserve facility, and associated development works (Shannon LNG)	Yes **-** The application for this project has not yet been concluded, however given the nature of the development, and its location relative to the proposed development, the potential for in-combination effects is identified through a pollution to watercourses which could impact aquatic species. Consequentially this could also produce direct

Plan or project[1]	Planning Reference	Location	Date Granted	Description	Potential for in-combination effects
					and indirect impacts to breeding, winter non-breeding and water bird species present in the local and wider area. Proposed works would also result in the loss of terrestrial habitats used by protected and priority species such as badgers and bats.
Project	315838	Tarbert Power Station Tarbert in the townland of Tarbert Island Co. Kerry	Recommendation/ Conclusion that AA is required 29.03.23	Application received under Section 4 of the Development (Emergency Electricity Generation) Act 2022 (the Act) for a designated development (construction of a temporary, 5 year, 150MW emergency generation plant – limited to a maximum of 500 operational hours per annum) located at Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	No – this development is currently being constructed and will be completed before the proposed development begins construction and as such there will be no overlap with construction phases and no potential for in-combination impacts..
Foreshore Licences					
Project	319080	Moneypoint Generating Station, Co. Clare	Lodged Nov 2023	ESB intends to undertake a survey campaign at the Moneypoint Generating Station site to inform the engineering design of the proposed Moneypoint Hub Project. The marine surveys will include geophysical, geotechnical, environmental, and met ocean surveys.	No – Given the nature of these works, and their location relative to the proposed development (3km away) no potential for in-combination effects is identified.

9.7 Mitigation and Monitoring

Mitigation is prescribed in accordance with the EPA guidance on EIAR (EPA, 2022) which requires mitigation by avoidance as a first approach. Where this is not feasible, measures to prevent impacts from giving rise to adverse effects will be adopted (eg design of bunded storage for chemicals). Where impacts cannot be avoided, eg generation of noise, mitigation by reduction of impact is required to limit the exposure of the receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor).

Mitigation is prescribed hereunder to address the impacts such that adverse effects do not occur.

Mitigation is described with respect to:

- how the measures will avoid/prevent/reduce the adverse impacts on the site to an acceptable level;
- the degree of confidence in their likely success;
- the timescale, relative to the project, when they will be implemented;
- how and when the measures will be monitored.

Care has been taken throughout the design process to avoid impacts to sensitive ecological receptors. Additional mitigation measures to ameliorate the impacts as described in this chapter are outlined hereunder. These are incorporated into the construction environmental management plan (CEMP) for the proposed development.

9.7.1 Ecological Clerk of Works (ECoW)

An ECoW will be employed by the Contractor to oversee implementation of mitigation. This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented. The Contractor's ECoW will also ensure any disturbance licenses are arranged, prior to construction works following completion of pre-construction confirmatory surveys for invasive species, badgers, otters, bats, amphibians and other terrestrial mammal species such as red squirrel, Irish hare and European hedgehog, based on relevant details outlined in this EIAR and any significant findings of further confirmatory pre-construction surveys outlined above. The Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated, and impacts are minimised. An independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the monitoring and compliance reports generated by the Contractor's ECoW.

The ECoW will also ensure works areas are minimised in relation to so impacts to woody vegetation (hedgerow, treeline, and scrub) are minimised as far as possible and disturbance risks to badger setts are avoided if possible. Pre-construction confirmatory surveys will be conducted by the EcOW to demarcate protected mammal breeding sites and confirm disturbance license requirements. Prior to enabling and construction works the site ECoW will review and confirm proposed access routes, demarcate sensitive habitats, and confirm works areas in these locations.

9.7.2 Mitigation and Retention of Habitats

Table 9.27 below summarises the potential for retention of key habitat features, such as scrub and hedgerow, and replanting of woody vegetation species to mitigate for the loss of scrub, hedgerow, and treeline.

As outlined under Section 9.7.1 the ECoW will monitor works and demarcate areas to ensure that the required mitigation for Habitat KER Loss and requirements for site clearance are kept to a minimum.

Table 9.27: Mitigation for Habitat KER Loss

Habitat	Estimate of Area Which May Be Lost	Mitigation
Treelines (WL2)	A total length of 0.65ha of treeline. This incorporates areas for both permanent and temporary works	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
Hedgerows (WL1)	A total length of 0.79ha of hedgerow. This incorporates areas for both permanent and temporary works.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
Scrub (WS1)	A total of 1.22ha of scrub is within the RLB. This incorporates areas for both permanent and temporary works.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
GS2 Dry Calcareous and Neutral Grassland	A total area of 5.52ha of Dry Calcareous Grassland habitat is within the RLB.	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.
GM1 Marsh	A total area of 0.11ha of marsh habitat is within the RLB.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
GS4 Wet Grassland	A total area of 1.90ha of wet grassland habitat is within the RLB. This is on the edges of the proposed development and outside of any permanent works.	Any areas cleared outside of the permanent works will be reinstated.
FW2 Lowland Depositing Stream	A total area of 0.03ha of Lowland Depositing Stream habitat is within the RLB. This is where the single Ralappane Stream crossing occurs along the proposed cable route	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
FW4 Drainage Ditch	A total of 0.01ha of Drainage Ditch habitat is within the RLB	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
GS2 Dry Meadows and Grassy Verge	A total area of 0.38ha of Dry Meadows and Grassy Verge habitat is within the RLB.	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.

Habitat	Estimate of Area Which May Be Lost	Mitigation
WN6 Wet Willow-Ash-Alder Woodland	A total of 0.02ha of Wet Willow-Ash-Alder Woodland habitat is within the RLB.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
WL2WS1 Treeline/Scrub	A total of 0.01ha of Treeline/Scrub habitat is within the RLB	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.

Reinstatement

As detailed in the STEP Power Plant EIAR, particular care will be taken at the boundary between the proposed development and the SAC, SPA and pNHA so that construction activities do not cause damage to habitats in this area. These habitats will be securely fenced off early in the construction phase. The fencing will be clearly visible to machine operators. The Ralappane Stream runs from the proposed development through the SAC and pNHA to the estuary, it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to Chapter 8 (Surface Water and Flooding) and Section 9.7.3 for further details on mitigation and monitoring measures for water.

To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub/woodland vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The ECoW will specify appropriate protective fencing where required.

Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.

Native woodland and shrub planting will include Scot's Pine, Willow, Oak, Alder, Rowan, Hazel, Blackthorn and Holly. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Natural regeneration of vegetation will also occur.

There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats. Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air and water circulating to the roots. No materials will be stored within the root protection area / dripline of trees earmarked for retention. The ECoW will specify appropriate protective fencing where required.

Details of the landscaping plan for the proposed development are included in Appendix 9.7. This includes detailed areas of native woodland and native scrub habitat as well as native wildflower planting. The woodland planting mix will be dominated by native species including Scots Pine (*Pinus sylvestris*), Willow (*Salix sp.*), Pedunculate Oak (*Quercus robur*) and Sessile Oak (*Quercus petraea*), Alder (*Alnus glutinosa*), Rowan (*Sorbus spp*). and Crab Apple (*Malus spp.*). The woodland edge planting mix will include Hazel (*Corylus spp.*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Elder (*Sambucus spp.*) and Holly (*Ilex spp.*). The objective of these elements is to create natural, multi-layered woodland habitat which will be of local ecological value and has the potential to support native flora and fauna. A linear strip of woodland along the southern boundary will help to maintain connectivity (east to west) between habitats in the wider landscape. Additional native specimen trees (Willow, Wild Cherry (*Prunus avium*), Rowan, Whitebeam (*Sorbus subg. Aria*) and Silver Birch (*Betula pendula*)) will be planted on peripheral areas such as the road edge and administration area.

A native wildflower mixes (of 100% Irish provenance) will be utilised to provide a more diverse sward which is of higher ecological value for invertebrates and birds. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Perennial Rye Grass or other vigorous amenity/ agricultural grass species will not be utilised as they tend to over-dominate the sward and reduce overall biodiversity. The final wildflower mix will be specified by the ECoW based on final ground conditions including alkalinity, fertility and moisture levels.

Based on the seed mix utilised and on prevailing ground conditions, the ECoW will specify the management regime, including weed control and mowing regime, necessary to maximise biodiversity and habitat value.

Reinstatement of linear features such as fencing, hedgerows or treelines from temporary works areas will be carried out in agreement with the landowners and SLNG's Agricultural Liaison officer. Unless otherwise agreed with the Employer's Representative, the Contractor will re-instate hedgerows, treelines, and scrub (to within 3m of the proposed cable route) to a species-rich condition (i.e. five woody species per 30 m), comprising only native species suited to the locality.

Where hedgerows are removed due to the works or works areas these areas will be planted with a double staggered hedgerows with native species –As per TII/NRA guidelines:

- Height of Plants: In general, taller species such as Hawthorn (*Crataegus monogyna)* should be in the order of 900 to 1000mm in height while lower growing and trailing species may be between 300 to 450mm in height/length. Where trees are included and, depending on the growth rate of individual species, the majority of plants should be between 900 and 1200mm in height. Occasionally taller trees, up to and including 'standard-sized' plants, may be provided at random or irregular intervals along the hedgerow.
- A wide variety of native tree species may also be included in the hedgerow for increased species diversity, local character and aesthetics, density and horizontal and vertical structural differentiation. Again, species selected should reflect the composition of existing hedgerows in the surrounding landscape. Where tree species are included in rural hedgerows, they should be randomly dispersed, thereby avoiding potential for development of simple repeating patterns and formal avenues. Depending on local conditions and set-back and safety requirements.
- Spacing of Plants: Hedgerows are best planted as double rows, particularly for the establishment of strong diverse plantings. Double rows will be set approximately 300 to 400mm apart, with plants at between 400 to 500mm centres, in staggered rows.
- Staking: Normal hedgerow plants will not require staking. Appropriate staking and ties will be provided for stability and establishment purposes where trees exceeding 1.5m in height are included.
- The principal maintenance required in the early years of establishment is controlling development of competing vegetation along the base of the hedgerow. This will ensure better overall establishment and allow for the development of lower branches giving a more desirable dense base.
- Particular care is needed in the use of herbicides in more mature hedgerows as base growth is desirable and, newly established, desirable species may have naturally recolonized the base of the hedgerow. Control will be be focused on undesirable, vigorous or competitive

species, e.g. Ragwort or Sycamore. Application of a minimum 50mm deep layer of mulch (bark chipping, etc), will reduce potential for weed growth and hence control weeds.

- Cutting back Hawthorn (*Crataegus monogyna*) at least once within the first three years after planting will encourage dense growth.
- In vulnerable areas, fencing will initially be required to protect plants from browsing by rabbits or hares. Rabbit guards will also be used in limited circumstances where protection is considered appropriate for more expensive plants (especially taller trees) and sensitive species.
- Replacement of plants which fail to grow is necessary at the earliest opportunity so as to maintain the integrity of the establishing hedgerow. Occasional plant failure within densely planted features is not a particular concern – and may lead to development of a more natural hedgerow appearance. In time, particularly wide spreading or leaning trees and shrubs may have to be pruned or removed for safety reasons.
- Long-term coppicing or 'laying' of hedgerows at 20-to-30-year intervals will retain hedgerow biodiversity, density and structure.

Where areas of broad-leaved habitat types are removed due to the works or works areas generate new linear boundaries, this will be planted with high canopy broad leaved habitat with native species – as per TII/NRA guidelines:

- Plant age and size: Trees will be in the order of 750 to 1200mm in height and will have been transplanted at least once, while taller shrubs may be 600 to 750mm on average. Lower growing shrubs will only be 300 to 450mm in height at planting.
- Spacing: High-canopy woodlands should be diverse and include areas for the development of glades. Such sites should be divided up into planting areas and retained open areas. In addition, planting areas should be further divided to incorporate small, randomly located, individual groups (3 to 5 trees) of dominant tree species such as Oak and Ash.
- Trees: These will be planted at varying distances between 1.5 x 1.5m to 3.0m x 3.0m spacings, while mixed arrangements of shrubs are best planted at between 900 and 1500mm centres depending on species.
- Staking: In general, trees should not require staking. However, appropriate staking and ties will be provided if plants in excess of 1.5m in height are included.
- Specification: As the planting is proposed for ecological and environmental aesthetic reasons (i.e. not for a commercial forest), forked or leaning woody plants, can be incorporated within tree and shrub treatments within the roadside landscape.
- The principal maintenance requirement for the establishment of successful high-canopy woodland treatments is control of competing vegetation at the base of individual trees or shrubs. This will ensure better overall establishment and allow for the development of a varied branching structure. Importantly weed control is not required over the entire site as individual plants may be well-spaced and semi-natural grassland treatments may be present in open areas and between individual trees.
- The application of a minimum 50mm deep layer of mulch (bark chipping, etc.) to a 400mm radius circle around the plant will reduce the potential for weed growth and hence the need for weed control. Otherwise, pulling or spot treatment of noxious and invasive weeds will be required on a regular basis.
- Initially, fencing may be required to protect plants from browsing by rabbits or hares. It may be possible to utilise rabbit proof fencing around a plot. Rabbit guards may also be used on individual plants. However, it is recommended that, where guards are used, stakes should be provided for plant support if the measure is to prove effective.
- The replacement of failed plants will be undertaken at the earliest opportunity so as to maintain the integrity of treatments. Particularly large areas of woodland treatments, with low

failures rates, may not require replacement planting as occasional losses will provide for some random windows in the canopy and a more natural appearance to the woodland.

- In time, particularly wide-spreading or leaning trees which pose a hazard to road safety may have to be pruned or removed for safety reasons.
- Leaving cuttings from tree and shrub thinnings at the site will promote nutrient cycling and restore nutrients to the soil, while, at the same time, providing a substrate for many plant species and providing suitable conditions for use by birds, small mammals and many invertebrates.

All other sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, or similar verge seed mixes, under the supervision and direction of the ECoW. Plant species of native provenance will be used in all replanting of semi natural habitats.

The Contractor will commit to a after-care plan for hedging, grassland, and agricultural reinstatement, or as otherwise agreed with the local authority.

The Contractor's agronomist will inspect, photograph and report in writing to the Employer's Representative on the establishment-phase of all vegetation.

The Contractor's agronomist will review and advise on any corrective measures required to ensure good condition, immediately after reinstatement, and at least twice yearly thereafter for a five-year period.

9.7.3 Mitigation for the Protection of Water Courses

General

At a minimum, all pollution control measures will be designed, installed, and maintained in accordance with measures outlined below and under the supervision of the Contractor's Environmental Clerk of Works (EnCoW).

9.7.3.1 Concrete

The pouring of concrete will be required during the construction phase. To prevent the runoff of concrete into nearby watercourses, drains and drainage ditches, the following will be implemented.

- No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck.
- Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the nearby watercourses, drains and drainage ditches.
- Concrete trucks will be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area.
- A concrete washout plan will be developed by the contractor
- Where concrete pours are to take place instream they will only take place within an isolated, dry, works area.
- Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until concrete has hardening negating a run-off risk.
- The Contractors EnCoW will ensure that covers are available for freshly poured concrete to avoid wash off in the event of rain.
- Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal.

- The Contractor will schedule concrete works during relatively dry weather conditions (i.e., when there are no active Met Eireann yellow, orange or red warnings) to reduce the elevated risk of runoff.
- The Contractor's EnCoW will notify the Employer's Representative Team, the NPWS and IFI immediately of any concrete spills into watercourses, drains and drainage ditches.

9.7.3.2 Hydrocarbons

Where mobile equipment is required e.g., generators, these will be housed in a suitably sized bund / plant nappy such that any leaks / spills are intercepted. All mobile equipment used will be stored within a plant nappy. Operators will regularly inspect the plant nappy, at a minimum on a daily basis, and replace it where it has become contaminated.

Fuelling and lubrication of plant and equipment will be restricted to the construction compound sites, or laydown areas.

All waste fuels, oils, and other hazardous wastes will be disposed of in accordance with the requirements of waste legislation.

Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained during induction to site by the Contractor's EnCoW in the use of this equipment.

Should use of a spill-kit be required it shall be immediately re-stocked by the Contractor.

All spill-kits shall be inspected on a weekly basis by the safety, health, environmental and quality SHEQ officer to ensure they are maintained as fit for purpose. Records relating to these inspections shall be kept.

Welfare / hygiene facilities will be located within the construction compounds.

Should one be required, any water from any wheel washes will be removed from site and disposed of in line with Waste Legislation. No wheel wash water will be discharged into any watercourses, drains or drainage ditches.

Prior to the works commencing, the measures prescribed in this section shall be installed to prevent the downstream transportation of surface water run off associated with vegetation clearance. This may be through the use of features like hay bales. Monitoring of these measures to ensure their continued effectiveness will take place on an on-going basis while the works are proceeding by the SHEQ officer.

Where watercourse crossings take place within the existing road curtilage, any drains or drainage ditches connecting into the relevant watercourse will be identified and protected through use of sandbags or similar to ensure flows of contaminant laden water do not enter into the watercourses, drains and drainage ditches. Temporary culverts will also be installed in areas where temporary roads/routes are required for regular use and crossing of drainage ditches.

The clearance of any riparian vegetation will be avoided / or kept to the minimum required for the facilitation of the works such that no unnecessary exposure of riverbanks occurs.

The Contractor's EnCoW shall direct the Contractor to take any corrective actions required. The Contractor will record all works authorisations, report these to the independent EnCoW within the Employers Representative Team and maintain on file for inspection as required.

Where the implementation of these measures fail, or are inadequate, the Contractor will implement adapted measures (for example replacement sediment treatment system) in agreement with the Contractor's EnCoW and the Employers Representative Team.

The IFI Biosecurity Protocol for Field Survey Works will be complied with.

9.7.3.3 Open Cut Water Crossing

Works will be carried out within a dry works area.

The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. Techniques include the use of inflatable dams, frame dams or, in smaller watercourses, sandbags (double-bagged and underfilled, containing only clean washed sand).

Prior to drying out of the works area, de-fishing will be undertaken under licence. This will include for the translocation of aquatic species including eels out of the works footprint, should they be found within the isolated works area.

Any pump used to dewater the works area will be fitted with an appropriate screen to prevent aquatic species from being sucked into the pump.

Water pumped from the dry works area will be treated using settlement tanks to remove sediment prior to discharge back to the watercourse. In consultation with Inland Fisheries Ireland (IFI), greater filtration of silt may be achieved prior to discharge, through proposed use of silt de-watering bags which trap silt and expel only clean water and can be left to biodegrade on riverbanks as a habitat enhancement measure.

Water will be conveyed over the isolated section of channel by pumping or the use of a temporary diversion. Where sufficient capacity is available, and there is no risk of excessive scour, the diversion will be within the footprint of the existing channel.

Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI and landowners. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.

Open cut trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie) and works will not take place at least during yellow, orange and red weather warnings. The Contractor's Environmental Clerk of Works (EnCOW) will monitor this daily and will provide reports for audit.

Unless otherwise agreed with IFI, any element of the works requiring instream works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive). Where trenching (instream) works are proposed, electrofishing may be required to remove fish under licence from IFI. Method statements will be developed in agreement with the Employer's Representative and with IFI for the works.

A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.

Silt fences will be installed downslope of the area where silt is being generated on disturbed ground as follows:

- To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse).
- Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh.
- The base of the silt fence will be bedded at least 15-30 cm into the ground at 2 metre intervals.

- Once installed the silt fence will be inspected regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains.
- The integrity of the silt fencing will be checked daily by the EnCoW and after poor weather conditions (rain or wind) and any failures rectified immediately.
- Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW.
- Any build-up of sediment along the fence boundary will be removed daily.
- Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW.
- The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment).
- Silt fences will not be removed during heavy rainfall.
- The silt fence will not be pulled from the ground but cutaway at ground level and posts removed.

All instream works, including silt control measures, biosecurity measures, and fish salvage operations will be monitored by an appropriately experienced ECoW.

9.7.4 Mitigation for the Protection of Otter

In advance of enabling works, the Contractor's ECoW will conduct a pre-construction confirmatory otter survey in advance of the commencement of any works within 150m of the works areas (where access is available) as per Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. This will allow for the identification of any holts have been established prior to commencement of works. The confirmatory otter survey will be conducted no more than 10-12 months prior to construction commencing. Otter surveys will be carried out having regard to guidance of NRA (2006, 2009)

The results of pre-construction confirmatory surveys will inform the refinement of mitigation measures (if required) in Contractor method statements, and all results will be incorporated into Contractor's constraint mapping.

Survey reporting and mapping will also be provided to the Employer's Representative team, and to local authority or other parties where required by conditions.

Should holts be identified within 150m of the proposed development the following will, at a minimum, be employed, unless otherwise agreed with the NPWS:

- No works will be undertaken within 150m of holts where breeding females or cubs are present.
- Works within 150m of such a holt can only take place following consultation and in agreement with the NPWS
- No wheeled or tracked vehicles of any kind will be used within 20m of active but nonbreeding holts
- No light work such as digging by hand or scrub will take place within 15m of such holts except under license from NPWS
- The identified exclusion zones will be fenced and clearly marked on site prior to any invasive works.
- All contractors on site will be made fully aware or the procedures in relation to the holts by the ECoW.
- No excavations are to be left uncovered or without means of egress (a sloped plank for example) overnight, as wildlife may fall in or enter and become trapped.
- No buildings or storage units are to be left open overnight, as wildlife may enter and become trapped.

- No poisonous or potentially harmful substances or materials are to be left unsecured overnight.
- No vehicles or machinery are to be used if installing any wildlife fencing or exclusion gates.

Where works in proximity to a holt or couch cannot be avoided, a licence to disturb otter will be required from NPWS. The Contractor will be required to comply with any specific mitigation measures as stipulated under the licence.

9.7.5 Mitigation for the Protection of Badger

Prior to any works commencing, a pre-construction confirmatory badger survey will be carried out. Surveys will be conducted having regard to Surveying Badgers (Harris et al.1989) and record signs of badgers, including tracks, hair, latrines and setts. The extent of survey area will be defined as 150m beyond all works areas within suitable habitat as set out in Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006).

Prior to works commencing, activity at all identified setts within 150m will be confirmed. This will be confirmed through the use of camera monitoring, setting of footprint traps, soft blocking of sett entrances, or similar. Any risk of disturbance to badger will be subject to disturbance license requirements.

A description of setts, i.e., main sett, annex sett, or outlier sett, will be provided by the ECoW, along with the level of activity at each. This will allow for an understanding of the importance of setts in the wider context of the local badger population.

As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006), where setts have been confirmed, no heavy machinery will be used within 30m (unless carried out under licence from the NPWS). Lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance and light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.

Unless otherwise agreed, and under licence from the NPWS, during the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts, neither will blasting or pile driving within 150m of active setts. An assumption that a sett is active will apply unless proven otherwise during the course of investigation.

All identified exclusion zones, as outlined above, will be clearly marked out on site and communicated to all site staff prior to works commencing.

Where works may interfere with a badger sett directly, exclusion will take place as per NRA (2006) guidelines.

During the construction phase management and protection measures should also include:

- No excavations are to be left uncovered or without a means of egress (a sloped plank for example) overnight, as badgers may fall in or enter in search of food and become trapped
- No buildings or storage units are to be left open overnight, as badgers may enter and become trapped
- No poisonous or potentially harmful substances or materials are to be left unsecured overnight
- No vehicles or machinery are to be used installing exclusion fencing or gates

If a badger is discovered or any activity suggesting badgers have been disturbed during construction, all work must cease immediately, and the ecologist should be notified as soon as possible to detail how best to proceed.

Badgers within the proposed development area are considered to also be susceptible to noise disturbances and as such mitigation outlined in section 9.7.8 for wintering birds will also apply to badger mitigation.

It is considered, however, that sett 2 identified by DixsonBrosnan (see section 9.5.3.2 and Appendix 9.4) will require more specialised mitigation in the form of a permanent sett closure. The closure of the outlier/subsidiary sett 2 will need to be carried out prior to the construction works can begin and will require the creation of an artificial sett to replace the loss of sett 2.

Pre-construction surveys will be carried out on these setts in order to determine if there has been any change in badger sett usage or spread and to identify appropriate locations for the creation of an artificial sett. Before closure works can begin a suitable site for the new artificial sett should be identified within the current area used by the local badgers in order to aid in the process of the badgers locating the new sett. Once the artificial sett has been constructed and located by the badgers the closure of the original sett can begin.

The sett closure will be carried out initially by excluding the badgers from the current sett through the use of one-way badger gates which are installed at the sett entrances. A strong wire mesh is to be installed over the surface of the sett to prevent badgers from creating new tunnel entrances or re-entering the sett. The gets will only open outwards allowing badgers to exit but not re-enter the sett.

The sett exclusion process can only take place between the 1st of July and the 31st of November as this is outside of the badgers breeding season.

The exclusion mesh and gates will be installed by hand so as to minimise disturbance around the setts.

9.7.5.1 Exclusion Methodology

- The exclusion process will be initiated by first installing the gates which are fitted in a two-way position to allow badgers to move in and out of the sett freely, thus becoming used to this new feature.
- After three days the gate will be set to a one-way operation so that badgers can only leave the sett and not re-enter.
- Wire fencing will also be fitted to cover the extent of the sett, preventing the creation of new tunnels or re-entry of the badger once they have been excluded.
- The movement of the badgers can then be monitored by placing sticks, sand or gravel immediately inside the gate and sett entrance and by erecting camera traps within the area and focused on the sett entrances. Once no movement has been recorded over a three-week period work can commence on closing the original badger sett permanently.
- The EcoW will supervise the installation and exclusion, regular monitoring and re-opening of the setts.

The above mitigation concerning the closure of sett 2 and artificial sett creation will be carried out at least one year before the commencement of works for the proposed development and following the completion of a pre-construction survey and development of a badger mitigation plan outlining details regarding the artificial sett location and structure and time scale for the original sett closure.

9.7.6 Mitigation for the Protection of Bats

No bat roosts were identified within the RLB of the proposed development. However, there is potential for roosts to become established in the time prior to construction. As such, as a precaution, a preconstruction confirmatory survey of trees to be felled as part of the works will be undertaken.

The Design and Construction of any bat mitigation measures will be site specific, and comply with licensing requirements, having regard for relevant guidance including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes"[2], and the NPWS Bat Mitigation Guidelines for Ireland[3].

The following measures will, at a minimum, be undertaken:

- Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in agreement with the ECoW, and NPWS as relevant.
- Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per Bat Surveys for Professional Ecologists: Good Practice Guidelines.
- Trees identified with potential roost features will be thoroughly examined, under licence from the NPWS, to ascertain the presence or absence of roosting bats. This will be conducted by an experienced bat expert. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. NPWS (2022)[4] guidance notes that emergence/re-entry surveys of trees are limited in terms of effectiveness. As such, inspections via endoscope will be carried out, including of features at height.
- Where felling does not occur within one day of the examination, the trees will be re-assessed.
- Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist, and any conditions under license. They will not be carried out during the breeding season, between the months of June to August inclusive, or during hibernation in the months of November to March inclusive, unless under license from the NPWS. Where the felling of trees found to be suitable as bat roosts cannot be avoided, appropriate mitigation will be agreed with the NPWS and put in place at least one month in advance of any felling or disturbance.
- If any bat roost sites are removed by the Works, appropriate replacement bat roost sites will be provided following consultation with the NPWS, and in consultation with the local authority.
- Any lighting (temporary flood lighting etc.) within compounds and construction area is to be turned off outside working hours to reduce impact on commuting and foraging bats species.

The Design and Construction of bat mitigation measures will be site specific, and comply with the requirements of the bat specialist, the Standards, the TII's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes", the National Parks and Wildlife Services Bat Mitigation Guidelines for Ireland, the National Parks and Wildlife Service Circular 2/07 Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997.

9.7.7 Mitigation for the Protection of Breeding Birds

Minimisation of habitat and reinstatement of areas of habitat which may be used by breeding birds (i.e. scrub, hedgerows, and grassland habitats) is outlined previously in Section 9.7.2.

As outlined in the description of the development the clearance of all vegetation (except for improved grassland, recognising bare ground, or other vegetation with no nesting potential as determined by the ECoW), will be planned to take place outside of the breeding season for birds, or as determined by risk of disturbance to a nest site.

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[2] https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

[3] Kelleher, Conor & Marnell, Ferdia. (2006). Bat Mitigation Guidelines for Ireland.

[4] Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland

Should clearance within the breeding season be required, a suitably qualified ecologist / ECoW will conduct pre-construction confirmatory surveys to assess risk of disturbance to nesting birds to inform vegetation clearance activity. In the event where pre-construction surveys confirm or presume nesting birds are present, an exclusion zone will be established around the nesting bird (to include the risk of abandonment due to indirect disturbance), and no vegetation clearance may proceed until young are presumed to have fledged, or nesting has failed. Repeat surveys will be required if vegetation has not been cleared within 72 hours of the initial survey. This will prevent direct impact to nesting birds within the footprint of the works.

9.7.8 Mitigation for the Protection of Wintering Birds

The principle likely disturbance from construction activities are temporary disturbance to very low numbers of SCI from works at the western end of the proposed development. Mitigation measures to minimise noise disturbance form works associated with the development are prescribed hereunder.

All plant used during the construction phase shall be the quietest of its type, practical for achieving the works, as demonstrated in writing by the Contractor to the local authority, with reference to other noisier models.

All plant shall be operated and maintained in accordance with the manufacturer ' s recommendations including the use and maintenance of the specific noise reduction measures in the next bullet.

The following will be incorporated to reduce the impact further:

- The use of mufflers on pneumatic tools
- Effective exhaust silencers
- Sound reducing enclosures
- Machines in intermittent use shall be shut down during periods where they are not required

9.7.9 Mitigation for the Protection of Other Terrestrial Mammals

Prior to works commencing in areas of suitable habitat for species such as hare and European hedgehog. A targeted pre-construction survey for each species will be carried out prior to any works taking place. Surveys may include observation surveys, camera traps or hair traps.

In consideration for red squirrels, should any dreys be identified on site belonging to grey squirrels, these will be removed under licence from the NPWS. These dreys will be replaced using artificial dreys. Any additional measures outlined by the NPWS under the terms of their license will also be incorporated. Mitigation concerning noise and habitats (Section 9.7.2) will also be adhered to and considered regarding other terrestrial mammal species. The implementation of mitigation for breeding birds as outlined in Section 9.7.8 will simultaneously avoid the majority of the main breeding season for species such as the European hedgehog which runs from April – October.

9.7.10 Mitigation for the Protection of Amphibians

A pre-construction confirmatory survey for frog will be undertaken prior to works commencing during the breeding season (February and March) at potential suitable breeding habitat (ditches, drains, and standing water impacted).

When surveying for the species biosecurity measures will be followed to ensure that there is no incidental spread of vector borne diseases between waterbodies. This includes the cleaning, disinfection and drying of all equipment and will have regard to guidelines from IFI.

Should frog be recorded, translocation of the species to areas outside of the proposed development footprint will be undertaken, in consultation with the NPWS. Any translocation of these species will be under license by the NPWS.

Any spawn or adult frogs recorded will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat that will not be impacted.

9.8 Residual Effects

It is considered that due to the permanent nature of the proposed development scheme, the residual effects will likely remain the same as those outlined for the operational phase. Correct adherence to the CEMP and mitigation measures will result in non-significant effects. Continued monitoring and maintenance of the project (specifically in the early stages of the operational phase) will help to assess the effectiveness of the mitigation measures that were in place and will help ensure potential impacts are minimised/avoided. However, in order to determine any anomalous impacts which may arise specific impacts have been discussed below.

Table 9.28: Residual Impacts to Key Ecological Receptors Following Implementation of Mitigation Procedures

Feature		Highest Value within ZoI	Potential Impacts During Construction Phase	Potential Impacts During Operational Phase	significance of effects with no Mitigation	Mitigation Proposed	Significance of effects with Mitigation
Designated Sites	Lower River Shannon SAC	International	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting QI features	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.4	Imperceptible
	River Shannon and River Fergus Estuaries SPA	International	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting SCI features	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Imperceptible
	Ballylongford Bay pNHA	National	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream and Shannon Estuary: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting feature species	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, slight and long term at a local level	Yes, refer to Section: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Imperceptible
	Tarbert Bay pNHA	National	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream and Shannon Estuary: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting feature species	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, slight and long term at a local level	Yes, refer to Section: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Imperceptible
	Scattery Island pNHA	National	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream and Shannon Estuary: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting feature species	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, slight and long term at a local level	Yes, refer to Section: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Imperceptible
	Poulnasherry Bay pNHA	National	Indirect impacts due to hydrological links with the proposed development site via the Ralappane stream and Shannon Estuary: Degradation of water quality through silt/sediment generation and hydrocarbon spill Noise disturbance impacting feature species	The proposed development will be operational 24 hours a day, seven days a week. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Negative, slight and long term at a local level	Yes, refer to Section: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Imperceptible

Feature		Highest Value within ZoI	Potential Impacts During Construction Phase	Potential Impacts During Operational Phase	significance of effects with no Mitigation	Mitigation Proposed	Significance of effects with Mitigation
Habitats	WL2 Treelines	Local Importance (Higher Value)	Direct Habitat Loss – temporary and permanent	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Site lighting if incorrectly positioned could illuminate treelines in surrounding habitat reducing the suitability of this habitat type as a foraging and commuting corridor for certain species such as lesser horesehoe bat. Replanting of habitat is also restricted upto 3m from cable route.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2	Negative, not significant and long term at a local level
	WL1 Hedgerows	Local Importance (Higher Value)	Direct Habitat Loss – temporary and permanent	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Site lighting if incorrectly positioned could illuminate treelines in surrounding habitat reducing the suitability of this habitat type as a foraging and commuting corridor for certain species such as lesser horesehoe bat. Replanting of habitat is also restricted upto 3m from cable route.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2	Negative, not significant and long term at a local level
	WS1 Scrub	Local Importance (Higher Value)	Direct Habitat Loss – temporary and permanent	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance. Site lighting if incorrectly positioned could illuminate scrubland in surrounding habitat reducing the suitability of this habitat type as a foraging, residential and commuting habitat for certain species such as badgers.	Negative, moderate and long term at a local level	Yes, refer to Section: 9.7.1 9.7.2	Negative, not significant and short term at a local level
	GS1 Dry Calcareous and Neutral Grassland	Local Importance (Higher Value)	Direct Habitat Loss – temporary and permanent	The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Section: 9.7.2	Negative, not significant and short term at a local level
	GM1 Marsh	Local Importance (Higher Value)	Direct Habitat Loss – temporary	The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations.	Negative slight and short term at a local level	Yes, refer to Section: 9.7.2	Negative, not significant and short term at a local level

Feature		Highest Value within ZoI	Potential Impacts During Construction Phase	Potential Impacts During Operational Phase	significance of effects with no Mitigation	Mitigation Proposed	Significance of effects with Mitigation
	GS4 Wet Grassland	Local Importance (Higher Value)	Direct Habitat Loss – temporary and permanent	The cable route will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.2	Negative, not significant and short term at a local level
	FW2 Lowland Depositing Stream	Local Importance (Higher Value)	Pollution - Degradation of water quality through silt/sediment generation and hydrocarbon spill	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Site lighting if incorrectly position could illuminate treelines in surrounding habitat reducing the suitability of this habitat type as a foraging and commuting corridor for certain species such as lesser horseshoe bat. As well as aquatic species.	Negative, moderate and short-term at local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3	Imperceptible
	FW4 Drainage Ditch		Direct Habitat Loss – temporary Pollution - Degradation of water quality through silt/sediment generation and hydrocarbon spill	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3	Negative, not significant and short term at a local level
	GS2 Dry Meadows and Grassy Verge	Local Importance (Higher Value)	Direct Habitat Loss – temporary	The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs.	Negative, slight and short term at a local level.	Yes, refer to Sections: 9.7.2	Negative, not significant and short term at a local level
Non-Volant Mammals	Badger	Local Importance (Higher Value)	Mortality or Injury Disturbance Displacement Loss of foraging habitat/territory Habitat fragmentation Loss of sett	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs. Site lighting if incorrectly position could illuminate surrounding habitat reducing the suitability of habitat types as a foraging, residential and commuting habitat for badgers. Modification of habitats as a result of the proposed development causing fragmentation of badger habitats.	Negative, significant and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.5	Negative, moderate and long term at a local level
	Otter	International Importance	Loss of foraging habitat Habitat fragmentation Disturbance Displacement	The proposed development will be operational 24 hours a day, seven days a week. Site lighting if incorrectly position could illuminate surrounding habitat reducing	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3	Negative, not significant and short-term term at a local level

Feature		Highest Value within ZoI	Potential Impacts During Construction Phase	Potential Impacts During Operational Phase	significance of effects with no Mitigation	Mitigation Proposed	Significance of effects with Mitigation
			Impact to potential prey source (European eel)	the suitability of habitat types as a foraging, residential and commuting habitat for otters. Modification of habitats as a result of the proposed development causing fragmentation of otter habitats. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.		9.7.4	
Bats	Bats (Common Pipistrelle, Soprano Pipistrelle, Leisler's, Brown Long-Eared, Lesser Horseshoe, *Myotis sp.*)	Local Importance (Higher Value)	Loss of foraging habitat Loss of commuting habitat Loss of roosting habitat Habitat fragmentation Disturbance Displacement	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs. Site lighting if incorrectly position could illuminate treelines in surrounding habitat reducing the suitability of this habitat type as a foraging and commuting corridor for certain species such as lesser horseshoe bat. Replanting of habitat is also restricted up to 3m from cable route causing fragmentation of linear features and gaps reducing the suitability of treelines and hedgerows for foraging and commuting routes for bats such as lesser horseshoe bats.	Permanent slight negative effect at a local scale	Yes, refer to Sections: 9.7.1 9.7.2 9.7.6	Negative, slight (non-significant) and short-term term at a local level
Amphibians	Common Frog	Local Importance (Higher Value)	Mortality or Injury during vegetation clearance Habitat loss	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, slight and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.10	Negative, not significant and short-term at a local level
Birds	SCI birds (River Shannon and River Fergus Estuaries SPA)	Local Importance (Higher Value)	Disturbance Displacement Loss of foraging habitat Pollution	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Negative, not significant, short term at a local level

Feature		Highest Value within ZoI	Potential Impacts During Construction Phase	Potential Impacts During Operational Phase	significance of effects with no Mitigation	Mitigation Proposed	Significance of effects with Mitigation
	Annex I species	Local Importance (Higher Value)	Disturbance Displacement Loss of foraging habitat Pollution	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Negative, not significant, short term at a local level
	Red list bird species (Non-SCI)	Local Importance (Higher Value)	Mortality or Injury Disturbance Displacement Loss of breeding habitat Loss of foraging habitat	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Negative, not significant, short term at a local level
	Amber list species	Local Importance (Higher Value)	Mortality or Injury Disturbance Displacement Loss of breeding habitat Loss of foraging habitat	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs requiring localised areas of habitat clearance.	Negative, moderate and long term at a local level	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3 9.7.7 9.7.8	Negative, not significant, short term at a local level
Aquatic Species	European Eel	Local Importance (Higher Value)	Disturbance Displacement Loss of nursery habitat Pollution	The proposed development will be operational 24 hours a day, seven days a week. The cable route will require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs. Site lighting if incorrectly position could illuminate surrounding habitat reducing the suitability of habitat types as a foraging, residential and commuting habitat for European eel. Discharge of stormwater runoff from the site could introduce silt, sediment and pollutants such as chemicals and hydrocarbons from vehicle movement on site.	Short-term moderate effects at a local scale	Yes, refer to Sections: 9.7.1 9.7.2 9.7.3	Imperceptible

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Chapter 10 - Air

July 2024

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10 Air

10.1 Introduction

This chapter provides an assessment of the potential effects and likely significance of the proposed development on local air quality.

The assessment of air quality has been carried out by competent air quality professionals in accordance with the Appendix B of the Transport Infrastructure Ireland (TII) guidance[1]. The assessment of air quality has also been carried out in accordance with the Institute of Air Quality Management's (IAQM) 'Guidance on the assessment of dust from demolition and construction', January 2024[2] and addresses the impacts resulting from air emissions.

The proposed development involves the construction and operation of two 220kV substations, a shunt reactor, internal access road and two 220kV underground cable circuits and fibre optic lines between the Shannon Technology and Energy Park (STEP) and existing Kilpaddoge Substation. Further details regarding the project's description can be found in Chapter 5 Description of the Proposed Development. For completeness, the proposed development does not contain any operational air emission points.

The air quality assessment includes:

- Identification of applicable legislation and emission limits;
- Assessment of existing air quality conditions in the study area;
- Assessment of construction dust and construction road traffic effects;
- Assessment of operation and maintenance road traffic effects; and
- Identification of mitigation measures for both construction and operation and maintenance phases where necessary.

10.2 Policy and Guidance

10.2.1 National Legislation

10.2.1.1 Ambient Air Quality

Directive 2008/50/EC[3] on Ambient Air Quality and Cleaner Air for Europe was adopted in May 2008 and consolidates previous air quality directives (apart from the Fourth Daughter Directive). This Directive sets out a range of mandatory limit values (LVs) for different pollutants and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. The Directive 2008/50/EC was transposed into Irish legislation by the Ambient Air Quality Standards Regulations[4]. The Fourth Daughter Directive sets health-based limits on polycyclic aromatic

[1] Transport Infrastructure Ireland (TII) (December 2022). 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document' (PE-ENV-01106). Accessible at: https://www.tiipublications.ie/library/PE-ENV-01106-01.pdf

[2] Institute of Air Quality Management (January 2024 (Version 2.2)). 'Guidance on the assessment of dust from demolition and construction.'

[3] European Union. (April 2008), 'Directive on Ambient Air Quality and cleaner Air for Europe', Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044.

[4] Ambient Air Quality Standards Regulations 2022 (S.I. No 739 of 2022)

hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable

The Air Quality Standards Regulations[5] implement the Directive 2008/50/EC and define the air quality standards currently applicable in Ireland. These regulations set out upper and lower assessment thresholds for the pollutants of concern. The Air Quality Standards include thresholds to encourage a higher standard of air quality where possible.

Table 10.1 presents the air quality standards and target values for the pollutants relevant to this assessment as prescribed by the EU and Irish legislation, hereafter referred to as air quality standards (AQS). Standards for the protection of vegetation and ecosystems are referred to as 'critical levels'.

Table 10.1: Air Quality Standards for NO_x and NO

Pollutant	Averaging period	AQS / Critical Level ($\mu g/m^3$)	Allowance	Limit Value Attainment Date
For the protection of human health				
Nitrogen dioxide (NO_2)	1-hour	200	18 times pcy	1 Jan 2010
	Annual	40	–	1 Jan 2010
Particulates (PM_{10})	24-hour	50 $\mu g/m^3$	35 times pcy	1 Jan 2005
	Annual	40 $\mu g/m^3$	–	1 Jan 2005
Fine particulates ($PM_{2.5}$)	Annual	25 $\mu g/m^3$	–	1 Jan 2015
	Annual	20 $\mu g/m^3$	–	1 Jan 2020
Critical level for the protection of vegetation and ecosystems				
Nitrogen oxides (NO_X)	Annual	30	–	

Source: Environmental Protection Agency Air Quality Standards[6]
Notes: pcy = per calendar year

The AQS presented in Table 10.1 are for the protection of human health and only apply at locations of relevant exposure. The Air Quality Standards Regulations sets out that the limit values (AQS) apply everywhere with the exception of:

a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;
b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply;
c) on the carriageway of roads; and
d) on the central reservations of roads except where there is normally pedestrian access to the central reservation.

The areas where the critical levels for the protection of vegetation apply are as follows:

a) More than 20 kilometres (km) from an agglomeration (i.e. an area with a population of more than 250,000); and
b) More than 5 kilometres away from other built-up areas, industrial installation or motorways or major roads with traffic counts of more than 50,000 vehicles per day.

[5] Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)

[6] Environmental Protection Agency (2021). 'Air Quality Standards'. Available at: https://airquality.ie/information/air-quality-standards

10.2.2 National Policy

10.2.2.1 National Air Emission Targets

Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (hereafter referred to as the National Emissions Reduction Directive) was published in December 2016.

The National Emissions Reduction Directive applied the limits set out in Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (hereafter referred to as the National Emission Ceiling Directive) until 2020 and established new national emission reduction commitments which are applicable from 2020 and 2030 for SO_2, NO_X, non-methane volatile organic compounds (NMVOC), ammonia (NH_3), $PM_{2.5}$ and methane (CH_4).

In relation to Ireland, the 2020 to 2029 emission targets are 25 kt (kilotonnes) for SO_2 (65% on 2005 levels), 69kt for NO_X (49% reduction on 2005 levels), 57kt for NMVOCs (25% reduction on 2005 levels), 118 kt for NH_3 (1% reduction on 2005 levels) and 15 kt for $PM_{2.5}$ (18% reduction on 2005 levels) as shown in Table 10.2. In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$, also shown in Table 10.2.

The report Ireland's Air Pollutant Emissions 1990 – 2030[7] discusses the outlook for future compliance with 2030 targets. It notes that SO_2, NO_x, NH_3 and $PM_{2.5}$ targets are projected to be met in 2030 with existing policies and measures, however no measures have yet been set to ensure compliance with NMVOC emission ceiling for 2030.

Table 10.2: National Air Emission Target (Ireland Air Pollutant Emissions 2020 to 2030)

Pollutant	2020 to 2029 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)	2030 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)
SO_2	25.5	11.0
	-65%	-85%
NO_X	69.0	42.0
	-49%	-69%
NMVOC	57.0	51.6
	-25%	-32%
NH_3	118.4	113.6
	-1%	-5%
$PM_{2.5}$	15.5	11.2
	-18%	-41%

Source: Ireland's Air Pollutant Emissions 1990-2030.

[7] Environmental Protection Agency (2022), Ireland's Air Pollutant Emissions – 1990-2030. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Irelands-Air-Pollutant-Emissions-report_2021Final.pdf (accessed 23 February 2024)

10.2.2.2 Clean Air Strategy

The Clean Air Strategy was published in April 2023[8] and provides the high-level strategic policy framework to identify and promote the integrated measures across government policy that are required to reduce air pollution and promote cleaner ambient air, while delivering on wider national objectives. The strategy commits Ireland to achieving the new World Health Organisation (WHO) guideline values for air quality by 2040, with progress to be measured against interim targets by 2026 and 2030. This Strategy sets out seven strategic frameworks includes:

- Targetted policy measures
- Ambition and strong governance
- Policy developments
- Legislation
- Enforcement
- Monitoring
- Communications

The aims of these key strategic frameworks are:

- To set the appropriate targets and limits to ensure continuous improvements in air quality across the country, to deliver health benefits for all.
- To ensure the integration of clean air considerations into policy development across Government.
- To increase the evidence base that will help us to continue to evolve our understanding of the sources of pollution and their impacts on health, in order to address them more effectively.
- To enhance regulation required to deliver improvements across all pollutants.
- To improve the effectiveness of our enforcement systems.
- To promote and increase awareness of the importance of clean air, and the links between cleaner air and better health.
- To develop the additional targeted/specific policy measures as required to deal with national or local air quality issues.

10.2.2.3 Climate Action Plan 2019, 2021, 2023 and 2024

The Climate Action Plan was first published in 2019[9] and detailed the proposed cross-sectoral policy measures for addressing climate change by setting out 200 different actions that could be implemented to meet its 2030 targets consistent with a net zero target by 2050. Some of the main actions aimed at increasing electricity generated from renewables to 80% through the Government's flagship support scheme, reducing EU Emission Trading System (ETS) industry emissions by 10-15% compared to projections, and increasing the number of Electric Vehicles (EVs) and Low-Emission Vehicles (LEVs) to 936,000.

However, Ireland will have to reduce its total greenhouse gas (GHG) emissions by 7% annually to meet its 2030 objectives, which will require a step up in its effort. This has been detailed in a

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[8] Department of the Environment, Climate and Communications; Clean Air Strategy. Available at: https://www.gov.ie/en/press-release/aa501-government-approves-irelands-first-ever-clean-air-strategy/#:~:text=The%20new%20Clean%20Air%20Strategy,polluting%20fossil%20fuels%2C%20for%20example.

[9] Department of the Environment, Climate and Communications; Climate Action Plan 2019. Available at: https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/ (23 February 2024)

Climate Action Plan 2021[10] which outlines 493 actions to be undertaken by the Irish Government. These include increasing the share of electricity demand being sourced by renewables to 80%, improving public transport infrastructure to increase active travel journeys by 14%, and decarbonising heat and building materials.

The Climate Action Plan 2023 is the second annual update to Ireland's Climate Action Plan 2019 and was published on 21 December 2022. This plan outlines 305 actions required to 2025 and beyond. These includes publishing roadmap for the development and implementation of Regional Renewable Electricity Strategies, 20% reduction in total vehicle kilometres, a reduction in fuel usage; and supporting the growth and development of district heating, electrification of heating and geothermal energy.

The Climate Action Plan 2024 is the third annual update to Ireland's Climate Action Plan 2019 and was initially published on 20 December 2023. The final version of the Climate Action Plan 2024 was approved by the government on 21 May 2024. This plan builds upon the Climate Action Plan 2023 by refining and updating the measures and actions required to deliver the carbon budgets and sectoral emissions ceilings. The Plan provides a roadmap for taking decisive action to halve Ireland's emissions by 2030 and reach net zero by no later than 2050, as committed to in the Climate Action and Low Carbon Development (Amendment) Act 2021. These includes reduction in total vehicles kilometres and fuel usage, and increase in sustainable transport trips, decrease embodied carbon in construction materials produced and used in Ireland by 10%, reduce agricultural nitrogen use to a maximum of 330,000 tonnes, etc.

It is recognised that many of the actions in the Climate Action Plan will have significant co-benefits on air quality by reducing emissions of air pollutants such as NO_x, SO_2, $PM_{2.5}$ and NH_3.

10.2.3 Local Policy

The proposed development lies within the local government area of Kerry County Council, which has the potential to be affected by air quality impacts. Local government policies and strategies on air quality, where relevant to the proposed development, are summarised below.

10.2.3.1 Kerry County Development Plan 2022-2028

The KCC Development Plan comprises of number of polices which set out the framework for development across the County 2022-2028.

The policies relevant to air quality are KCDP 11-31 and KCDP 11-32, which states:

"*KCDP 11-31 Improve and maintain good air quality and support measures to prevent harmful effects on human health and the environment in our urban and rural areas*.

KCDP 11-32 Promote the development of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions and promotion of measures that improve air quality including provision and management of green infrastructure."

[10] Department of the Environment, Climate and Communications; Climate Action Plan 2021. Available at: https://www.gov.ie/en/publication/67104-climate-action-plan/#climate-action-plan-2019 (23 February 2024)

10.2.3.2 Kerry County Council's Local Authority Climate Action Plan 2024 -2029

The Kerry County Council (KCC) Local Authority Climate Action Plan (LACAP)[11] was adopted in 2024. The LACAP are statutory 5-year plans and are to include mitigation and adaption actions that ultimately provide pathways to achieve a decarbonised society. The LACAP set out five strategic goals includes:

- Strategic goal 1: Built environment and Transport
- Strategic goal 2: Natural environment and green infrastructure
- Strategic goal 3: Sustainability and resource management
- Strategic goal 4: Communities, resilience and transition
- Strategic goal 5: Governance and leadership

The objectives of strategic goals relevant to air quality are Objectives 1.3, 1.4.and 1.5, which states:

Objectives 1.3 – Reduce transport emissions and support decarbonisation of KCC fleet.

Objectives 1.4 – Support decarbonisation of transport in the county.

Objectives 1.5 – Increase the availability and utilisation of sustainable transport infrastructure.

10.2.4 Guidance

In addition to the specific statutory air quality standards, the assessment has referred to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of ambient air quality impacts. These are summarised below:

- Environmental Protection UK and Institute of Air Quality Management (2017), 'Land-Use Planning and Development Control: Planning for Air Quality'.
- Institute of Air Quality Management (2024). 'Guidance on the assessment of dust from demolition and construction.

10.3 Assessment Methodology

10.3.1 Approach to Data Collection

The air quality assessment has been assessed based on the information as presented in Table 10.3.

Table 10.3: Data source for air quality assessment

Data source	Date	Data contents
Project team	19 March 2024	Application site boundary
Project team	1 May 2024	Construction traffic for screening of need of assessment
Environmental Protection Agency (EPA)	1 March 2024	Ambient air quality monitoring

[11] Kerry County Council, Kerry County Council Local Authority Climate Action Plan 2024-2029 (January 2024). Available at: https://www.kerrycoco.ie/kerry-county-council-local-authority-climate-action-plan-2024-2029/#:~:text=Kerry%20County%20Council%20Local%20Authority%20Climate%20Action%20Plan%202024%2D2029,-Public%20Notice&text=Notice%20is%20hereby%20given%20that,Climate%20Action%20Plan%202024%2D2029.

10.3.2 Approach to Impact Assessment

10.3.2.1 Construction Phase Methodology

Construction Dust Emissions

Construction activities can result in temporary effects from dust. Dust is a generic term and usually refers to particulate matter in the size range of 1-75 microns in diameter. The most common impacts from dust emissions are soiling and increased ambient PM_{10} concentration. Dust can arise from numerous construction activities such as concrete batching, piling, wind erosion on material stockpiles and earth moving. It can be mechanically transported either via wind or through the movements of vehicles onto public highways (transport of debris on vehicle wheels or uncovered loads).

Guidance from the IAQM[2] recommends splitting the construction activities into four separate source categories and determining the dust risk associated with each of these individually. Each assessment has determined the risk of each of the following categories:

- Demolition;
- Earthworks;
- Construction; and
- Trackout[12].

The risk of each source for dust effects can be described as 'negligible, 'low risk', 'medium risk' and 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction activities or site boundary. Each assessment is used to identify the mitigation measures proportional to the level of risk to reduce the effects such that they are not significant.

Each assessment considers three separate effects from dust:

- Annoyance due to dust soiling;
- Harm to ecological receptors with account being taken of the sensitivity of the area that may experience these effects; and
- The risk of human effects due to increased exposure to PM_{10}.

As per the IAQM guidance, Step 1 of each assessment applies screening criteria to the proposed development which states that an assessment will be required where there is:

- A 'human receptor' within:
  - 250m of the boundary of the site; and
  - 50m of the route(s) used by construction vehicles on the public highway up to 250m from the site entrance(s).
- An 'ecological receptor' within:
  - 50m of the boundary of the site; and
  - 50m of the route(s) used by construction vehicles on the public highway up to 250m from the site entrance(s).

No further assessment is required if there are no receptors within the defined boundaries.

[12] Trackout = "The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/ demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site" as defined by the IAQM Guidance on the assessment of dust from demolition and construction

To assess the likely dust risk, the need to quantify the overall dust emission magnitude ('small', 'medium' or 'large') from each of the dust sources identified (demolition, earthworks, construction and trackout) is first established in alignment with the criteria provided in Table A.10.1 in Appendix 10.1.

The sensitivity of receptors is then defined (as 'high', 'medium' or 'low') for each dust effect (dust soiling, human health and ecosystem impacts) and the sensitivity of the surrounding area determined for each activity. The sensitivity of the area is based on the distance of the source to the closest receptors, the receptors sensitivity and in the case of PM_{10} effects, the local background concentration, as outline in Table A.10.2 to Table A.10.5 in Appendix 10.1. The highest level of area sensitivity defined for dust effect has been used in each assessment.

The final step of the assessment combines the dust emission magnitude and the sensitivity of the area to determine the dust risk categories for each activity for dust soiling and health effects, as outlined in Table A.10.6 to Table A.10.9 in Appendix 10.1.

The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that, in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation. To determination of the significance effects, as recommended in the IAQM guidance, implementation of proportional and appropriate mitigation measures should result in construction dust having a negligible impact on air quality and the overall effect being not significant. There may be some cases, for example, there is inadequate access to water for dust suppression to be effective, and even with other mitigation measures in place there may be a significant effect. Results of the dust assessment are presented in Section 10.5.1.

Construction site plant and machinery emissions

Construction requires the use of different equipment such as excavators, cranes and on-site generators. All construction plant has an energy demand, with some resulting in direct emission to air from exhausts. The IAQM 'Guidance on the assessment of dust from demolition and construction'[2] includes some discussion of onsite plant and non-road mobile machinery (NRMM) emissions and states:

'*Experience of assessing the exhaust emissions from on-site plant (NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur.*'

Given the nature of the site plant, effects of plant emissions on local air quality are considered low and not significant compared to surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further with respect to air quality. However, mitigation measures to reduce the impacts on local air quality are presented in Section 10.7.1.

Construction road traffic emissions

The Environmental Protection UK and Institute of Air Quality Management (EPUK / IAQM)[13] guidance indicates that an assessment of traffic emissions is only likely to be required for large, long term construction sites that will generate an additional annual average daily traffic (AADT)

[13] Environmental Protection UK and Institute of Air Quality Management (2017), 'Land-Use Planning and Development Control: Planning for Air Quality'

flow of greater than 100 Heavy Duty Vehicles (HDVs [14] greater than 3.5 tonnes) per day or greater than 500 Light Duty Vehicles (LDV[15] less than 3.5 tonnes) per day.

10.3.2.2 Operation and Maintenance Phase Methodology

Operational road traffic emissions

The proposed development will construct and operate two substations and a 220kV underground cable between the Shannon Technology and Energy Park (STEP) and Kilpaddoge Substation. As presented in Chapter 5, access may be required on rare occasion for maintenance.

Given the frequency of maintenance, the effects of operation road traffic contributions from the proposed development are considered low and not significant. On this basis, no further consideration has been given to the effects of construction road traffic on ambient air quality.

Operational combustion emissions

An emergency diesel generator will be provided within each Gas Insulated Switchgear (GIS) substation building. There are two GIS buildings within the proposed development. As presented in Section 5.3.1, these generators are only run in emergency scenarios as a back-up power for the ancillary electrical services in each substation and will be in rare cases such as the loss of main power.

The EPA guidance[1] indicates that emergency generators are not required to meet Emission Limit Values (ELVs) set in the Medium Combustion Plant (MCP) Regulations provided operational hours for each emergency generator are restricted to a maximum of 500 hours per annum, as a rolling average over 5 years (existing plant), or over 3 years (new plant). The operation hours of each emergency generator is well below the criteria set in the EPA guidance. Therefore, no ELVs are required for these emergency generators. Given the nature of these generators, effects of these emergency generators on local air quality are considered of negligible impact. Therefore, combustion emissions from these emergency generators have not been assessed further.

10.3.3 Study Area

For the construction phase, the study area covers human health receptors and ecologically designated sites within 250m of the construction site boundary and within 50m of the routes used by construction vehicles on the public highway, up to 250m from the site entrances.

As mentioned in Section 10.3.2.1 and 10.3.2.210.3.2.2, no further considerations have been given to the effects of operational and maintenance, and construction traffic and construction plant. As such these have not been included in the study area.

10.3.4 Limitations of this EIAR

As discussed in Section 10.4.2 background air concentration data from 2020 and 2021 have the potential to be impacted by effects associated with the coronavirus pandemic such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations. Therefore, data from 2020 and 2021 may not be representative of existing concentrations.

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[14] HDV is refer to heavy good vehicles (HGVs) and buses greater than 3.5 tonnes.

[15] LDVs is refer to cars and small vans less than 3.5 tonnes.

[1] Environmental Protection Agency (EPA) (December 2021), ‘Operation of Emergency Generation Plant by Large Energy Users’. Accessible at: https://www.epa.ie/publications/licensing--permitting/industrial/ied/Advice-Note-on-large-scale-EG-operation-21122021.pdf

10.4 Receiving environment

10.4.1 Overview

Information on existing air quality in Ireland can be obtained from the Environmental Protection Agency (EPA) who undertake monitoring at a number of locations across the country. For the purpose of air quality, Ireland is split into four main regions:

- Zone A: Dublin conurbation;
- Zone B: Cork conurbation.
- Zone C: 23 cities and large towns with population >15,000 (Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise); and
- Zone D: Rural Ireland, i.e. the remainder of the state excluding zones A, B and C.[16]

10.4.2 Background Air Concentrations

The proposed development is located within Zone D (rural Ireland). The Zone D monitoring station closest to the proposed development is located in Askeaton, a background site monitoring PM_{10}, $PM_{2.5}$, SO_2 and metal approximately 28.7km east of the proposed alignment. However, NO_2 is not monitored at this site. The next closer Zone D monitoring, Birr, to the proposed development is located approximately 115km northeast of the proposed development. However, the characteristic of Birr monitoring is located in inland area, which is different from that of the proposed development (near coastal area). Therefore, data from the Zone D monitoring site at Castlebar, which is located at 142km distance from the proposed development in a similar suburban background environment near coastal area have also been presented. NO_2, PM_{10} and ozone are monitored at this site. Other monitoring sites in Zone D are closer to the development but are less representative of the study area.

Monitoring data from two suburban monitoring sites (Ennis and Limerick People's Park) in Zone C have been reviewed due to their closer proximity to the proposed development. Ennis is located approximately 41km to the northeast of the proposed development, while Limerick People's Park is located approximately 52km to the northeast of the proposed development. At the Ennis station, PM_{10}, $PM_{2.5}$ and SO_2 are monitored. At the Limerick People's Park, PM_{10}, $PM_{2.5}$, NO_2 and Ozone are monitored.

Locations and pollutants monitored at each station are summarised in Table 10.4, together with the rationale for reporting each station.

Table 10.4: Air quality monitoring stations

Site Name	Location		Site Type	Distance from proposed development	Pollutants monitored	Rationale for reporting
	X	Y				
Askeaton	534231	649225	Rural background Zone D	28.7km	PM_{10}, $PM_{2.5}$, SO_2 and metal	Closest to project area
Ennis	533342	677367	Suburban background Zone C	41km	PM_{10}, $PM_{2.5}$ and SO_2	PM_{10} and $PM_{2.5}$ monitoring close to proposed development (not representative of project area)

[16] Environmental Protection Agency (2021), 'Air Quality Zones'. Available at; https://airquality.ie/information/air-quality-zones

Site Name	Location		Site Type	Distance from proposed development	Pollutants monitored	Rationale for reporting
	X	Y				
Limerick People's Park	557458	656558	Suburban background Zone C	52km	PM_{10}, $PM_{2.5}$, NO_2 and Ozone	NO_2, PM_{10} and $PM_{2.5}$ monitoring close to proposed development (not representative of project area)
Castlebar	514462	789842	Suburban background Zone D	142km	NO_2, PM_{10}, Ozone	Representative site in Zone D, similar as proposed development

Source: EPA Annual Air Quality Reports and EPA Maps https://gis.epa.ie/EPAMaps/

Table 10.5 to Table 10.7 present the NO_2, PM_{10} and $PM_{2.5}$ monitoring results from these sites between 2018 and 2022. Data from 2020 and 2021 have the potential to be impacted by effects associated with the coronavirus pandemic such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations. Therefore, data from 2020 and 2021 may not be representative of existing concentrations.

Table 10.5: Annual mean NO_2 concentration

Site Name	Site Type	Annual mean NO_2 concentrations (µg/m^3)				
		2018	2019	2020	2021	2022
Limerick People's Park	Suburban background Zone C	_[(a)]	13 (33%)	10 (96%)	10 (100%)	10 (100%)
Castlebar	Suburban background Zone D	8 (99%)	8 (98%)	6 (93%)	6 (98%)	8 (100%)

Source: EPA Annual Air Quality Reports
Data Capture is presented in parenthesis
Askeaton and Ennis do not monitor NO_2 so are not presented above
(a) No data available (not yet operational or low data capture)

Table 10.6: Annual mean PM_{10} concentration

Site Name	Site Type	Annual mean PM_{10} concentrations (µg/m^3)				
		2018	2019	2020	2021	2022
Askeaton	Rural background Zone D	_[(a)]	_[(a)]	_[(a)]	9 (69%)	9 (96%)
Ennis	Suburban background Zone C	16 (84%)	18 (100%)	20 (100%)	19 (100%)	20 (94%)
Limerick People's Park	Suburban background Zone C	_[(a)]	_[(a)]	13 (94%)	13 (100%)	14(98%)
Castlebar	Suburban background Zone D	11 (93%)	16 (93%)	14 (96%)	10 (99%)	11 (97%)

Source: EPA Annual Air Quality Reports
Data Capture is presented in parenthesis
(a) No data available (not yet operational or low data capture)

Table 10.7: Annual mean $PM_{2.5}$ concentration

Site Name	Site Type	Annual mean $PM_{2.5}$ concentrations (µg/m^3)				
		2018	2019	2020	2021	2022
Askeaton	Rural background Zone D	_[(a)]	_[(a)]	_[(a)]	6 (77%)	6 (99%)
Ennis	Suburban background Zone C	10 (87%)	14 (84%)	14 (99%)	15 (99%)	16 (94%)
Limerick People's Park	Suburban background Zone C	_[(a)]	_[(a)]	9 (96%)	9 (99%)	9 (98%)

Source: EPA Annual Air Quality Reports
Data Capture is presented in parenthesis
Castlebar do not monitor $PM_{2.5}$ so are not presented above
(a) No data available (not yet operational or low data capture)

Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations monitored at these sites are all well below the respective national AQS. Overall, on average, annual mean NO_2 concentrations have decreased between 2018 and 2022. This is in part due to the coronavirus pandemic and the associated impact on reduced road travel in 2020 and 2021. Annual mean PM_{10} and $PM_{2.5}$ concentrations have increased slightly overall on average across the same period. This is likely to have been caused by conditions other than road traffic, such as industrial, agricultural and construction work.

Monitoring results from rural background site (Askeaton) and suburban background site (Castlebar), which could be considered representative of the project area, show annual average NO_2 concentrations was 7 µg/m³ at Castlebar past five years. Annual average PM_{10} concentrations was 9 µg/m³ at Askeaton and 12 µg/m³ at Castlebar in past five years.

In addition to the monitoring data made available by the EPA, there is also data available from other air quality assessments undertaken in the vicinity of the proposed development, including the EIAR for the Foynes to Limerick Road (including Adare Bypass) project. That report included NO_2 concentration data measured at several locations in Co. Limerick, to the east of the proposed development, over a period of 2 winter months. Whilst a 2-month survey of data cannot be directly comparable to the annual mean, measured roadside concentrations of 5.7 to 12.8 µg/m³ and background concentrations of 1.9 to 6.7 µg/m³ over winter months continue to demonstrate that existing local air quality in the vicinity of the proposed development is unconstrained.

The data summarised in above demonstrates that the existing airshed in the vicinity of the proposed development is unlikely to be constrained and concentrations are generally well below the respective Air Quality Standards.

10.5 Likely Significant Effects

10.5.1 Construction Phase

10.5.1.1 Construction Dust Emissions

The magnitude and sensitivity descriptors that have been applied to assess the overall effect of the construction phase are presented in Appendix 10.1. Table 10.8 presents a summary of the dust emission magnitude assigned to each construction activity based on these descriptors.

There are no ecological designated sites within 50m of potential dust sources of the proposed development or from roads to be used by construction traffic. The nearest ecological designation is the Lower River Shannon SAC located approximately 150m north and west of the substation/cable route. Therefore, ecological designations are not considered further.

Table 10.8: Dust emission magnitude

Activity	Dust emission magnitude	Justification
Demolition	N/A	No demolition works associated with this project.
Earthworks	Medium	Total site area is 18,000m² – 110,000m² for cable route while total site area is less than 18,000m² for civil works and less than 5 heavy earth moving vehicles are likely to be active at any one time. Assumed medium magnitude as worst-case scenario.
Construction	Small	Total building volume is less than 12,000m³ and materials would have a low potential for dust release (concrete, steel and metal cladding).
Trackout	Large	Assuming that civil works and cable would take place during the same period, it is estimated that there could be up to approximately 50 outbound heavy goods vehicle movements in a single day.

Table 10.9 presents the sensitivity of the receptors to effects caused by construction activities and is based on the criteria presented in Table A.10.2 to Table A.10.5, Appendix 10.1. Figure 11.7 and Figure 11.8 present the dust assessment buffers.

10.9: Area sensitivity

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	**Comment**	**Sensitivity**	**Comment**
Earthworks	High	There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of the work area. These are mainly located on road L1010.	Low	Background annual mean PM_{10} concentrations are <24µg/m^3[17] (see Table 10.5)) There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of the work area. These are mainly located on road L1010.
Construction	High		Low	
Trackout	High	There are approximately 10 - 100 high sensitivity receptors within 20m (residential properties) from the side of potential routes used for construction traffic (up to 250m from potential site exits).	Low	As above, background annual mean PM_{10} concentrations are <24µg/m^3[18] (See Table 10.5). There are approximately 10 - 100 high sensitivity receptors to health effects of PM_{10} are within 20m (residential properties) from the side of potential routes used for construction traffic (up to 250m from potential site exits).

The overall risk of receptors to dust soiling effects and PM_{10} effects are presented in Table 10.10. Risk is based on the criteria presented in Table A.10.6 to Table A.10.9 in Appendix 10.1.

Table 10.10: Summary of the risk of construction effects

Activity	Dust soiling effects	PM_{10} effects
Earthworks	Medium	Low
Construction	Low	Negligible
Trackout	High	Low

Dust soiling effects are ‘Low’ to ‘High’ and PM_{10} effects are ‘Negligible to Low’ without mitigation. Mitigation measures appropriate for the proposed development are presented in Section 10.7.1. These measures will be presented in the Construction Environmental Management Plan (CEMP) which accompanies the application.

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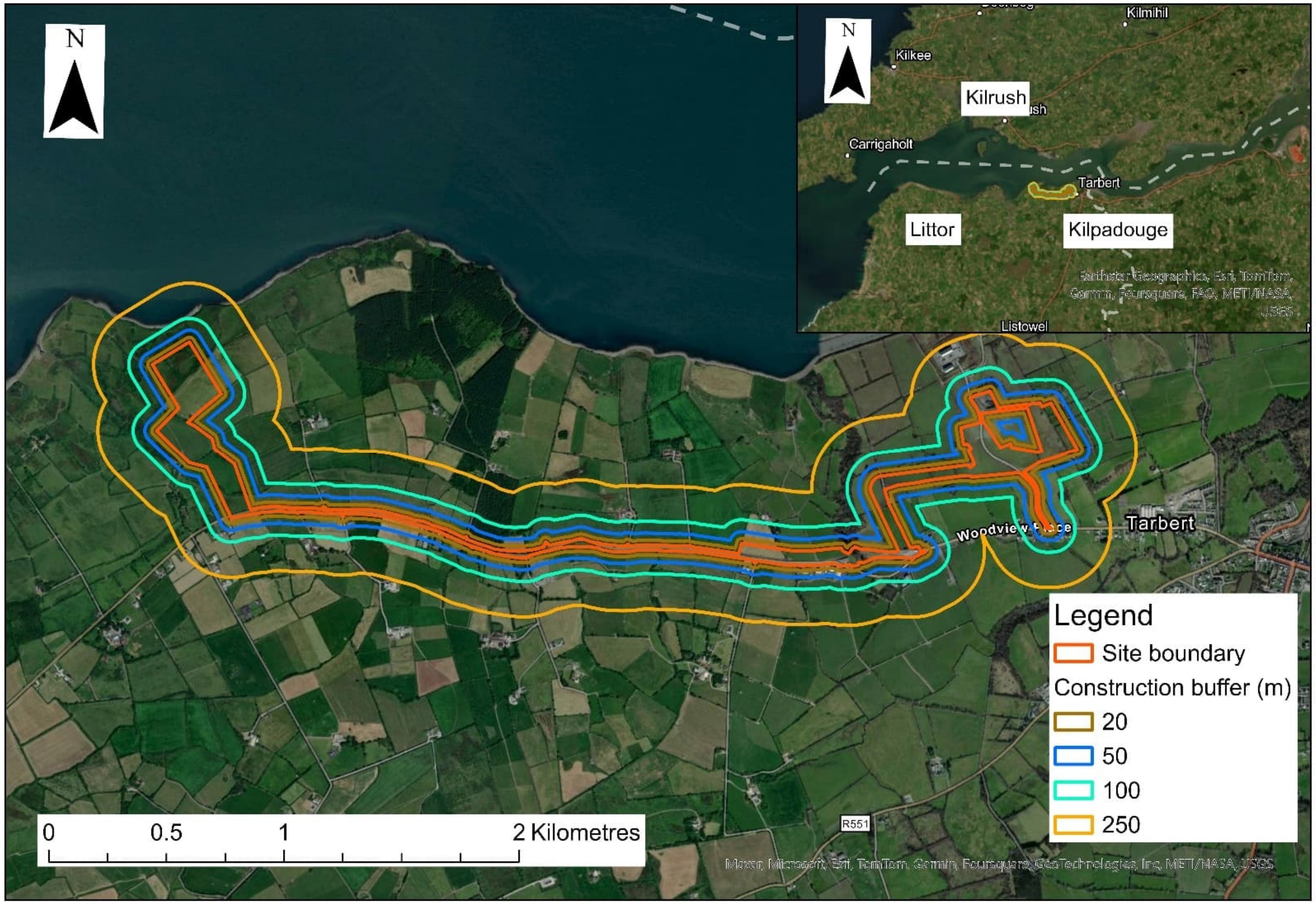
[17] EPA Data Archive – Summary Data Tables

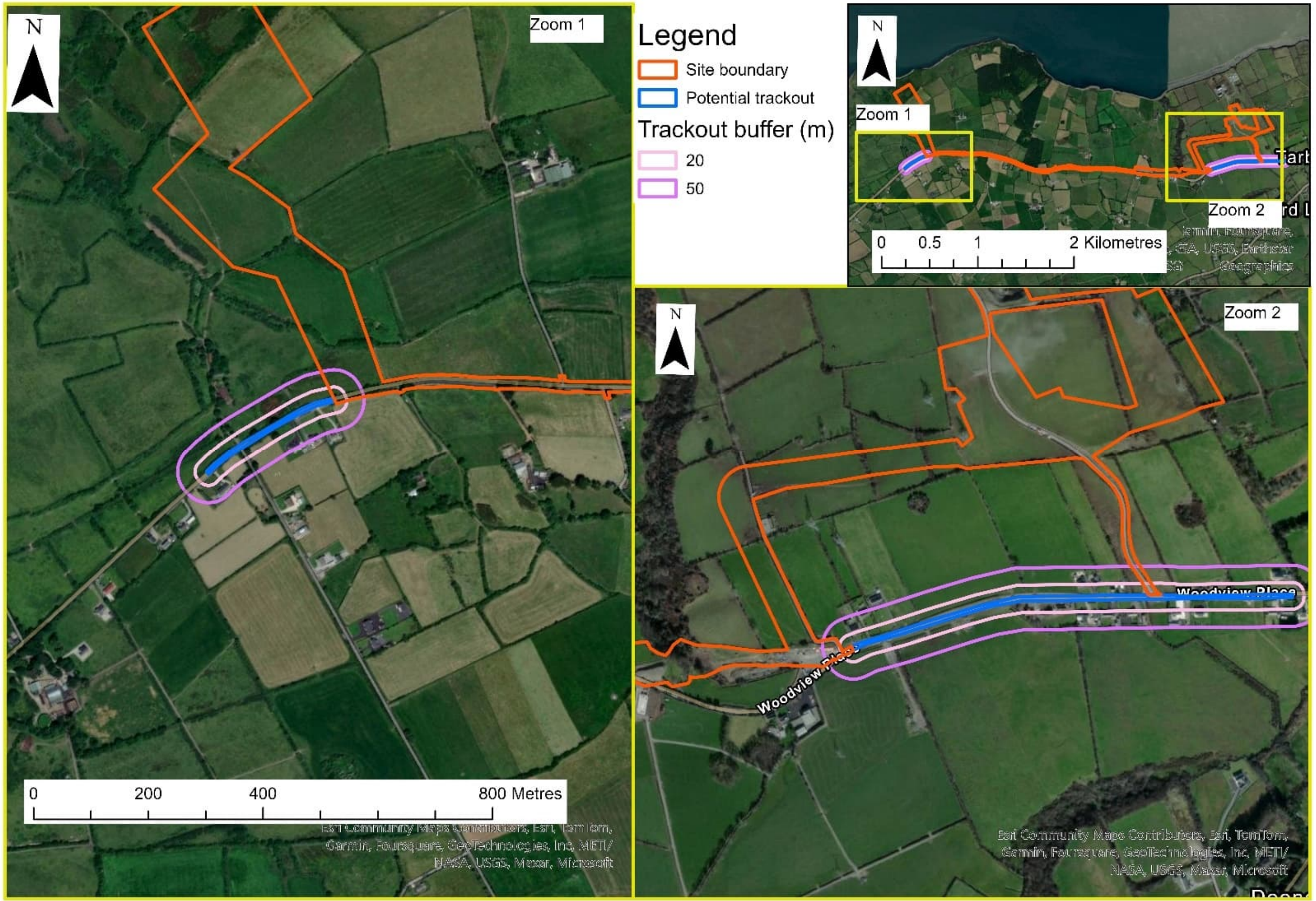
[18] EPA Data Archive – Summary Data Tables

Figure 10.1: Construction dust assessment buffers (earthworks and construction)



Source: Mott MacDonald

Figure 10.2: Construction dust assessment buffers (trackout)



Source: Mott MacDonald

10.5.1.2 Construction road traffic emissions

Following consultation with the proposed development engineering team, the construction of substations and underground cables phase will increase the number of HDV traffic movements to the area. It is expected that construction traffic movement during other construction phases (such as electrical works) would be insignificant. As presented in Chapter 5, works are required during the substation and underground cabling phases. During the 10-week site preparation and civil construction of the substation phase, the average daily flow is predicted to be approximately 16 HDV vehicles. Whereas during the 20-week underground cabling phase, the average daily flow is predicted to be approximately 48 HDV vehicle movements. These phases are not expected to overlap, however if this were to occur, the traffic movements would still be well below the 100 HDV movement threshold for the proposed development. Given the construction traffic generated is well below the EPUK/IAQM criteria, effects of construction traffic emissions on local air quality are considered to be low and not significant. On this basis, no further consideration has been given to the effects of construction road traffic on ambient air quality.

10.5.2 Operation and Maintenance Phase

As presented in Chapter 5, access may be required on rare occasion to facilitate cable replacement if failure occurs. Given the frequency of maintenance, the effects of operation road traffic contributions from the proposed development are considered of low and not significant.

10.5.3 Do Nothing Scenario

There would be no air quality impact in a Do-Nothing scenario. Therefore, no further Do-Nothing assessment has been made.

10.5.4 Decommissioning Phase

As presented in Chapter 5, it is expected that the Eirgrid substation and grid connection will form part of the national electrical grid infrastructure. The design life of the substation is approximately 40 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

The SLNG substation is expected to have a design life of 25 years. Where decommissioning takes place, all above-ground components associated with the substation will be disassembled and removed from the site and effects are likely to be similar or of a lesser magnitude than the construction effects. As part of the STEP Power Plant, it is expected that it would be a condition of the IE licence for the STEP Power Plant that a closure and residuals management plan, including a detailed decommissioning plan, be submitted to the EPA for their approval.

It is not intended to decommission the proposed electricity cabling. Equipment will be replaced but decommissioning is not intended. No detailed information is available to complete an assessment for the decommissioning. However, the impacts stated for the construction phase should be referred to for the decommissioning phase. Therefore, the impact of the decommissioning phase on air quality should be similar but less than those assessed during the construction phase, and the effects are considered to be not significant.

10.6 Cumulative Effects

10.6.1 Introduction

Cumulative construction impacts are possible where the construction of the proposed development coincides with the construction of any one of nine developments in the area (see Table 4.2 in Chapter 4 of this EIAR for further details of these developments).

Construction programmes of these nine projects are not available. It is therefore recommended, in line with IAQM guidance, that regular liaison meetings are held with construction sites within 250m of the site boundary to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. Provided this and other appropriate mitigation measures are implemented, such as those outlined in Section 10.7.1 of this chapter, the cumulative air quality impact associated with the construction dust will be considered low and not considered further.

The cumulative effects cannot be ruled out for construction traffic and the method and conclusions are discussed below.

As presented in Section 10.5.2, given the frequency of maintenance, the effects of operation road traffic contributions from the proposed development are considered of low**.** There are no cumulative impacts associated with the operational phase, therefore operational traffic impacts are not considered further.

10.6.2 Method

The impact of the cumulative construction with other developments has the potential to affect air quality by increasing traffic and by increasing the number of vehicles on the road network at a similar time to other. As presented in Section 17.7, the other developments have been considered for cumulative traffic assessment are as follows. The detail rational for selection of other developments can be referred to Table 17.24 in Chapter 17.

- 18878 – (Location: Kilpaddoge, Tarbert, Developer: Shannon Clean Tech Ltd) Construct a battery energy storage system (BESS) facility.
- 20850 - (Location: Kilpaddoge, Tarbert, Developer: Kilpaddoge Green Energy Ltd) Change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.
- 21/549 - (Developer: Donal Murphy Glencloosagh Energy Ltd) 10 year planning permission for a high inertia synchronous compensator compound containing electrical equipment containers.
- 18/392 - (Location: Tarbert Island, Tarbert, Developer: SSE Renewables (Ireland) Ltd) 10-year permission to construct a battery storage facility.
- 1825 - (Location: Ballybunion, Developer: Dan Ahern (Portfinch Ltd)) Solar PV farm consisting of a solar PV array of approximately 12.5 ha of solar panels within a total red line boundary of 14.16 ha.
- ABP 318540 (Location: Tarbert, Developer: SSE Generation Ireland Ltd) - 10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works.
- 23284 (Location: Various Locations in Co. Kerry, Developer: Harmony Solar Kerry Ltd) -10 year permission and 40 year operation for a solar farm of 146.6 hectares.
- ABP-PA08.319566 (Location: STEP Power Station, Developer: Shannon LNG) - Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above

Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024.[19]

- Gas Pipeline (Location: STEP Power Station, Developer: Shannon LNG) – planning permission exists for the development of a 26 km natural gas pipeline which will facilitate connection from the STEP Power Plant to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.

The traffic data used in this assessment was compiled by the proposed development traffic team. This data combines the total vehicle flows in annual average daily traffic flows, including HGV numbers for the proposed development, with the same traffic split from other developments in the area during the construction phase. The traffic data considers 10 traffic links close to the proposed development as presented in Table 17.25. There is limited information available about durations, therefore as a worst case, it has been assumed that all cumulative developments use these routes at the same time as the proposed development cabling stage, where the HGV movements are at their highest. In reality, they would likely be a staggering of flows, smoothing out across a number of months. Of the data from the 10 traffic links provided, nine traffic links trigger for further assessment using the criteria outlined within Section 10.3.2.1.

All 10 traffic links have been considered in cumulative change in traffic in Section 17.7 and presented in Table 10.11. The table presents the individual proposed development traffic flows and the cumulative flows. It should be noted that the proposed development has a small contribution relative to the other nine cumulative developments. 'N67 between N67/R551 junction and N67/N69 junction', through the small village of Tarbert, has the highest overall traffic change during the cabling stage of construction although there are a high number of flows in the surrounding road network.

The Roads Emission Model (REM) tool[20], provided by TII has been used to calculate the overall change at human health receptors. The REM provides a spatial and temporal estimate of equivalent emissions and the pollutant concentrations resulting from vehicular use on the National Roads Network. The REM integrates:

- Traffic information from the TII National Transport Model which provides validated estimates of the volumes of light and heavy vehicles, and the speed at which they travel, on the National Roads Network.
- A Fleet Mix database developed by researchers in the Energy Policy and Modelling Group at University College Cork for cars based on economic projections, and for other light and heavy vehicles by AECOM. The Fleet Mix database is underpinned by the Central Statistics Office's goods vehicles registration data (both heavy and light goods vehicles).
- Emission Rate Database derived from the European Environment Agency's (EEA) COPERT Emissions Tool - the EU industry standard vehicle emissions calculator – published in the EMEP/EEA air pollutant emission inventory guidebook. These data were adjusted further using data published in the UK by DEFRA.
- An Ambient Air Quality Model module, which calculates pollutants (NO_X, NO_2, PM_{10} and $PM_{2.5}$) released from each individual road link, using predictions of atmospheric pollutants concentration and dispersion, scaled up to an annual average concentration.

TII's REM calculates road transport emissions integrating traffic volumes/speeds for light and heavy vehicles on the Irish National Roads Network with Irish fleet composition information.

[19] As there is no data available or EIAR for the STEP Strategic Gas Emergency Reserve facility, this did not form part of the cumulative assessment.

[20] Road Emissions Model (REM) – Transport Infrastructure Ireland. Availabe at: Transport Infrastructure Ireland - Application Portal (tii.ie)

In addition to above, the REM Tool is used in conjunction with the Calculator for Road Emissions of Ammonia (CREAM)[21] to determine the appropriate ammonia emission rates for calculation at ecological designations.

[21] Air Quality Consultants - Air Quality Reports, Resources & Tools (aqconsultants.co.uk)

Table 10.11: Traffic data used in assessment

Route Section	Traffic Data for Proposed Development		Traffic Data for all ten Cumulative Developments		Combined	
	Total vehicles	HGVs	Total vehicles	HGVs	Total vehicles	HGVs
L1010 between Kilcolgan Upper and Ballylongford	88	48	1935	164	**2023**	**212**
L1010 between Tabert Coprehensive School and Kilcolgan Upper	88	48	2111	308	**2199**	**356**
L1010 between R551 and Tabert Comprehensive School	88	48	2111	308	**2199**	**356**
N67 between Tarbert Ferry Terminal and N67/R551 junction	2	0	426	62	428	62
N67 between N67/R551 junction and N67/N69 junction	86	48	2381	333	**2467**	**381**
N69 between N67/N69 junction and Ahalana	20	10	483	122	**503**	**132**
N69 between Ahalana and Listowel	20	10	483	122	**503**	**132**
N69 between N67/N69 junction and Glin	66	38	1993	278	**2060**	**317**
N69 between Glin and Foyles	66	38	1993	278	**2060**	**317**
N69 between Foyles and N18	66	38	472	140	**539**	**179**

Source: Mott MacDonald

Note: The traffic links triggering for assessment are highlighted in in bold

As mentioned in Section 10.2.1.1, the AQS only apply at locations of relevant exposure, therefore three human health receptors have been selected on the façade of residential properties on three different traffic links with the highest overall flows and HDVs. The chosen human health receptors have been presented in Table. 10.12 and displayed in Figure 10.3.

Table 10.12: Modelled human health receptors

Receptor ID	Road Link	Irish National Grid reference	
		X	Y
HH1	N69 between Glin and Foyles	512909	647501
HH2	N67 between N67/R551 junction and N67/N69 junction	506686	647736
HH3	L1010 between Tabert Coprehensive School and Kilcolgan Upper	506392	647838

The nearest ecological designations are the Lower River Shannon SAC as well as the River Shannon and River Fergus Estuaries SPA. A review of sensitive habitats for these designated sites was undertaken using Air Pollution Information System (APIS)[22] and in consultation with the proposed development ecologists. An ecological receptor covering the worst case habitat within the Lower River Shannon SAC ecological designation and at the closest point to the routes used by the cumulative developments has been selected and presented in Table 10.13 and Figure 1-.3.

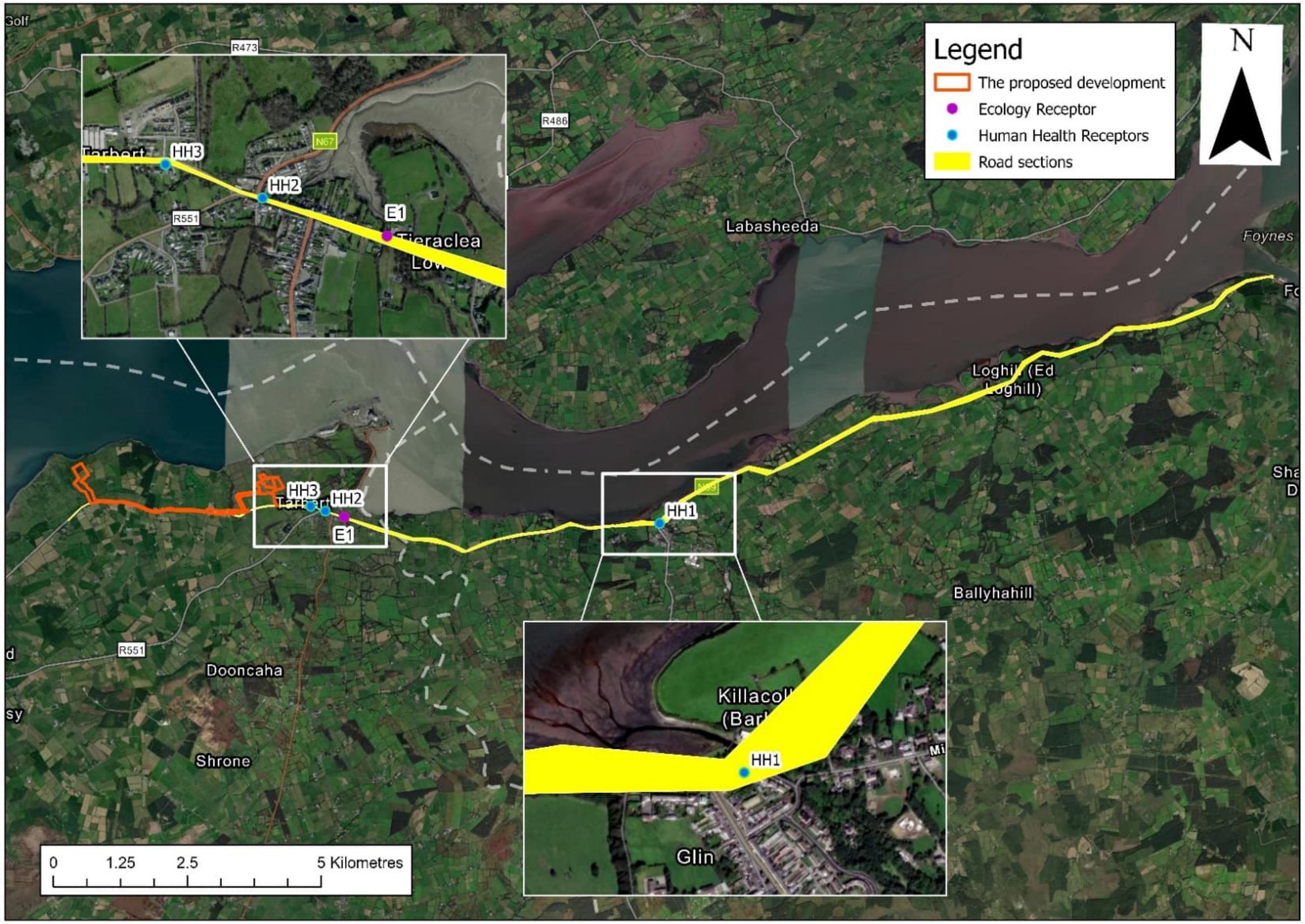
Table 10.13: Modelled ecological receptor

Ecological Designated site / Receptor ID	Sensitive Habitat	Lower critical load for nitrogen (kg N/ha/yr)	Ammonia critical level (μg/m^3)	Road Link	Irish National Grid reference	
					X	Y
Lower River Shannon SAC / E1	Pioneer, low-mid, mid-upper saltmarshes	20	3	N69 between N67/N69 junction and Glin	507038	647628

Note: River Shannon and River Fergus Estuaries SPA is in the same location as Lower River Shannon SAC / E1. Only Lower River Shannon SAC has been presented as a worse-case scenario.

[22] UK Air Pollution Information System (APIS) www.apis.ac.uk

Figure 10.3: Human health and ecological receptor locations



Source: Mott MacDonald

10.6.3 Results

10.6.3.1 Human Health

Table 10.14 presents the background pollutant concentration and the predicted effect of cumulative construction on pollutant concentration. The background concentrations for NO_2, PM_{10} and $PM_{2.5}$ are all well below their relevant objectives. Further, the predicted additional road contributions for all the pollutants are small. The largest change in concentration are small and would be for a short duration during the proposed development construction phase. It is therefore concluded that the cumulative effects on the worst-case human health receptors can be considered not to be significant.

Table 10.14: Background and predicted cumulative change in road pollutants

Receptor	Background NO$_2$ (µg/m^3)	Background PM$_{10}$ (µg/m^3)	Background PM$_{2.5}$ (µg/m^3)	Road NO$_2$ (µg/m^3)	Road NO$_X$ (µg/m^3)	Road PM$_{10}$ (µg/m^3)	Road PM$_{2.5}$ (µg/m^3)
HH1	8.0	11 6	0.8	1.4	0.5	0.3	
HH2	8.0	11	6	1.0	1.7	0.6	0.4
HH3	8.0	11 6	0.7	1.3	0.5	0.3	

10.6.3.2 Ecological

Table 10.15 presents a summary of the change in NO_X concentration for the ecological site and a comparison against the AQS (30µg/m^3). Changes in NO_X concentrations are predicted to be greater than 1% of the AQS. However, the NO_x concentrations at the worst-case receptor, E1, is within the standard of 30µg/m^3, and therefore not significant.

Table 10.16 presents a summary of the change in ammonia concentration for the ecological site using the CREAM tool and a comparison against the ammonia critical level. Changes in ammonia concentrations are predicted to be greater than 1% of the critical level. However, the ammonia concentrations at the worst-case receptor, E1, is below the critical level of 3µg/m^3, and therefore not significant.

Table 10.17 presents a summary of the change in nitrogen deposition for the ecological site, with an additional ammonia component applied using the CREAM Tool and percentage change in relation to the lower critical load. Results highlight that changes are greater than 1% of the relevant critical load. Potentially significant effects are therefore predicted. However, given the short time frame during which the increase in which traffic movements would occur and the dilution ratios and tidal influences within the Shannon Estuary on sensitive habitats, it is not considered that the impact from air emissions will be significant and will be imperceptible.

There is no applicable critical load for acid deposition to the sensitive habitat at Lower River Shannon SAC.

Table 10.15: NO_X critical level

Ecological Designated site / Receptor ID	Sensitive habitat	Distance to road (m)	NO_x background concentration (µg/m^3)	NO_X concentration (µg/m^3)	Comparison against air quality standards (µg/m^3)	Percentage change in relation to air quality standard
Lower River Shannon SAC / E1	Pioneer, low-mid, mid-upper saltmarshes	0	2.4 [(a)]	1.48	30	4.9%

Note: River Shannon and River Fergus Estuaries SPA is in the same location as Lower River Shannon SAC / E1. Only Lower River Shannon SAC has been presented as a worse-case scenario.

a) Source: UK Air Pollution Information System (APIS) www.apis.ac.uk

Table 10.16: Ammonia critical level

Ecological Designated site / Receptor ID	Sensitive habitat	Distance to road (m)	NH_3 background concentration (kg N/ha/yr)	NH_3 concentration (kg N/ha/yr)	Comparison against critical level (µg/m^3)	Percentage change in relation to critical level
Lower River Shannon SAC / E1	Pioneer, low-mid, mid-upper saltmarshes	0	1.6 [(a)]	0.2	3	6.7%

Note: River Shannon and River Fergus Estuaries SPA is in the same location as Lower River Shannon SAC / E1. Only Lower River Shannon SAC has been presented as a worse-case scenario.

a) Source: UK Air Pollution Information System (APIS) www.apis.ac.uk

Table 10.17: Nitrogen deposition with ammonia

Ecological Designated site / Receptor ID	Sensitive habitat	Distance to road (m)	Background average total N deposition (kg N/ha/yr)	Dry deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percentage change in relation to lower critical load
Lower River Shannon SAC / E1	Pioneer, low-mid, mid-upper saltmarshes	0	3.8 [(a)]	1.15	20	5.8%

Note: River Shannon and River Fergus Estuaries SPA is in the same location as Lower River Shannon SAC / E1. Only Lower River Shannon SAC has been presented as a worse-case scenario.

Source: UK Air Pollution Information System (APIS) www.apis.ac.uk

10.7 Mitigation and Monitoring

10.7.1 Construction dust emission

Construction activities associated with the proposed development with no mitigation are predicted to have 'Low' to 'High' for dust soiling effects and 'Negligible to Low' for PM_{10} effects. They are also considered short-term – only having the potential to occur during the construction phase, only likely during working hours onsite, when construction activities are being undertaken within the site at locations closest to a receptor, and when the wind is blowing from the activity towards the receptors, at a speed that can transport the dust from the activity to the receptor.

Best practice mitigation measures adapted from the IAQM guidance are presented below. In line with IAQM construction dust guidance, providing adequate dust mitigation measures are implemented onsite, all of which are common practice on all well managed construction sites across the country, then impacts can be adequately controlled to the extent that any effect is Not Significant.

The potential dust risk of dust soiling effects is comparatively higher, therefore specific mitigation measures have been recommended. These measures will be presented as draft in the proposed development's CEMP. The dust and emission control methods presented below will be implemented as agreed with the local authority and implemented effectively throughout the construction period.

10.7.1.1 Standard Mitigation applicable to all areas (for low to medium risk)

- Communication and Site Management
  - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Information will be shared with the local community and how their feedback will be incorporated into the project's air quality management plans. This will include public meetings, regular updates, and accessible reporting of air quality data.
  - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This will be the environment manager / engineer or the site manager.
  - Display the head or regional office contact information.
  - Develop and implement a dust management plan (DMP), which will include measures to control other emissions, approved by the Local Authority.
  - Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken.
  - Make a complaint log available to the planning authority, when requested.
  - Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book.
- Monitoring
  - Carry out regular site inspections, record inspection results and make an inspection log available to the planning authority, when requested.
  - Increase frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
  - Undertake daily onsite and offsite inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked.

  - Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
- Preparing and maintaining the site
  - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
  - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
  - Avoid site runoff of water or mud.
  - Keep site fencing and barriers clean using wet methods.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
  - Cover, seed or fence stockpiles to prevent wind whipping.
- Operations vehicles / machinery and sustainable travel:
  - Ensure all vehicles switch off engines when stationary – no idling vehicles.
  - Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment, where practicable
- Operations
  - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
  - Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water, where possible and appropriate.

10.7.1.2 Specific mitigation applicable to trackout (with high risk)

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

10.8 Residual Effects

With the successful incorporation of best practice mitigation as detailed as presented in Section 10.7.1 which accompanies the application, the residual impacts on dust emissions from construction activities will be negligible. Matrix of determination of significant effect is presented in Table 10.18.

Table 10.18: Residual effects

	Construction effect	Residual effect
Construction dust emission	Dust soiling effects: ‘Low’ to ‘High’ risk PM10 effects: ‘Negligible to Low’ risk	Not significant with mitigation

Source: IAQM (2024)[23]

[23] Institute of Air Quality Management (2024) Guidance on the assessment of dust from demolition and construction

Note: Construction road traffic, and operation and maintenance traffic have been scoped out in Section 10.5.1.2 and 10.5.2 respectively. Therefore, it is assumed that residual impacts of both construction, and operation and maintenance traffic is not significant.

There are no significant impacts predicted during the construction and operational phases for air quality with the successful incorporation of best practice mitigation.

10.9 References

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Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 11 - Climate Resilience

July 2024

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Contents

Tables

11 Climate Resilience

11.1 Introduction

This section presents an assessment of the resilience of the proposed development to present-day and future extreme weather and changes to the average seasonal climate conditions due to climate change. The assessment is based on the development as described in Chapter 5 Description of the proposed development.

This section details the potential impacts of climate change on the proposed development and outlines considerations for appropriate resilience measures that are to be considered during the next stage of design. The assessment of impact of the proposed development on greenhouse gas emissions (GHG) is included in Chapter 12.

11.2 Policy and Guidance

The Planning Report that accompanies this application describes the wider policy and legislative context applicable to the proposed development. Policies and guidance documents of potential relevance to the climate change impacts are set out in this section.

11.2.1 International Climate Change Legislation and Policy

11.2.1.1 The Paris Agreement

Ireland is a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Both provide a legal framework for addressing global climate change. Building on the UNFCCC process, the Paris Agreement is a global treaty established with the intention of developing a unified approach to combating climate change. Agreed in December 2015, the Paris Agreement aims to restrict global temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C (UNFCCC, 2016). All countries will aim to play their role in curbing emissions through their nationally determined contributions (NDC). Since the Paris Agreement, countries have reconvened at the United Emirates in 2023 and agreed to continue to pledge to achieve the Paris Agreement temperature goal (UNFCCC, 2024).

11.2.1.2 The European Green Deal

To align with the goals of the Paris Agreement, the European Green Deal (European Commission, 2020) commits EU members to delivering net-zero GHG emissions at EU level by 2050, with an EU-wide GHG emissions reduction target to at least 55% by 2030. It provides a framework for a just transition to a climate-neutral, fair and prosperous society, with a modern, resource-efficient and competitive economy. Key pillars of the European Green Deal include decarbonising energy system and building climate resilience.

11.2.1.3 EIA Directive 2014/52/EU

EIA Directive 2014/52/EU (Official Journal of the European Union, 2014) Annex IV specifically requires that an environmental impact assessment considers the likely significant effects resulting from the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.

11.2.2 National Legislation & Policy

11.2.2.1 Project Ireland 2040 National Planning Framework

The National Planning Framework (Government of Ireland, 2018) contains strategic level planning policy for guiding development and investment in Ireland over the coming two decades focusing on three key pillars (1) sustainability (2) security of supply, and (3) competitiveness.

One of the National Strategic Outcomes includes 'Transition to a Low Carbon and Climate Resilient Society' aiming to achieve a transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050 by investing into new energy systems and transmission grids, harnessing on-shore and off-shore potential from energy sources such as wind, wave and solar, and connecting the biggest sources of renewable energy to the major sources of demand.

11.2.2.2 National Policy on Climate Action and Low Carbon Development

Ireland's first piece of climate action policy on its coherent journey towards a low-carbon, climate resilient and sustainable economy was the Climate Action and Low-Carbon Development National Policy Position (Department of Environment, Climate and Communications, 2013), which was launched in 2014 which:

- Recognises the threat of climate change for humanity.
- Anticipates and supports mobilisation of a comprehensive international response to climate change, and global transition to a low-carbon future.
- Recognises the challenges and opportunities of the broad transition agenda for society.
- Aims, as a fundamental national objective, to achieve transition to a competitive, low-carbon, climate resilient and environmentally sustainable economy by 2050.

The policy position also sets out a high-level roadmap for future climate policy in Ireland, based on the adoption of a series of national plans addressing both climate adaptation and greenhouse gas mitigation efforts in the period to 2050.

11.2.2.3 Climate Action and Low-Carbon Development Act, 2015 (Amended 2021)

The 2015 Act (Department of Environment, Climate and Communications, 2021) was the first piece of legislation following the launch of the National Policy Position. The Act provides the statutory basis for the national transition laid out in the national policy position. It provides arrangements for achieving transition to a low-carbon, climate-resilient and environmentally sustainable economy by 2050. The Act includes the following key elements:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- Mandated the creation of sector level adaptation plans.
- A National Long Term Action Strategy will be prepared every five years.
- Introduces a requirement for each local authority to prepare a Climate Action Plan which will include both mitigation and adaptation measures and be updated every five years.

11.2.2.4 National Adaptation Framework (NAF), 2018

The NAF (Department of Environment, Climate and Communications, 2018) specifies the national strategy for the application of adaptation measures in different sectors and by local authorities in order to reduce the vulnerability of Ireland to the adverse impacts of climate change and realise any positive impacts. Additional key actions under the framework include:

- Putting in place revised governance and reporting arrangements.
- Formalising the status of existing guidelines.
- Formalising long term operational support for key sectors.
- Facilitating the establishment of regional local authority climate action offices.
- Increasing awareness around climate adaptation and resilience.
- Integrating climate adaptation into key national plans and policies, ranging from building adaptive capacity through to policy and finance-based actions.

11.2.2.5 Climate Action Plan, 2024

The Climate Action Plan 2024 (CAP24) (Department of Environment, Climate and Communications, 2024) aims to enhance the advancements of the 2023 Climate Action Plan by implementing strategies, initiatives, and actions that will contribute to the achievement of climate goals set for 2030 and 2050. The plan is updated annually, taking into account the most recent reports, research and publications, including those from the Environmental Protection Agency (EPA) and the Climate Change Advisory Council (CCAC). The CCAC, an independent advisory entity, provides guidance on Ireland’s transition towards a climate-resilient, biodiversity-abundant, and climate-neutral economy.

The plan details a number of adaptation actions to help achieve this aim, including:

- AD/24/1 Develop a new National Adaptation Framework
- AD/24/2 Complete a review of the national Preliminary Flood Risk Assessment to assess the potential impacts of climate change on flooding and flood risk across Ireland.
- AD/24/12 Strengthen adaptive capacity and further embed adaptation within work processes and decision-making.
- AD/24/18 Develop business continuity measures to ensure continuity of service provision during severe weather events.

11.2.3 Sectoral Plans

11.2.3.1 Electricity and Gas Networks Sector - Climate Change Adaptation Plan

This is the first sectoral Adaptation Plan for the energy networks (electricity and gas) sector, prepared under the National Adaptation Framework (Government of Ireland, 2021). The Plan focuses on the energy networks (electricity and gas), specifically electricity generation and electricity and gas transmission and distribution infrastructure and interconnectors. The Plan is to be viewed as the first step towards reducing vulnerability and building resilience in the sector. The Plan also:

- Examines the impacts of climate change and weather-related events, both past and projected, on the energy networks.
- Details how the energy sector must prepare for and adapt to new climate conditions.
- Sets a methodology for identifying areas of vulnerability, the steps that can be taken and measures put in place to avoid or minimise future adverse impacts within the sector and to exploit opportunities.

11.2.4 Local Plans

11.2.4.1 Kerry County Council Climate Action Plan 2024-2029

Kerry County Council developed a Climate Change Action Plan as a response to the impact that climate change is having, and will continue to have, on the region of Kerry (Kerry County

Council, 2024). The Kerry Council Climate Action Plan comprises 25 objectives covering five strategic goals that are identified to ensure the county will be climate resilient in 2030 and on to 2050. The five strategic goals are outlined below:

- Built Environment and Transport - The built environment and infrastructure will be climate-proofed to ensure emissions and energy efficiency targets are met towards reaching a decarbonised society and to implement a sustainable mobility policy of 'avoid-shift-improve' in order to cut emissions from the transport sector.
- Natural Environment and Green Infrastructure - Responses to the challenges of climate change will be underpinned by conserving, protecting, and enhancing biodiversity and ecosystem services in the county.
- Sustainability and Resource Management - Promote the principles of the circular economy and lever green and bio-economies to provide sustainable enterprises and business opportunities in the county.
- Communities, Resilience and Transition - Ensure a Just Transition to a climate resilient future for communities across the county.
- Governance and Leadership - Mainstreaming climate action and the climate proofing of all decision-making within the Local Authority

11.2.4.2 Kerry County Council Climate Change Adaptation Strategy 2019-2024

The Climate Change Adaptation Strategy (Kerry County Council, 2019) sets out a framework of actions and measures proposed to adapt to climate change through embedding adaptation into all of the Council's areas of responsibility.

This plan encourages embedding climate action into planning policy directly through policies and objectives that support climate action but also indirectly through spatial and physical planning. Climate change policy ultimately supports population growth in a compact, connected, and sustainable way which is less transport intensive through better planning, remote and home-working and modal shift to public transport.

11.2.4.3 Kerry County Development Plan 2022-2028

The Kerry County Development Plan 2022-2028 has ten main goals for the future development of the county, including the transition to a low carbon and climate resilient society. The Plan forms an important part of the County's Climate Action Response. As part of this, the plan takes forward the three priority areas for action outlined in the Southern Regional RSES: Decarbonisation, Resource efficiency and Climate resilience.

11.2.5 Guidance

11.2.5.1 Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment (EIA) Guide to: Climate Change Resilience & Adaptation (2020)

This guide notes that assessing the impacts of climate change on a scheme, as with Climate Resilience, is fundamentally different to the assessment of impacts arising from the scheme, as in other EIA topics. It provides a framework of eight steps to follow for the effective consideration and integration of climate change resilience and adaptation into the EIA process.

11.3 Assessment Methodology

11.3.1 Approach to Data Collection

Information on current weather and climate for Ireland is described in the Status of Ireland's Climate, 2020 (Environmental Protection Agency, 2021), with a recent update in Provisional State of the Irish Climate Report 2023 (Met Éireann, 2024). Met Éireann also provides the 1991-2020 climate averages for Shannon Airport which is the closest weather station to the proposed development (Met Éireann, 2023).

Information on future climate used for the assessment of the climate resilience of the proposed development includes climate change projections. Those projections are used to understand how the climate is expected to change during the operational lifetime of the proposed development (see Section 11.3.3 for more detail on operational life of different assets) and to inform potential climate change risks likely to impact the proposed development.

Data used to inform the future climate of Ireland is based on Nolan, P and Flanagan, J. (2020) High-resolution Climate Projections for Ireland – a Multi model Ensemble Approach as it provides projections specific to Ireland. The climate change projections provided are based on the following climate scenarios from the following two sources:

- The 'business-as-usual' precautionary emissions scenario referred to as RCP8.5 (Nolan, P. and Flanagan, J. (2020)); and
- The 'moderate' emissions scenario referred to as RCP4.5 (Nolan, P. and Flanagan, J. (2020)).

Those projections were generated by downscaling multiple Coupled Model Intercomparison Project Phase 5 (CMIP5) global datasets. They account for uncertainty arising from the estimation of future global emission of greenhouse gases by considering both a medium emission scenario (RCP4.5) and a high emission scenario (RCP8.5). The outputs of this downscaling provide a more accurate evaluation of the local impacts of climate change on Ireland on the national scale.

11.3.2 Approach to Impact Assessment

A climate change impact assessment has been undertaken to assess the climate resilience of the proposed development. The impact assessment methodology takes a qualitative approach informed by the future climate baseline. The approach considers the magnitude of climate change risks and the sensitivity of receptors, along with consideration of embedded mitigation measures within the design, to determine whether identified climate change risks to the proposed development should be considered significant.

The impact assessment considers both the magnitude of impact and the sensitivity of the receptor. The criteria for defining the magnitude of impacts of climate change on the proposed development are described in Table 11.1.

The magnitude is based on information from the climate change projections, together with the knowledge and professional judgement on the nature of the impacts and level of certainty associated with the projections. For example, there is a higher degree of certainty with climate projections in relation to temperature change; however, there is a lower level of certainty in relation to the exact change in rainfall patterns, or the frequency of extreme rainfall or temperature maximums.

Table 11.1: Magnitude of impact criteria

Magnitude	Criteria	Examples
Major	Large change to the climate condition and large increase in the frequency of the event.	Increased and prolonged maximum summer temperatures that create extreme regional heatwaves throughout each summer.
Moderate	A large, measurable change in climate conditions at a regular frequency.	Increase in the intensity and volume of extreme rain events of an intensity that could lead to surface water flooding.
Minor	Change in climate conditions that may have measurable effect on an asset, but which are low likelihood/infrequent.	Increased average annual frequency of lightning strikes.
Negligible	Small or undetectable change in climatic or weather conditions.	Change in average wind direction for a few days in a year.
No change	No change in climate condition.	No change in climate condition.

The criteria for defining sensitivity for the assessment of receptors of the proposed development are described in Table 11.2.

The sensitivity of the receptors is the ability of the receptor to withstand and recover from a climate impact while keeping or shortly returning to its normal functionality. The sensitivity of a receptor considers its susceptibility to a change in climatic conditions or an extreme weather event, and the consequences of this change.

Table 11.2: Sensitivity of receptors criteria

Sensitivity	Criteria	Examples
Very high	Short-term, acute impact to receptor functionality or a substantial, measurable decrease in receptor lifespan following the occurrence of a climate impact. Substantial increase in need for periodic maintenance or in maintenance costs.	Buildings located in existing flood risk zones are highly susceptible to surface water flooding during an extreme rainfall event and may incur significant repair costs.
High	Large, measurable decrease in receptor lifespan following the occurrence of a climate impact. Large increase in need for periodic maintenance or in maintenance costs.	Periodic cycles of drought or dry periods followed by severe rainfall events can result in continuous shrink-swell of soils, potentially leading to ground subsidence.
Medium	Measurable decrease in receptor performance (short-term or long-term) or lifespan or increase in necessary maintenance frequency and costs following the occurrence of climate impact.	Landscaping vegetation that is susceptible / reactive to changes in weather conditions – the climate impact of longer growing season will lead to increased growth (impact on the receptor) and associated maintenance cost.
Low	Small, measurable impact to a receptor's performance following climate impact, or small reduction in receptors lifespan due to chronic deterioration (e.g. slight decrease in lifespan of an asset due to increased higher temperatures)	Ability of reinforced concrete receptors to withstand daily changes in temperature, which can result in a small but noticeable increase in the rate of spalling and deterioration (due to expansion of metal components)
Negligible	No change to the integrity of receptor or a small, temporary, reversible change to receptor performance following the occurrence of a climate impact.	Underground / buried assets have negligible susceptibility to higher temperatures due to being buried below ground.

The significance of each risk is calculated through quantifying magnitude and sensitivity ratings to determine overall significance using the significance matrix shown in Table 11.3. Where a risk is determined to have a Moderate risk or above, this is considered significant.

Table 11.3: Significance matrix (effects can be either adverse or beneficial)

Magnitude	Sensitivity				
	Very high	High	Medium	Low	Negligible
Major	**Major**	**Major**	**Moderate**	**Moderate**	Minor
Moderate	**Major**	**Moderate**	**Moderate**	Minor	Negligible
Minor	**Moderate**	**Moderate**	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

Source: Professional judgement informed by the IEMA Guidance (IEMA, 2020)

11.3.3 Study Area

The study area includes the full spatial extent of the proposed development. As per the *Environmental Impact Assessment (EIA) Guide to: Climate Change Resilience and Adaptation* (IEMA, 2020), climate resilience assessments are fundamentally different to the assessment of other EIA topics and consider the impacts on climate change on the proposed development.

The temporal extent extends through to the end of the century, in line with the operational life of the proposed development:

- SLNG substation – expected operational life of 25 years;
- EirGrid / ESBN substation – not expected to be decommissioned due to regular maintenance and upgrades and, as such, likely to be operational for 40 years; and
- Underground cables – not expected to be decommissioned due to regular maintenance and upgrades and, as such, likely to be operational at the end of the century.

11.3.4 Limitations of this EIAR

The assessment in this report is based on freely available information available from third parties for reporting purposes, being observational data from local weather stations, a number of readily available climate change projections and a range of existing climate change datasets and literature at the time of writing this assessment. The following limitations and disclaimer should be noted.

- Climate change projections: climate projections are not predictions or forecasts but simulations of potential scenarios of future climate under a range of hypothetical emissions scenarios and assumptions. The results, therefore, from the experiments performed by climate models cannot be treated as exact or factual, but projection options. They represent internally consistent representations of how the climate may evolve in response to a range of potential forcing scenarios and their reliability varies between climate variables.
- For a single emission scenario, projections can vary significantly as a function of the model used and how it is applied, so that there is a wide uncertainty band in the results. Scenarios exclude outlying “surprise” or “disaster” scenarios in the literature and any scenario necessarily includes subjective elements and is open to various interpretations.
- Generally global projections are more certain than regional, and temperature projections more certain than those for precipitation. Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future. Climate models and associated projections are updated on a regular basis, implying changes in the forecasted future climate.
- Validation of information: Mott MacDonald has not independently verified the observational or projection data and does not accept responsibility or liability for any inaccuracies or shortcomings in this information. Should these information sources be modified by these third parties we assume no responsibility for any of the resulting inaccuracies in any of our reports. Issued reports are relevant to the project information provided and are not intended

to address changes in project configuration or modifications which occur over time. The data is obtained to provide a general ‘sense check’ on the published literature on existing observational and climate projections for the region.

- We have not undertaken any climate modelling and rely solely on freely available data on climate projections in this region. Accordingly, any further research, analysis or decision-making should take account of the nature of the data sources and climate projections and should consider the range of literature, additional observational data, evidence and research available - and any recent developments in these.

11.4 Receiving environment

Since the purpose of this climate resilience assessment is to determine impacts of climate change upon the proposed development, the receiving environment for this aspect refers to the receptors that constitute the proposed development.

The receiving receptors that are included within this assessment are as outlined below: and as described in Chapter 5 Description of the proposed development:

- 2x 220kV substations (SLNG substation and EirGrid/ESBN substation)
- Ca. 5km of two 220kV underground cables

11.4.1 Climate Baseline

Ireland’s climate is described by the climate averages for 1991-2020 summarised by Met Éireann (Met Éireann, 2023). Ireland’s climate is predominantly influenced by the Atlantic Ocean and therefore does not suffer from the extremes of temperatures experienced by other countries at similar latitudes. Mean temperature for this 30-year period is 9.8°C and ranges from 8.5°C to 10.8°C, higher mean temperatures are found in coastal regions while higher elevations are the coolest. Summer is the warmest season, followed by autumn, spring and winter. Highest rainfall occurs in the western half of Ireland and on high ground, with rainfall decreasing towards the east. Averaged over all of Ireland, mean annual rainfall is 1288mm. The driest seasons are spring and summer with mean seasonal rainfall of 256mm and 283mm respectively, while autumn and winter have a mean seasonal rainfall of 369mm and 380mm respectively.

The summary of 1991-2020 climate averages show that, averaged over the country, there has been an increase of 7% in rainfall totals between the periods 1961-1990 and 1991-2020 with all seasons showing an overall increase in rainfall. There has also been an increase of 0.7˚C in mean temperature between the 1961-1990 and 1981-2010 periods. Minimum and maximum temperatures have also increased by 0.5˚C to 0.6°C respectively. Each season also shows a rise in temperature, with spring showing the greatest increase between two time periods with an increase of 0.8°C, whilst winter has the smallest at 0.6°C.

For the purposes of this assessment, the baseline conditions are based upon historic climate change data obtained from Met Éireann recorded by the closest meteorological station to the proposed development, Shannon Airport, approximately 20 km north-east of the Site (Met Éireann, 2023). This is described in Table 11.4.

Table 11.4: Shannon Airport 1991-2020 Climate Averages

Climate variable	Annual	Summer (JJA)	Winter (DJF)
Temperature (°C)			
Mean daily temperature	10.7	15.4	6.3
Mean daily maximum temperature	14.0	19.0	9.2

Climate variable	Annual	Summer (JJA)	Winter (DJF)
Mean daily minimum temperature	7.4	11.9	3.4
Rainfall (mm)			
Mean monthly total	85.0	77.7	102.0
Greatest daily total	52.3	45.3	35.2
Relative humidity (%)			
Mean at 1500UTC	72.2	67.7	80.0
Sunshine (hours)			
Mean daily duration	3.7	4.8	1.9
Wind (knots)			
Mean monthly speed	9.1	8.4	9.9
Weather (mean no. of days with…)			
Snow or sleet	5.9	0	1.4
Thunder	5.2	0.5	0.6
Fog	28.3	1.2	3.1

11.4.2 Climate Change – Basis for Design

The range of climatic effects to be considered on the proposed development are changes in temperatures, precipitation and storms. Sea level rise is not considered as part of this assessment as the site is at 20m elevation above the sea, and set back from the cliff edges. As such, sea level rise is not anticipated to affect the proposed development as it will be in the order of 0.5m within the proposed development's operational lifetime (IPCC, 2024).

Climate projections for Ireland from Nolan, P. and Flanagan, J. (2020) are summarised in Table 11.5.

Table 11.5: Climate Projections for Ireland

Climate variables	Climate projections summary (2041-2060 relative to 1981-2000)	Resultant future climate
Temperature	Mean annual temperature is projected to increase up to 1.2 °C and 1.6 °C for the RCP4.5 and RCP8.5 scenarios respectively. Summer months are projected to increase up to 1.3 °C and 1.8 °C for the RCP4.5 and RCP8.5 scenarios respectively. Winter months are projected to increase up to 1.2 °C and 1.6 °C for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience an increase in ambient air temperature across both emission scenarios.
Precipitation	Decreases in precipitation are projected for the summer months with up to an 11% decrease and 17% decrease for the RCP4.5 and RCP8.5 scenarios respectively. Frequencies of heavy precipitation events show notable increases over the year and in the winter and autumn months with projected increases in frequency of up to 19%.	Ireland is projected to experience drier summers and wetter winters across both emission scenarios. Ireland is also projected to see an increase in heavy rainfall events throughout the year.
Heatwaves	Heatwave events are projected to increase with a range of 1 to 8 events for the RCP4.5 scenario and from 3 to 15 for the RCP8.5 scenario. There is a clear gradient across Ireland where the highest number of heatwaves is projected to occur in the south-east. This is relative to the 1981-2000 baseline which observed 1 to 6 heatwaves across Ireland.	Ireland is projected to experience an increase in heatwave events across both emission scenarios with most heatwave events occurring in the south-east.

Climate variables	Climate projections summary (2041-2060 relative to 1981-2000)	Resultant future climate
Frost and ice days	Number of frost days is projected to decrease by 45% and 58% for the RCP4.5 and RCP8.5 scenarios respectively. Number of ice days is projected to decrease by 68% and 78% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in frost and ice days due to rising ambient air temperatures.
Snowfall	Snowfall is projected to decrease with reductions of 51% and 60% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in snowfall events due to rising ambient air temperatures.
Wind speed	Mean 10-m wind speeds are projected to decrease for all seasons up to 3.4% and 5.4% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in average wind speeds throughout the year across all emission scenarios.

In addition to consideration of climate change projections within this chapter, climate uplifts have been used within the Flood Risk Assessment (FRA), Appendix 8.1 to Chapter 8 Surface Water and Flooding. The FRA was carried out using climate uplift guidance from the Office of Public Works and the FRA carried out for the STEP Power Plant site, which included a 20% uplift to the 1% AEP fluvial flooding model and to the 50% AEP for tidal flooding, to inform the downstream fluvial conditions and backing up of fluvial flows. The conclusions of Chapter 8 Surface Water and Flooding and the FRA have been used to inform the risks relating to increases in precipitation in this assessment.

11.5 Likely Significant Effects

The assessment of the Likely Significant Effects is based on the assessment methodology presented in Section 11.3.2.

11.5.1 Construction Phase

As the construction is expected to start in October 2026 and take place over 27 months, it will be undertaken within a time period where the climate will not have notably changed from present day and, as such, the construction phase is not considered as part of this assessment. Extreme weather events will be managed through the Construction Environmental Management Plan (CEMP), such as:

- inaccessible construction site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying construction.
- health and safety risks to the workforce during severe weather events.
- unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities.
- damage to construction materials, plant and equipment, including damage to temporary buildings/ facilities within the Site boundary, such as offices, compounds, material storage areas and worksites, for example as a result of stormy weather; and potential pollution incidents due to severe rainfall events or storms.

11.5.2 Operation and Maintenance Phase

This section outlines the potential impacts that the proposed development may face due to climate change throughout its operational lifetime (see Section 11.3.3 for more detail on operational life of different assets). The impact assessment has been conducted to determine likely significance of potential impacts.

Table 11.6 presents the findings of the impact assessment. The embedded mitigation is considered as part of the assessment.

Mitigations can take one of two forms:

1) Embedded – Some measures are embedded into the design of the proposed development. For example, inclusion of climate change allowances within flood modelling and the application of climate change uplifts to drainage design.
2) Operational – These are secondary mitigation measures such as asset management planning and asset maintenance that should be carried out throughout the lifetime of the proposed development to continue to provide protection against evolving climate hazards. Such mitigations may also include future refurbishments, upgrades or changes to assets and processes at the appropriate time in the future, based on how significantly the climate continues to change and the evolving resilience needs of the proposed development.

A full review of the mitigation embedded within the proposed development design will be carried out at the detailed design stage, including consideration of all additional mitigation recommended to be embedded within the detailed design. Recommended embedded mitigation measures are included in Section 11.7, alongside all operational / secondary mitigation measures.

Table 11.6: Climate Change Risk Assessment for the Proposed Development

Change in climate variable	Climate hazard	Description of potential climate impact	Affected asset	Embedded mitigation measures	Magnitude	Sensitivity	Significance of effect
Increased heavy rainfall events	Flooding	Heavy precipitation and flooding events may result in exceeding drainage capacity and thus damaging assets located within the substation, affecting operations and leading to reduced output or time lost. Flooding could cause access and egress issues, endangering operational workforce and waterlogging of pavement surface due to increased percolation of water into its porous upper layers, leading to weakened asphalt and formation of faults and potholes and increased maintenance requirements.	Substation	N/A	Moderate	Medium	Moderate, significant
	Flooding	Rainwater can lead to surface erosion and deterioration of concrete of the concrete post and rail fencing, reducing its overall lifespan.	Substation – concrete post fencing	N/A	Moderate	Medium	Moderate, significant
Increased heavy rainfall events Changing temperature variability	Freeze thaw cycles	Penetration of rainwater to the concrete, followed by cold periods causing rainwater to freeze, expand and crack the surrounding concrete, and potentially compromising the fence's stability. While freeze events may become fewer, this risk may increase due to increased winter rainfall and waterlogging of the ground.	Substation – concrete post fencing	N/A	Minor	High	Moderate, significant
Reduced rainfall	Increased drought risk	Shrinkage and desiccation of ground leading to cracks, strength loss and instability. Substation foundations may be affected.	Substation – structural foundation	N/A	Moderate	High	Moderate, significant
	Increased drought risk	Drought conditions can cause asphalt and concrete surfaces to become brittle and potentially lead to cracking, increasing requirement for maintenance.	Substation – asphalt surface of internal roadways	N/A	Moderate	Medium	Moderate, significant

Change in climate variable	Climate hazard	Description of potential climate impact	Affected asset	Embedded mitigation measures	Magnitude	Sensitivity	Significance of effect
	Increased drought risk	Reduced availability of potable water for operational staff when present on site which is proposed to be sourced from the existing public watermain system via a new connection.	Substation – water supply	The potable water demand is estimated to be low as the substation will normally be unmanned and operated remotely. Taps incorporate automatic shut-off mechanism, automatic flushing mechanism in place for WC which operates only twice per day.	Moderate	Low	Minor, not significant
	Increased drought risk	Prolonged drought can cause soil drying around underground cables, leading to reduced heat dissipation from the cables and affecting their current-carrying capacity (ampacity)	Underground cables	Underground cables will be surrounded by Cement Bound Granular Mixture (CBGM) and then backfilled with soil. CBGM will insulate the underground cables, thus preventing impacts on their ampacity from prolonged droughts.	Moderate	Low	Minor, not significant
	Increased drought risk	Increasing temperatures combined with reduced rainfall can lead to increased stress upon landscape vegetation, and even dieback.	Landscaping - vegetation	N/A	Moderate	Medium	Moderate, significant
Increasing temperatures (including average temperatures and temperature extremes)	Increased risk of extreme high temperatures /heatwaves	Increased temperature extremes and/or sustained high temperatures may inhibit power infrastructure (e.g. transformers, circuit breakers) performance due to the changes in operating temperature ranges of generators and electrical equipment, leading to accelerated deterioration, insulation breakdown and electrical failure.	Substation – generators, power infrastructure, transformers, circuit breakers	Generators are proposed to be located in a dedicated room within each substation building with appropriate ventilation to ensure cooling.	Minor	Medium	Minor, not significant
		Cracking, reduced strength and increased rate of deterioration of metallic components.	Substation – generators, power infrastructure, electric components	N/A	Minor	Medium	Minor, not significant
		Extreme temperatures may lead to melting and deformation of asphalt surface course, leading to uneven road surface and early replacement.	Substation – asphalt surface of internal roadways	N/A	Minor	Medium	Minor, not significant

Change in climate variable	Climate hazard	Description of potential climate impact	Affected asset	Embedded mitigation measures	Magnitude	Sensitivity	Significance of effect
		Increased temperatures leading to reduced current-carrying capacity (ampacity) of underground cables.	Underground cables	Cables are proposed to be buried underground. Soil acts as an insulator thus providing resilience to high temperatures.	Minor	Negligible	Negligible, not significant
Increase in extreme weather	High wind speeds	Structural damage resulting from high winds, particularly a risk to lighting poles due to their height, standing at 18.5m tall.	Substation - lighting poles	N/A	Negligible	High	Minor, not significant
		Increased risk of physical damage to transmission infrastructure affecting the ability to transfer power to the grid	Substation	N/A	Negligible	High	Minor, not significant
	Lightning	Electrical faults leading to power outages, due to storms and lightning strikes	Substation	The current design incorporates lightning protection masts on each of the substations to protect the current design from lightning strike. An emergency diesel generator (less than 400 KVA) will also be provided to supply back up power for the ancillary electrical services in each substation, and will be used in rare cases, such as the loss of main power. The generator will be located in a dedicated room within each GIS building with appropriate fire rating and ventilation. A below ground earth grid will be installed in a grid arrangement approximately 600 – 750 mm below the finished surface. The earth grid will consist of bare stranded copper conductor with an outside diameter of approximately 95mm2. The purpose of the earth grid is to ensure personnel and public safety during electrical faults that may occur on the transmission grid.	Minor	Low	Negligible, not significant

11.5.3 Decommissioning Phase

The EirGrid substation and the grid connection will remain a permanent part of the national electricity system and will be refurbished and / or redeveloped as required rather than be decommissioned. However, cables and other electrical infrastructure may need to be replaced in the future and will follow appropriate weather resilience measures similar to those outlined in Table 11.8.

The SLNG substation is predicted to have an operational life of 25 years in line with the STEP Power Plant. The decommissioning activities of the SLNG substation are likely to be similar to the construction activities and, as such, will be managed through the Construction Environmental Management Plan (as per Section 11.5.1), with consideration for construction industry best practice at the time.

11.6 Cumulative Effects

Cumulative effects in relation to climate resilience typically consider risks such as urban heat island massing or significant cumulative loss of local flood storage. Further detail on individual projects considered as part of the cumulative assessment is included in the Table 11.7. It is unlikely the proposed development would result in any negative cumulative effects with other projects in the local area due to their distance, the rural nature of the area and the project's coastal location. It is also not anticipated that the project will affect the climate resilience of other projects.

Table 11.7: Climate Resilience Cumulative Effects Assessment

Development	Development description	Assessment outcome
Strategic Gas Reserve Facility	Development comprised a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works. A pre-application was submitted to An Board Pleanála on 13th May 2024 (ABP-319717-24)	Due to the rural nature of the wider area, it is considered that the cumulative effect of hardstanding is sufficient or extensive enough to exacerbate the urban heat island nor result in significant loss of local flood storage.
Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works	Development comprises CCGT, BESS, above ground installation and associated ancillary works. A planning application was submitted to An Board PLenala on 19th April 2024.	Due to the rural nature of the wider area, it is considered that the cumulative effect of hardstanding is sufficient or extensive enough to exacerbate the urban heat island nor result in significant loss of local flood storage.
Gas Pipeline	Development comprises an already consented (Planning Reference GA08.GA0003) 26km natural gas pipeline which will facilitate connection from the STEP facility to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.	Due to the nature of the gas pipeline, which will be underground, it is considered that the cumulative effect of the two developments is unlikely to contribute to any urban heat islands nor result in significant loss of local flood storage.
Data Centre Campus	As part of the STEP Power Plant Masterplan, a data centre campus is proposed to the west of the STEP site. This will be a separate planning application and will be accompanied with an EIAR.	Due to the rural nature of the wider area, it is considered that the cumulative effect of hardstanding is sufficient or extensive enough to exacerbate the urban heat island nor result in significant loss of local flood storage.

11.7 Mitigation and Monitoring

Due to potential significant effects identified on climate resilience, further mitigation measures are required beyond what is currently included in the design and presented in Table 11.6. All significant effects are included in Table 11.8, with relevant secondary measures considered to determine the significance of residual effects.

Table 11.8: Secondary Mitigation Measures

Change in climate variable	Climate hazard	Description of potential climate impact	Significance of effect	Secondary mitigation measure	Significance of residual effect
Increased heavy rainfall events	Flooding	Heavy precipitation and flooding events may result in exceeding drainage capacity and thus damaging assets located within the substation, affecting operations and leading to reduced output or time lost. Flooding could cause access and egress issues, endangering operational workforce and waterlogging of pavement surface due to increased percolation of water into its porous upper layers, leading to weakened asphalt and formation of faults and potholes and increased maintenance requirements.	Moderate, significant	N/A	Moderate, significant
	Flooding	Rainwater can lead to surface erosion and deterioration of concrete of the concrete post and rail fencing, reducing its overall lifespan.	Moderate, significant	N/A	Moderate, significant
Increased heavy rainfall events Changing temperature variability	Freeze thaw cycles	Penetration of rainwater to the concrete, followed by cold periods causing rainwater to freeze, expand and crack the surrounding concrete, and potentially compromising the fence's stability.	Moderate, significant	N/A	Moderate, significant
Reduced rainfall	Increased drought risk	Shrinkage and desiccation of ground leading to cracks, strength loss and instability. Substation foundations may be affected.	Moderate, significant	The operational phase will include inspection and monitoring of the ground and foundations, taking a proactive approach to repair.	Minor, not significant
	Increased drought risk	Drought conditions can cause asphalt and concrete surfaces to become brittle and potentially lead to cracking, increasing requirement for maintenance.	Moderate, significant	The operational phase of design will consider monitoring of asphalt surface during drought conditions to ensure a proactive approach to maintenance activities.	Minor, not significant
	Increased drought risk	Increasing temperatures combined with reduced rainfall can lead to increased stress upon landscape vegetation, and even dieback.	Moderate, significant	N/A	Moderate, significant

Monitoring will be undertaken by the client (Shannon LNG Limited) in accordance with all legal, regulatory and licence conditions. Refer to Table 11.6 for embedded mitigation measures and Table 11.8 for secondary mitigation measures.

11.8 Residual Effects

Refer to Table 11.8 for residual effects on proposed development. Following embedded and secondary mitigation measures to be implemented during the detailed design and operation of the site, there are some residual effects on climate resilience of the proposed development which are considered significant. To further mitigate against the potential significant residual effects, Table 11.9 provides a list of further embedded mitigation measures which will be investigated and implemented as necessary during detailed design.

Table 11.9: Recommended embedded mitigation measures for consideration during detailed design

Climate hazard		Additional embedded mitigation measures
Flooding	Heavy precipitation and flooding events may result in exceeding drainage capacity and thus damaging assets located within the substation, affecting operations and leading to reduced output or time lost. Flooding could cause access and egress issues, endangering operational workforce and waterlogging of pavement surface due to increased percolation of water into its porous upper layers, leading to weakened asphalt and formation of faults and potholes and increased maintenance requirements.	In order to ensure that there is no internal property flooding for a storm with a 1 in 100 year return period, a +20% allowance for climate change to be included in the detailed drainage design.
Flooding / freeze thaw cycles	Rainwater can lead to surface erosion and deterioration of concrete of the concrete post and rail fencing, reducing its overall lifespan. Penetration of rainwater to the concrete, followed by cold periods causing rainwater to freeze, expand and crack the surrounding concrete, and potentially compromising the fence's stability.	Application of a concrete sealer to be incorporated as required as part of the detailed design in order to protect the concrete surfaces from water penetration and reduce the risk of erosion.
Increased drought risk	Shrinkage and desiccation of ground leading to cracks, strength loss and instability. Substation foundations may be affected.	Ground stability under future climate conditions to be addressed during detailed design to avoid effects on foundations.
Increased drought risk	Increasing temperatures combined with reduced rainfall can lead to increased stress upon landscape vegetation, and even dieback.	The planting specification within detailed design to consider choosing native plant species that can withstand increasing temperatures and reduced rainfall conditions, so as to prevent species failure and enhance resilience.
Increased risk of extreme high temperatures/heatwaves	Increased temperature extremes and/or sustained high temperatures may inhibit power infrastructure (e.g. transformers, circuit breakers) performance due to the changes in operating temperature ranges of generators and electrical equipment, leading to accelerated deterioration, insulation breakdown and electrical failure.	Detailed design to consider utilisation of materials with higher temperature thresholds for key or critical assets.
Increased risk of extreme high temperatures/heatwaves	Cracking, reduced strength and increased rate of deterioration of metallic components.	Detailed design to consider utilisation of materials with higher temperature thresholds for key or critical assets.

Climate hazard		**Additional embedded mitigation measures**
High wind speeds	Structural damage resulting from high winds, particularly a risk to lighting poles due to their height, standing at 18.5m tall.	Detailed design to include consideration of wind speeds to design structures resilient to wind loads that account for future climate change.
	Increased risk of physical damage to transmission infrastructure affecting the ability to transfer power to the grid.	Detailed design to include consideration of wind speeds to design structures resilient to wind loads that account for future climate change.

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UNFCCC (2016), Paris Agreement. Available at: Paris Agreement (All language versions) | UNFCCC (accessed 10/04/2024).

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Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 12 - Climate-Carbon

July 2024

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12 Climate - Carbon

12.1 Introduction

This chapter identified the impacts on climate change likely to be caused by the proposed development, based on the features stated in Chapter 5 (Description of the Proposed Development). The assessment is qualitative in nature and considers the potential greenhouse gas (GHG) emissions arising from the construction and operation of the proposed development and recommends mitigation measures to reduce potential impacts. The potential impact of climate change on the proposed development is addressed in Chapter 11 (Climate Resilience).

12.2 Policy and Guidance

Ireland is committed to maintaining the security of the country's energy system in the most cost-effective manner, whilst also achieving net zero GHG emissions by 2050 (Ireland's Climate Action Plan, updated 2024). The extant Kerry County Development Plan is also aligned with this climate commitment and aims to reduce emissions by 51% between 2018 and 2030 and reach net zero by 2050 (Kerry County Development Plan 2022-2028).

GHGs have the ability to trap heat in the atmosphere and are recognised by the Kyoto Protocol[1] as needing to be controlled to limit the global temperature increase. The reduction of GHG emissions to achieve a low-carbon economy and mitigate climate change is a national ambition.

12.2.1 Policy and legislation

The policies and guidance documents at European, national, and international level, that have potential relevance to the climate change impacts and their management, are set out in this section.

These policy and guidance documents have been used to inform this chapter of the EIAR.

12.2.1.1 International Climate Change Legislation and Policy

EU Climate Legislation

The European Green Deal[2] is a set of policy initiatives aiming to make Europe climate neutral by 2050. Key pillars of the Green Deal include decarbonising energy systems and building climate resilience. The initiatives include European Climate Law, and the Fit for 55 package.

Regulation (EU) 2021/1119, known as the European Climate Law[3], commits Europe to becoming the first climate-neutral continent (a net-zero balance of GHG emissions) by 2050, and includes a mid-term target of at least 55% GHG emissions reduction by 2030 against 1990 levels.

As part of this legislation, the European Union's Emissions Trading Scheme (EU ETS)[4] was created through the Directive 2003/87/EC (as amended). The EU ETS is a cap-and-trade

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[1] Kyoto Protocol – Targets for the first commitment period, 2012 [online] Available at: https://unfccc.int/process-and-meetings/the-kyoto-protocol/what-is-the-kyoto-protocol/kyoto-protocol-targets-for-the-first-commitment-period [Accessed 9 April 2024].

[2] European Green Deal, 2019 [online] Available at: https://www.consilium.europa.eu/en/policies/green-deal/ [Accessed 15 March 2024].

[3] EU Law in Force, 2021 [online] Available at: https://op.europa.eu/en/web/eu-law-in-force/bibliographic-details/-/elif-publication/365a2e8e-e04f-11eb-895a-01aa75ed71a1 [Accessed 15 March 2024].

[4] EUR-Lex, Directive 2003/87/EC, 2023 [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32003L0087 [Accessed 15 March 2024].

system under allowances entitling holders to emit one tonne of CO_2e. These allowances can be traded between firms in the EU regulated carbon market.

The EU ETS has previously undergone three phases, with Phase 4 (2021-2030) reducing the overall number of EU Allowances annually by 2.2%. A reform of the EU ETS[5], promoted by the "Fit for 55 package", states a more ambitious goal, proposing a European Commission emissions reduction target from 43% to 62% by 2030 compared with 2005 levels in the sectors covered by the EU ETS. The sectors covered include electricity and heat generation, energy-intensive industry sectors and commercial aviation.

The EU Effort Sharing Regulation (EU ESR)[6] establishes binding national targets for member states covering emissions reductions from 2013 through to 2030. These targets cover emissions from most sectors not already included in the EU ETS, such as transport, buildings, agriculture and waste. Ireland has a target (updated in 2023) of 42% reduction by 2030 on a 2005 baseline.

EU Regulation 2018/842 on setting binding annual GHG reductions from 2021 to 2030 requires Ireland to commit to 30% reduction on 2005 emissions[7].

12.2.1.2 National Climate Change Policy and Legislation

Climate Action and Low-Carbon Development Act 2015 (Amended 2021)

The Act[8] was the first piece of legislation following the launch of the National Policy Position on Climate Action and Low Carbon Development (2014).[9] It provides a direction to adopt and implement government plans to move to a low-carbon economy. The Act includes arrangements for achieving the transition to a low-carbon, climate-resilient, and environmentally sustainable economy by 2050. The Act includes the following key elements:

- Integrates a 'national climate objective', to pursue and achieve the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy;
- Mandates the creation of carbon budgets and sector level emissions ceilings;
- Determines that a National Long Term Action Strategy will be prepared every five years which shall specify projected reductions in GHG emissions, alongside an assessment of potential opportunities for achieving those reductions; and
- Introduces a requirement for each local authority to prepare a Climate Action Plan, which will include both mitigation and adaptation measures and shall be updated every five years, being consistent with the carbon budget programme.

Climate Action Plan, 2024

The Climate Action Plan[10] is the third annual update of Ireland's Climate Action Plan 2019, approved in May 2024 it sets out the roadmap to achieve Ireland's climate ambition. This plan highlights Ireland's commitment to achieving a 51% reduction in GHG emissions between 2021 and 2030 (relative to 2018 levels), and to achieve net-zero emissions no later than 2050.

[5] Infographic – Fit for 55: reform of the EU emissions trading system, 2023 [online] Available at: https://www.consilium.europa.eu/en/infographics/fit-for-55-eu-emissions-trading-system/ [Accessed 15 March 2024].

[6] Effort Sharing Regulation, 2023 [online] https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en [Accessed 6 June 2024].

[7] Regulation (EU) 2018/842, 2018 [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018R0842 [Accessed 15 March 2024].

[8] ISB, Climate Action and Low Carbon Development (Amendment) Act 2021, 2021 [online] Available at: https://www.irishstatutebook.ie/eli/2021/act/32/enacted/en/html [Accessed 15 March 2024].

[9] Gov.ie, National Policy Position on Climate Action and Low Carbon Development, 2021 [online] Available at: https://www.gov.ie/en/publication/6f393-national-climate-policy-position/ [Accessed 15 March 2024].

[10] Climate Action Plan 2024, 2024 [online] Available at: https://www.gov.ie/en/publication/79659-climate-action-plan-2024/ [Accessed 20 June 2024].

The proposed pathway includes an electricity-sector carbon budget from 2021 to 2025 of 40 $MtCO_2e$ and from 2026 to 2030 of 20 MtCO2e. The national key targets to be reached, 2025 and 2030 for the electricity sector are based on the expansion of renewable energy, increasing the energy generation from onshore wind, solar and offshore wind, complemented with new flexible gas plants.

To reach 2030 targets, the Climate Action Plan aims to increase renewable generation to supply 80% of energy demand by 2030, develop micro- and small-scale generation, transform the flexibility of the electricity systems and support it with tools and mechanisms, and deliver at least 2 GW of new flexible gas-fired energy generation.

National Energy & Climate Plan 2021-2030

Ireland is committed to achieving a 7% annual average reduction in GHG emissions between 2021 and 2030. This plan is in line with the EU effort-sharing approach[11] and includes policies and measures currently being developed to achieve the 7% reduction trajectory. These measures comprise the establishment of carbon budgets, a strengthened Climate Change Advisory Council (CCAC) and greater accountability to the Parliament, managed through new governance arrangements. The key objectives most relevant to the energy sector are:

- Achieve a 34% share of renewable energy in energy consumption by 2030. Increase electricity generated from renewable sources to 70%;
- Contribute towards the EU wide target of achieving at least 32.5% improvement in energy efficiency by 2030;
- Maintaining the security of Ireland's energy system in the most cost-effective manner; and
- Develop further interconnection to facilitate Ireland's 2030 target of 70% renewable electricity.

National Development Plan 2021-2030

The National Development Plan - Chapter 3 (Climate Action and the Environment)[12] comprises measures to tackle climate change, including mitigation and adaptation, alongside a transition to a circular economy. The Plan aims to enable change to reduce the GHG emissions in Ireland, including energy efficiency and low-carbon electricity.

The Plan contains several Sectoral Strategies including energy. This Sectoral Strategy states that "public capital investment choices over the next 10 years must not only contribute to the objective of a 51% reduction in GHG emissions by 2030, but also lays a path to achieve the national climate objective of net-zero GHG emissions by 2050". Decarbonising energy is noted as a priority, with the objective of transitioning to "net-zero carbon, reliable, secure, flexible and resource-efficient energy services at the least cost for society" before 2050.

The Programme for Government – Our Shared Future

The Programme for Government – Our Shared Future[13] sets out the Government's ambition for the future, including the response to climate change. Energy is set out as having a "central role" in growing a sustainable economy, with a focus on "safe, secure and clean energy" to decarbonise the energy sector by phasing-out the use of fossil fuels. The document sets out actions to achieve 70% renewable electricity by 2030 and commits to developing new standards to reduce emissions from F-gases.

[11] Ireland's National Energy and Climate Plan 2021-2030, 2021 [online] Available at: https://www.gov.ie/en/publication/0015c-irelands-national-energy-climate-plan-2021-2030/ [Accessed 15 March 2024].

[12] Gov.ie, National Development Plan 2021-2030, 2021 [online] Available at: https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/ [Accessed 15 March 2024].

[13] Programme for Government: Our Shared Future, 2021 [online] Available at: https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/ [Accessed 15 March 2024].

Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction

Ireland's Long-term Strategy on Greenhouse Gas Emissions Reductions[14] sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. It builds upon the decarbonisation pathways set by the carbon budgets, sectoral emissions ceilings, and Climate Action Plan 2023.

National Planning Framework

The National Planning Framework (GOI, 2018)[15] contains strategic level planning policy for guiding development and investment in Ireland to 2040, with national energy policy focusing on three key pillars (1) sustainability (2) security of supply, and (3) competitiveness. This includes National Policy Objective 47 to "strengthen all-island energy infrastructure and interconnection capacity, including distribution and transmission networks to enhance security of electricity supply".

The White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030

The White Paper[16] considers Ireland's complete energy policy and European and International climate change objectives and agreements, as well as Irish social, economic and employment priorities. It provides a roadmap for halving Ireland's emissions by 2030 and reaching net zero by no later than 2050. This roadmap acknowledges that "non-renewable energy sources will make a significant – though progressively smaller – contribution" to the national grid through the transition.

12.2.1.3 Local Policy

Regional Spatial and Economic Strategy for the Southern Region (Southern Regional Assembly, 2020)

The Regional Spatial and Economic Strategy for the Southern Region contains the statutory, regional-level strategic planning policy for the counties of Kerry, Limerick, Clare, Cork, Tipperary, Waterford, Kilkenny, Carlow, and Wexford, and aligns with and is informed by the National Planning Framework. The RSES vision for the Southern Region is led by 11 Statements of Strategy including Statement 8 – Low Carbon, Resilient and Sustainable Society, which seeks to 'drive the transition to a low carbon and climate resilient society'. One of the Strategic Environmental Objectives (SEOs) guiding the strategy's Strategic Environmental Assessment (SEA) Statement relates to climate and is as follows, "Achieving transition to a competitive, low carbon, climate-resilient economy that is cognisant of environmental impacts". Reducing GHG emissions and integrating "sustainable design solutions into the region's infrastructure" are some of the climate-related Strategic Environmental Objectives for the region.

Kerry County Council Climate Change Adaptation Strategy 2019-2024 (Kerry County Council, 2019)

Formed under the National Adaptation Framework, this strategy details actions for the Council across themes of Local Adaptation Governance and Business Operations, Infrastructure and Built Environment, Land use and Development, Drainage and Flood Management, Natural Resources and Cultural Infrastructure, and Community Health and Wellbeing. Actions include promotion of measures to reduce GHG emissions through sustainable planning strategies, promoting sustainable modes of transport, renewable energy, climate-smart and near zero

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[14] Long-term Strategy on Greenhouse Gas Emissions Reductions, 2023. [online] Available at: https://www.gov.ie/en/publication/e4e81-long-term-strategy-on-greenhouse-gas-emissions-reductions/ [Accessed 06 June 2024].

[15] Government of Ireland, Project Ireland 2040 National Planning Framework, 2018. [online] Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/246231/39baaa8c-48dc-4f24-83bd-84bbcf8ff328.pdf#page=null [Accessed 06 June 2024]

[16] Department of Communications, Climate Action and Environment, The White Paper, 2020. [online] Available at: gov - The White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030 (www.gov.ie) [Accessed 06 June 2024].

energy buildings, stipulating climate change requirements for urban storm water drainage systems.

Kerry County Development Plan 2022-2028[17]

Kerry County Council developed a development plan that covers the period from 2022 to 2028 and is addressed to contribute to a transition to a low-carbon economy and a climate resilient society, being aligned with the Ireland's national goal of reducing emissions by 51% between 2018 and 2030 and reaching Net-Zero by 2050.

Within the climate change mitigation actions, this plan states the provision of a framework and work with stakeholders to decarbonise the agriculture, transport, electricity, and built environment sectors. Regarding the electricity sector, the Council will reduce the reliance on fossil fuels and increase renewable energy as main source, alongside the promotion of energy efficiency, and climate change awareness and behavioural change.

Kerry County Council Climate Action Plan 2024-2029 (Kerry County Council, 2024).

This plan outlines the ambition of Kerry County Council in climate action to meet its own emissions and energy efficiency targets. This includes a 51% reduction in GHG emissions and a 50% improvement in energy efficiency by 2030. Externally the Local Authority seeks to influence, advocate and facilitate climate action ambitions within the local community.

12.2.2 Guidance

This GHG assessment follows the considerations set out in **Assessing GHG Emissions and Evaluating their Significance**, by the Institute of Environmental Management & Assessment (IEMA) published in 2022[18] (referred to hereafter as the IEMA Guidance). This guidance includes recommended approach for how to undertake a GHG assessment, the likely mitigation opportunities, and how to consider significance depending on the effects of a project.

Following the **PAS 2080:2016** standard for managing infrastructure carbon, the Institution of Civil Engineers (ICE) expanded its scope and created a new update that includes the whole built environment. This revised version of PAS 2080 launched in 2023[19], covers the infrastructure and building value chain and incorporates carbon reduction in their whole life. Moreover, this guidance helps identify opportunities for carbon reduction, create carbon management strategies and prioritise actions against climate impacts.

12.3 Assessment Methodology

The methodologies presented in the following section have been developed in line with the relevant planning policy requirements and appropriate industry guidance for assessing GHGs.

A qualitative approach was taken to complete the assessment of the proposed development. The method for this report was as follows:

- Identify a local or national baseline of publicly available GHG emissions data including power sector emissions.

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[17] Kerry County Development Plan 2022-2028, 2022 [online] Available at: https://www.kerrycoco.ie/kerry-county-development-plan-2022-2028/ [Accessed 18 March 2024].

[18] IEMA, Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2022 [online] Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions [Accessed 18 March 2024].

[19] Guidance Document for PAS 2080 – Practical actions and examples to accelerate the decarbonisation of buildings and infrastructure, ICE, 2023 [online] Available at: https://www.ice.org.uk/media/vm0nwehp/2023-03-29-pas_2080_guidance_document_april_2023.pdf [Accessed 1 April 2024].

- Qualitatively assess the impact of the activities related to the proposed project including determining whether these will have a positive or negative effect on climate compared to a scenario without the proposed project scenario.
- Highlight potential mitigation measures.

12.3.1 Approach to Data Collection

The following data sources and information (Table 12.1) have been considered during production of this EIAR.

Table 12.1: Data Sources used to inform the climate chapter of this EIAR

Data source	Date	Data contents
Ireland's National Inventory Report 2023[20]	01/04/2024	National and sectorial GHG emissions 1990-2021
Climate Action Plan 2024[21]	01/04/2024	National GHG emissions commitments.
Shannon Technology and Energy Park Environmental Impact Assessment Report	01/04/2024	Project description

12.3.2 Approach to Impact Assessment

A qualitative assessment has been undertaken. This assessment is broken down by activity – including construction and operation.

The IEMA guidance on evaluating significance of GHG emissions in EIA states "in the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant, and an EIA should ensure the project addresses their occurrence by taking mitigating action". Nevertheless, this guide states significance criteria to determine different levels of significance, depending on the adverse and beneficial effects that the project generates over its lifetime.

12.3.3 Study Area

GHG emissions are not bound by location and effect the concentration of CO_2e in the global atmosphere, therefore impact assessment is taken based on the activities associated with the Proposed Development, rather than any specific geographical study area.

The following table describes the activities that are part of the proposed development (Table 12.2):

Table 12.2 Proposed development description

Asset/Activity	Description
Underground cable	Grid connection underground cables (two underground circuits) between the proposed Shannon Technology and Energy Park (STEP) substations and the existing grid network. The connection points will be made to the Kilpaddoge – Tarbert 220kV Circuit, which is located approximately 5km east of the proposed STEP facility, one via a joint bay to an existing underground cable and one via a line cable interface mast (LCIM) to an existing 220kV overhead line into the existing Kilpaddoge substation.
Substations	The connection will include two substations (onsite EirGrid/ESBN operated GIS substation and customer operated GIS substation).

[20] Ireland 2023 National Inventory Report, 2023 [online] Available at: https://unfccc.int/documents/627850 [Accessed 1 April 2024].

[21] Climate Action Plan 2024, 2024 [online] Available at: https://www.gov.ie/en/publication/79659-climate-action-plan-2024/ [Accessed 20 June 2024].

12.3.4 Limitations of this EIAR

As a detailed design has not yet been completed, data are not available to allow for a quantified assessment of the GHG emissions from the construction and operation of the proposed development. A qualitative assessment is presented here.

A quantitative assessment of cumulative GHG effects is not possible as the identified receptor is the global climate and effects are therefore not geographically constrained. As stated by IEMA guidance (IEMA, 2022) effects of GHG emissions from specific cumulative projects in general should not be individually assessed, as there is no basis for selecting any particular (or multiple) cumulative project over any other. Consequently, consideration of the effects of the proposed development together with other developments on GHG emissions is not considered to be applicable.

12.4 Receiving environment

12.4.1 Overview

According to the Ireland's National Inventory Report 2023[22], there have been improvements in electricity production through energy efficiency and changing fuel types (including renewable energy generation). Overall, the trend in emissions from electricity and heat production has been a decrease in emissions over the period 1990-2021. In 2021, GHG emissions from the energy sector increased on 2019 and 2020 totals, due to greater coal combustion and a reduction in natural gas and renewable energy generation.

Ireland is committed to reducing GHG emissions through a faster deployment of renewable energy to replace fossil fuels, providing a flexible system to support renewables and manage electricity demand. This will include phasing out coal and peat in energy generation before 2030. The GHG emissions reduction trend is consistent with the decarbonisation goals as the GHG emissions resulting from electricity decreased by 45% from 2005 to 2020, according to the Ireland Climate Action Plan 2023[23]. This decrease in emissions is linked to greater renewable generation and use of higher-efficiency gas turbines.

12.4.2 National Baseline

The function of the proposed development is to provide connection from the proposed STEP Power Plant to Ireland's electricity grid, the carbon baseline is therefore taken as the energy sector GHG emissions generated in Ireland in 2021.

Based on Ireland's National Inventory Report 2023[24], in 2021 the energy sector generated 35 Mt CO_2e from which 10 Mt CO_2e come from public electricity and heat production. This data comes from 15 electricity generating stations and includes the GHG emissions generated from coal, peat, oil, natural gas and municipal solid waste (MSW) combustion.

12.5 Likely Significant Effects

A qualitative assessment has been undertaken, this sets out the main emissions-causing activities and evaluating their impact based on previous project experience. The potential impacts of the proposed development scoped into this chapter, covering construction phase and

[22] Ireland National Inventory Report (NIR), 2023 [online] Available at: https://unfccc.int/documents/627850 [Accessed 9 April 2024].

[23] Climate Action Plan, 2023 [online] Available at: https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/ [Accessed 9 April 2024].

[24] Ireland National Inventory Report (NIR), 2023 [online] Available at: https://unfccc.int/documents/627850 [Accessed 9 April 2024].

operational activities, have been summarised in Table 12.3 and Table 12.4. This assessment is broken down by activity (key emissions sources).

In line with the IEMA Guidance (2022), new GHG emissions contribute to a negative environmental impact, and it is important to consider likely adverse and beneficial effects that the project generates over its lifetime.

12.5.1 Do Nothing Scenario

Under a Do-Nothing scenario there will not be a suitable connection from the proposed low carbon and flexible generation capacity STEP Power Plant to the national grid. The generation of new GHG emissions associated with construction and operation of the proposed development (i.e. the grid connection) would not occur under this scenario.

However, if the connection cannot be built, then the STEP Power Plant would not be built. This would then be contrary to Ireland's Climate Action Plan target of delivering up to 2 GW of additional new flexible gas-fired power plants.

More specifically, in the absence of the low carbon and high efficiency combined cycle (CCGT) STEP Power Plant, the system operator will be obliged to turn on less efficient higher carbon open cycle (OCGT) generators, with more significant impact on the nation's GHG emissions.

12.5.2 Construction Phase

The proposed development includes to the construction of two 220kV gas-insulated substations (GIS), two underground cable circuits (approximately 5km of cables), and connection points.

Construction-related GHG emissions include the use of materials (which have embodied carbon associated with their production), transport of these construction materials to site, use of construction equipment and disposal of waste. There will be earthworks, new cables, new buildings and equipment for the substations. Emissions sources are set out in Table 12.3.

Table 12.3. Construction impacts

Activity	Emission source	Likely impact
Grid connection underground cables (two underground circuits) between the proposed Shannon Technology and Energy Park (STEP) Power Plant and the existing grid network.	Embodied emissions from production of construction materials, and transport of those materials and workers to site. Materials are mainly the ~5km of underground cabling required. Vehicle and machinery usage (electricity, fuel, and water consumption), including for site clearance and temporary construction compounds. Waste and excavated material management. Land use change along the cable route.	Based on previous project experience, construction material manufacture (embodied carbon) is likely to be the most significant source of GHG emissions on this project. Fuel consumption in vehicle and machinery use will also be a large source, although not as significant.as construction material use
Two substations (EirGrid/ESBN Glansillagh GIS substation and customer Knockfinglas GIS substation).	Embodied emissions from production of construction materials, transporting these materials and workers to site. Materials will include structural steel, metallic cladding and roofing for the substation buildings, as well as lightning protection masts, and equipment such as circuit breakers and transformers. Vehicle and machinery usage (electricity, fuel, and water consumption), including earthworks for preparing the site. Waste and excavated material management. Land use change associated with site development and proposed landscaping.	

Construction emissions are considered to be adverse and significant, as all new GHG emissions, regardless of quantity, are known to contribute to a negative environmental impact on climate change.

12.5.3 Operation and Maintenance Phase

The proposed development is part of STEP Power Plant that aims to provide 600MW of fast-acting flexible thermal generation capacity to the Irish electricity market, through three blocks of combined cycle gas turbines (CCGT) with 200MW capacity and provide a 120 MWh battery energy storage system (BESS). The overall project will include underground cables will run from the two new substations to the connection point at the existing LCIM near Kilpaddoge substation.

The operation of substations and maintenance of the infrastructure will require energy use over the project's lifespan, although overall operational energy use is not anticipated to be significant. SF_6 gas is used by the GIS substation as an insulator, and it is estimated a leak rate lower than 1% per year[25]. SF_6 has a very high global warming potential, therefore small leaks can lead to large GHG emissions over the operational lifetime[26].

Table 12.4. Operation impacts

Activity	Emission source	Likely Impact
Two substations (onsite EirGrid/ESBN GIS substation and customer GIS substation).	SF_6 leaks Energy and fuel consumption (emergency diesel generator)	Significant SF_6 emissions without leak monitoring and management in place. Energy consumption expected to be minor.

It is noted that no significant effects are expected to occur from the cables or connection point infrastructure. The cables will not require specific or routine maintenance activities along the cable trench or joint bay locations. Therefore, the GHG emissions generated by this proposed development will be mainly related with its construction phase and operational SF_6 leaks. Without leak management measures, operational impacts would likely be adverse and significant.

12.5.4 Decommissioning Phase

The EirGrid/ESBN Glansillagh substation is expected to remain a permanent part of the national electricity transmissions network to be refurbished as required; cabling equipment will be replaced as required but decommissioning is not intended. The SLNG Knockfinglas substation has a predicated design life of 25 years, associated emissions from decommissioning are similar to those of construction assuming that materials are removed for disposal and the site is restored. Therefore, emissions regardless of quantity, are considered to be adverse and significant.

12.6 Cumulative Effects

As described in other chapters, separate to this planning application, the wider site is also intended to be further developed with the STEP Power Plant, 26km gas pipeline and as well as a possible future Strategic Gas Reserve facility and data centre which will be subject to future consents.

The nature of GHG emissions means that the ultimate receptor is the global climate system. The GHG assessment does not consider cumulative effects, as GHG emissions do not result in

[25] Gas-Insulated Substations – GIS, Electrical Engineering Portal, 2010 [online] Available at: https://electrical-engineering-portal.com/gas-insulated-substations-gis#:~:text=A%20gas-insulated%20substation%20%28GIS%29%20uses%20a%20superior%20dielectric,inside%20grounded%20metal%20enclosures.%20Gas-Insulated%20Substations%20%E2%80%93%20GIS [Accessed 10 April 2024].

[26] Greenhouse Gases (GHGs) refer to the seven gases covered by the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). The global warming potential of these gases is measured in units of carbon dioxide equivalent (CO2e) which expresses the impact of each gas in terms of the amount of carbon dioxide that would create the same impact. GHGs are commonly referred to as carbon.

a regional or local effects on climate and, therefore, the effects of the project's emissions on climate will not differ when combined with other developments. This is in line with the IEMA Guidance (2022) which states that "*effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other.*"

12.7 Mitigation and Monitoring

The Climate Action Plan 2024 states updated carbon budgets and sectoral emissions ceilings, as well as the roadmap to reach net zero GHG emissions by 2050. The proposed development contributes to providing national security of electricity supply and reducing emissions through moving away from coal and peat-fired power generation.

It is recommended that emissions reduction measures are put in place as part of the proposed development throughout the design stage and onwards, leveraging the ability to effect change to achieve GHG emissions reduction over time. GHG reduction is articulated within the Construction Environmental Management Plan, the Traffic Management Plan and the Construction Resource Waste Management Plan, as well as operational management plans as recommended below:

- Develop construction works in accordance with the best practicable means, to reduce fumes or emissions that could result in additional GHG emissions. For example:
  - Use of renewable electricity where practical, such as solar-power to construction lighting or construction cabins;
  - Vehicles and plant with low exhaust emissions will be used and will be serviced regularly;
  - Substitute machinery fuels by low-carbon fuels when possible (for example use of alternative fuels such as Hydrotreated Vegetable Oil (HVO) for construction vehicles);
  - Implement regular maintenance of construction equipment to ensure it is running efficiently;
  - Engines will not be left running unnecessarily;
  - Vehicles will be monitored entering the site for noticeable exhaust emissions and site security personnel will have the power to ban offending vehicles from the site;
  - Material transport associated with the project will be assessed in order to reduce associated carbon expenditure (i.e. choosing local suppliers or more sustainable transport options); and
  - The Contractor will engage the supply chain to reduce the number of vehicle movements relating to site material.
- Implementation of energy efficiency strategies. For example:
  - Use of more efficient construction cabins (with insulation, renewable energy generation, low-energy lighting etc.); and
  - Incorporate energy efficiency into the operation of the proposed development (using motion-activated low-energy lighting, building management systems where appropriate).
- Introduce low-carbon technology and process in design, construction and maintenance of the proposed development. For example:
  - Design with carbon footprint of construction materials in mind, using low-carbon concretes and steel with high recycled content where structurally appropriate;
  - Consider maintenance processes within the design, for example choosing materials with longer durability or reduced maintenance requirements;

- Minimise transport and travel demand during construction by having a travel management plan for site personnel to encourage car-sharing, active travel, use of buses, and prioritise electric vehicles;
- Minimise waste generation and implement circular economy processes, avoiding landfilling and waste incineration;
- Periodically monitor and control the GIS to avoid SF_6 leaks; and
- Seek eco-efficient alternatives to SF_6 these may include dry air, or other products such as G3 (Green Gas for Grid), C4 gas, 3M Novec 4710.

12.8 Residual Effects

There would be unavoidable GHG emissions resulting from the construction and operational phases of the Proposed Development as materials, energy and fuel use, and transport would be required. In line with IEMA Guidance, "the goal of the EIA process should be to reduce the project's residual emissions at all stages" and therefore mitigation and monitoring measures (such as those detailed in Section 12.712.7) are recommended. The residual effect of Minor Adverse with mitigation is anticipated with No Significant effects expected. In line with the IEMA Guidance, minor adverse means that the project's emissions are in-line with good practice design standards and are also in-line with national net zero pathways.

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Chapter 13 - Noise & Vibration

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13 Noise and Vibration

13.1 Introduction

This chapter presents an assessment of the likely and significant effects arising due to noise and vibration from the proposed development. The assessment is based on the proposed development as described in Chapter 5 of this EIAR. The assessment has been prepared by a competent expert and details are provided in Appendix 1.1.

The main sources of noise and vibration associated with the proposed development are:

- Noise and vibration due to activities (such as earthworks) and the use of mobile plant during construction
- Noise due to additional road traffic during the construction phase
- Noise due to operation of fixed plant associated with the GIS substation

This chapter presents an assessment of the impacts on the closest Noise Sensitive Locations (NSLs) due to the above sources of noise and vibration.

The volume of vehicle movements generated by the proposed development during the operational phase is considered to be negligible and the assessment of environmental effects have been scoped out. Therefore, the operational phase noise impacts due to road traffic are not assessed.

Vibration due to the operation of the proposed development is considered to be negligible given that the proposed development is not expected to be a significant source of ground-borne vibration and the long separation distance to the nearest NSLs and is not considered further.

13.2 Policy and Guidance

Policies and guidance documents of relevance to the noise and vibration impact assessment are set out in this section.

13.2.1 Policy

The Environmental Noise Regulations (ENR)[1] transpose the EU Directive 2002/49/EC[2] (commonly referred to as the Environmental Noise Directive (END)) for the strategic control of environmental noise within Ireland. The ENR was revised and revoked by the European Communities (Environmental Noise) Regulations 2018[3].

Nuisance due to noise is dealt with by the Environmental Protection Agency Act S.I. No. 7/1992 (as amended)[4], and the Protection of the Environment Act 2003 S.I. No.27/2003 (as amended)[5] require Best Available Techniques in controlling noise as a result of human activity *"which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment"*. Both acts clarify that 'noise' includes vibration.

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[1] Environmental Noise Regulations, 2006 (S.I. No. 140 of 2006).

[2] The European Parliament and the Council of the European Union, 2002. Directive 2002/49/EC of 25 June 2002 relating to the assessment and management of environmental noise.

[3] The European Communities (Environmental Noise) Regulations 2018 (Statutory Instrument No. 549/2018).

[4] Government of Ireland. Environmental Protection Agency Act, 1992.

[5] Government of Ireland. Protection of the Environment Act, 2003.

13.2.2 Guidance

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the 'EPA Guidelines') (EPA, 2022).

There are no statutory standards in Ireland relating to noise and vibration limit values for construction works or for environmental noise relating to the operational phase. In the absence of specific statutory Irish guidelines, the assessment has made reference to non-statutory national guidelines, where available, in addition to international standards and guidelines relating to noise and / or vibration impact for environmental sources. These are summarised below:

- British Standard Institution (BSI) British Standard (BS) 5228 (2009 +A1 2014) Code of practice for noise and vibration control of construction and open sites - Part 1: Noise
- BS 5228 (2009 +A1 2014) Code of practice for noise and vibration control of construction and open sites - Part 2: Vibration
- BS 7385 (1993) Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration
- BS 6472 (2008) Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting
- European Communities (EC) (Environmental Noise) Regulations 2018 (S.I. No. 549 / 2018)
- EC (Environmental Noise) Regulations 2006 (S.I. No. 140/2006)
- EC Noise Emission by Equipment for Use Outdoors (Amendment) Regulations (S.I. No. 241 / 2006)
- International Organization for Standardization (ISO) 9613-2 (1996) Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation
- ISO 1996-1 (2016) Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures
- ISO 1996-2 (2017) Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels
- National Roads Authority (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1
- National Roads Authority (2014) Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes Noise Guidelines
- UK Department of Transport and Welsh Office (1988) Calculation of Road Traffic Noise (CRTN)
- World Health Organization (WHO) (2018) Environmental Noise Guidelines for the European Region
- Institute of Environmental Management and Assessment (IEMA) (2014) Guidelines for Environmental Noise Assessment

13.3 Assessment Methodology

The proposed development is expected to give rise to both temporary (construction and decommissioning) and permanent (operational) noise and vibration impacts. The potential for these to result in significant adverse effects has been considered within separate construction and operational assessments detailed in Section 13.5. This section describes the approach to the assessment based on the various relevant requirements and criteria.

Cumulative impacts due to the contributions of noise from other nearby developments are also assessed, detailed in Section 13.6.

13.3.1 Approach to Data Collection

The following information and data sources (Table 13.1) have been considered during the production of this EIAR.

Table 13.1 Data sources used to inform the noise and vibration chapter of this EIAR

Data source	Date	Data contents
Shannon Technology and Energy Park Power Plant - Vol 2 EIAR April 2024 by AECOM (ABP-PA08.319566)[6]	April 2024	Baseline noise data Traffic data Operational noise prediction
Glencloosagh Phase 1 (up to 4no. rotating stabilisers, 5no. battery storage containers, control room, 2no transformers and ancillary equipment), Planning and Environmental Report, December 2018 (KCC reference 19115)[7]	December 2018	Operational noise prediction

Source: Mott MacDonald

13.3.2 Approach to Impact Assessment

13.3.2.1 Determining Significance of Effect

The EPA Guidelines 2022 require that the EIAR focuses on effects that are both likely and significant and the description of the effects that are accurate and credible. Significance of effects is usually understood to mean the importance of the outcome of the effects (the consequences of the change). Significance is determined by a combination of (objective) scientific and subjective (social) concerns. The significance of effect criteria applied to this project are in accordance with the EPA Guidelines 2022, is reproduced in Table 13.3. The Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) are Guidelines written to facilitate the implementation of EIA Directive 2011/92/EU as amended by EIA Directive 2014/52/EU (together, the “EIA Directive”) in Ireland. This chapter covers the assessment and description of the likely significant environmental effects.

Table 13.2: EIAR guidelines significance description

Significance of effect	Description
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.

[6] https://www.pleanala.ie/en-ie/case/319566

[7] https://www.eplanning.ie/KerryCC/AppFileRefDetails/19115/0

Significance of effect	Description
Profound Effects	An effect which obliterates sensitive characteristics.

Chapter 4: Methodology sets out the description of the duration of effects.

13.3.2.2 Construction Noise

BS 5228 Part 1: Noise[8] has been adopted for the assessment of temporary noise impacts due to demolition and construction. This standard provides comprehensive guidance including details of typical noise levels associated with items of plant and activities, prediction methods, and options for mitigation measures, and therefore has been considered appropriate for use in this assessment.

British Standard 5228[8] has been adopted for the assessment of effects at noise sensitive receptors[9] during construction. Based on the BS 5228 Part 1 'Example method 2 – 5 dB(A) change' in BS 5228 Part 1 2009+A1:2014, noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq, T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.

13.3.2.3 Construction Vibration

BS 5228 Part 2: Vibration[10] provides guidance on the assessment of vibration due to construction activity. The Standard considers levels of vibration from construction in terms of peak particle velocity (ppv) defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and is expressed in millimetres per second (mm/s). Methods to predict indicative levels of vibration due to some types of construction activity are described, along with measured case history data of vibration for various types of activity. BS 5228 Part 2 includes guidance on the levels of vibration that correspond with reported disturbance of occupants of residential buildings, and with cosmetic or structural damage to different types of buildings.

BS 5228-2:2009+A1:2014 explains that even when vibration due to construction activity is very low in magnitude, this can be perceptible to the occupants of nearby buildings. Nuisance associated with vibration is frequently associated with the assumption that if vibration can be felt then building damage is inevitable. Considerably greater levels of vibration over the threshold of perception are however required before damage to buildings at either a cosmetic or structural level will occur. BS 5228-2:2009+A1:2014 presents the following guidance on the effects of vibration with regards to human response:

- 0.14 mm/s: Vibration may just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies people are less sensitive to vibration.
- 0.3 mm/s: Vibration might just be perceptible in residential environments.

[8] British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'.

[9] Residential buildings, hotels and hostels, buildings in religious use, buildings in educational use and buildings in health and/or community use.

[10] British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'.

- 1.0 mm/s: It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior notification and explanation has been given to residents.
- 10 mm/s: Vibration is likely to be intolerable for any more than a brief exposure to this level in most building environments.

BS 5228-2:2009+A1:2014 states that low frequency vibration at a ppv of 15 mm/s may cause cosmetic damage in un-reinforced or light framed structures e.g. for residential/light commercial use, and 50 mm/s in heavy commercial buildings. These values apply to transient vibration which does not induce a resonant response in structures and low-rise buildings. A source of continuous low frequency vibration may induce a vibration response in buildings or structures at their resonant frequencies. The building would then be subject to additional dynamic forces arising from its own motion. Therefore, BS 5228–2:2009+A1:2014 recommends that the values given should be reduced by 50% to take into account for dynamic magnification due to resonances. Applying a reduction of 50% to the lowest values in BS 5228–2:2009+A1:2014 gives:

- 7.5 mm/s for residential and light commercial buildings; and
- 25 mm/s for industrial and commercial buildings.

The Standard also states: "*Important buildings which are difficult to repair might require special consideration on a case-by-case basis. A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*."

It is concluded that a significant adverse effect is expected to arise where the level of ground-borne vibration at a receptor location due to the construction of the proposed development exceeds:

- 1.0 mm/s with regards to the disturbance of building occupants
- 7.5 mm/s with regards to potential (cosmetic) damage to buildings

13.3.2.4 Construction Traffic

Changes in noise from road traffic on public roads can arise due to diversion routes (not required for the proposed development) or due to additional traffic for the transfer of materials and equipment and the attendance of site personnel. The National Roads Authority Guidelines[11] and Guidance[12] do not provide a method for the assessment of temporary changes in road traffic noise associated with construction, specifically. However, the 2014 Guidance describes requirements for noise monitoring in Section 3.13. This states:

"*The baseline noise level should be established for every noise-sensitive building or group of buildings where traffic noise levels are likely to change significantly as a result of the scheme. This includes areas where traffic flows are reduced by 20% or more, and where existing flows are increased by 25% or more. Traffic noise will also change where traffic parameters other than total flow volumes are changed. An increase in the percentage of heavy vehicles, or in traffic speed, will also lead to increases in traffic noise. It is sufficient to calculate the Basic Noise Level with and without the scheme to determine whether there would be a difference of 1dB or more.*"

[11] National Roads Authority (2004) Guidelines for the treatment of noise and vibration in national road schemes, Revision 1

[12] National Roads Authority (2014) Good practice guide for the treatment of noise during the planning of national road schemes noise guidelines

The UK calculation procedure: the Calculation of Road Traffic Noise (CRTN)[13] is used to calculate the Basic Noise Level (BNL) for a road with and without the additional road traffic. The UK guidance the Design Manual for Roads and Bridges LA 111 Noise and Vibration[14] provides criteria for the magnitude of impact at NSLs due to changes in in road traffic noise due to construction traffic as given in Table 13.3.

Table 13.3: Magnitude of impact at receptors – changes in road traffic noise due to construction traffic

Magnitude of impact	Increase in BNL of closest public road used for construction traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Source: DMRB LA 111 Noise and Vibration Revision 2 Table 3.17

The guidance does not define absolute levels of noise above which changes of these magnitudes would result in a significant effect. Reference is made to guidance prepared by the National Roads Authority and issued by Transport Infrastructure Ireland[15,16]. This includes a design goal of 60 dB L_{den} for road traffic noise from operational of national road schemes. Although the proposed development is not a road scheme, this is adopted for the assessment of temporary changes in road traffic noise as a result of the proposed development on a precautionary basis.

13.3.2.5 Operational Noise

The EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016)[17] describes a methodology to assess and control the predicted and measured noise impacts associated with licenced sites. It specifically considers operational noise impacts only. For construction-related noise, the Guidance states this is not a licensable aspect of site noise and is generally covered by conditions attached to a planning permission. BS 5228 Part 1[8] and Part 2[10] are referenced as relevant guidance.

The NG4 Guidance sets out a methodology for setting appropriate noise criteria on operational noise emissions with the potential to affect Noise Sensitive Locations (NSLs). NSLs are defined as "*Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels*."

Firstly, sites are screened to determine whether they are Quiet Areas based on the proximity of the proposed development to urban areas and other major sources of environmental noise. The Quiet Area Noise Criteria for applicable sites is a limit defined as 10 dB below the average background noise level for the day (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods obtained by long-term noise monitoring.

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[13] UK Department of Transport and Welsh Office (1988) Calculation of Road Traffic Noise

[14] Highways England et all. (2020) Design manual for roads and bridges (DMRB) LA 111 – Noise and vibration. Revision 2

[15] TII (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes

[16] TII (2014) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes

[17] Environmental Protection Agency Office of Environmental Enforcement Guidance Note for Noise Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). January 2016.

For NSLs that are not identified as being within Quiet Areas, the NSLs are first screened for low background noise defined as those where the average background noise levels (L_{AF90}) are less than or equal to:

- Daytime: 40 dB L_{AF90}
- Evening: 35 dB L_{AF90}
- Night-time: 30 dB L_{AF90}

The noise criteria for NSLs with low background noise are:

- Daytime (07:00 to 19:00) 45 dB $L_{Ar,T}$
- Evening (19:00 to 23:00) 40 dB $L_{Ar,T}$
- Night-time (23:00 to 07:00) 35 dB $L_{Aeq,T}$

where $L_{Ar,T}$ is the rated noise level, which is equal to the L_{Aeq} plus any correction for tonal or impulsive acoustic features.

Where low background noise criteria are not met, then the general criteria apply as follows:

- Daytime: (07:00 to 19:00) 55 dB $L_{Ar,T}$
- Evening: (19:00 to 23:00) 50 dB $L_{Ar,T}$
- Night-time: (23:00 to 07:00) 45 dB $L_{Aeq,T}$

The EPA NG4 Guidance states that the limit values for noise from licensed sites apply to "*noise attributable solely to on-site activities, expressed as a free field value at any NSL*".

Where the predicted noise impacts exceed these values, the final significance of effect shall be considered with regard to:

- Sensitivity of receptor
- Whether the impact is temporary (construction-related) or short-term (operational)
- The magnitude by which the limit value is exceeded
- The change in ambient noise levels as a result of the contribution of the proposed development

Operational noise is not expected to include significant tonal or impulsive features and therefore no corrections of the daytime and evening noise levels are applied to represent rating levels

The operational noise levels will be predicted by using 3-dimensional computer modelling software that based on the methodology provided in ISO 9613-2 (1996)[18] at all of the considered NSLs which are mostly likely to be affected by operational noise.

13.3.2.6 Receptor Sensitivity

The effects of environmental noise take various forms including but not limited to annoyance, sleep disturbance, disturbance of tranquillity, ability to communicate or concentrate, or participate in social and community activities. Noise-sensitive locations are usually defined within an Industrial Emissions Licence (IEL)[19] as "*Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels*."

[18] International Organization for Standardization (ISO) 9613-2 (1996) Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation

[19] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions

Table 13.4 sets out typical classes of sensitive receptors and classification of noise sensitivity respectively. Most receptors or NSLs likely to be affected by the noise and vibration effects arising from the proposed development are dwellings and are therefore considered high sensitivity.

Table 13.4: Criteria for sensitivity

Sensitivity	Criteria
High	Receptors where occupants or activities are particularly susceptible to noise. Examples include: Residences, quiet outdoor areas used for recreation, conference facilities, auditoria/studios, schools in daytime, hospitals/residential care homes and religious institutions e.g. churches or mosques.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance. Examples include offices, restaurants and sports grounds where spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. golf or tennis).
Low	Receptors where distraction or disturbance from noise in minimal. Examples include residences and other buildings not occupied during working hours, factories and working environments with existing high noise levels and sports grounds where spectator noise is a normal part of the event.

Source: Mott MacDonald

Summary of significance of effect criteria

Table 13.5 summarises the significance of effect criteria applied within this assessment.

Table 13.5: Significance of effect

Category	Significance of effect
Construction vibration	Disturbance of building occupants: Exceedance of 1.0 mm/s for a period of 10 or more days of working in any 15 consecutive days is considered to be a significant effect Building damage: Exceedance of 7.5 mm/s
Construction noise	Exceedance of the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect
Changes in road traffic noise during construction	A significant effect is considered to occur where the predicted temporary increase in daily average road traffic noise due to the proposed development is 1 dB or more
Operational Noise	A significant effect is considered to occur where the specified daytime or night-time levels are exceeded at a residential property with the proposed development with a minor noise increase (or higher); or where the 45 dB(A) day, 40 dB(A) evening and 35 dB(A) night-time thresholds are exceeded at a residential property with the proposed development with a major noise increase

13.3.3 Study Area

The study area is defined as 500m from the red line boundary of the proposed development for construction and operational noise impacts, and 100m for construction vibration impacts. This is shown in Figure 13.1. Locations within the study area have been identified that are sensitive to noise and vibration. These are residential properties and reported as NSLs as described in the Section 13.4.

13.3.4 Limitations of this EIAR

The specific inventory of plant and working methods to be applied during the construction phase will be devised by the appointed contractor. The construction contractor is not yet appointed therefore, these specific details are not available to inform the assessment of potential noise and vibration impacts. However, the assessment has been undertaken based on the impacts of construction activities that are expected to be required. The construction activities are chosen to represent a reasonable worst-case scenario. It is assumed that the majority of works can be undertaken during weekday daytime periods and that works during the night-time would only be undertaken by exception and approval by Local Authority.

13.4 Receiving Environment

13.4.1 Site Location

The proposed development is located approximately 3km west of Kilpaddoge substation, Carrowdotia, Co. Kerry, on the southern shore of the Shannon Estuary, the site location is provided in Figure 13.1. Most of the site lies to the north of the L1010 road, which links STEP Power Plant and the existing ESBN/ EirGrid Kilpaddoge 220kV substation to the east of the site. Surrounding land use is predominantly agricultural with isolated residential properties.

The underground cables will run from the two new substations, adjacent to the STEP Power Plant access track, prior to joining the L1010 road, for approximately 2.2km, within the carriageway. The underground cable will exit the carriageway and travel across private agricultural lands, for approximately 2.8km to two grid connection points in proximity to Kilpaddoge substation.

13.4.2 Baseline Noise Monitoring

The assessment references the results of noise monitoring undertaken between February 2020 and October 2020 to describe baseline conditions affecting the closest NSLs considered by the operational noise assessment. This baseline data is only used to derive the relevant criteria to be used for the assessment and the most stringent criteria possible were selected i.e. any change in baseline conditions could not result in a more onerous criterion.

A long-term measurement of over two weeks was undertaken at position LT1, short-term measurements of thirty-minute intervals were carried out at positions ST1, ST2 and ST3. The NSLs and measurement locations are indicated in Figure 13.1 and a summary of baseline noise levels is given in Table 13.6. Table 13.7 provides description of each of the NSLs.

The existing acoustic environment is rural in nature. Sound sources identified included birdsong, farm animals and weather induced sound (e.g. the wind ‘rustling’ vegetation). Some intermittent road traffic sound was present, mainly from the L-1010 road.

Table 13.6: Summary of baseline noise survey results

Receptor	Representative measurement location	Noise level [Average level], L_{Aeq} dB			Noise level [Average level], L_{A90} dB			Remarks
		Day	Evening	Night	Day	Evening	Night	
NSL1	LT1	36-68 [47]	27-52 [39]	25-43 [37]	27-51 [36]	21-45 [34]	23-40 [32]	[a]
NSL2	ST3	59	44 *	28	37-38	30 *	23	[a]
NSL3	ST2	57	52 *	46	26-30	28 *	24-25	[a]
NSL4	ST1	57	52 *	46	28-31	28 *	24-25	[a]
NSL5	ST1	57	52 *	46	28-31	28 *	24-25	[a] [b]

Remarks:
[a] Based on Shannon Technology and Energy Park - Vol 2 EIAR August 2021 by AECOM
[b] Referenced to the noise data at NSL4 due to close proximity
* Estimation based on daytime and night-time levels.

The dominant source of noise affecting the baseline noise climate were identified as:

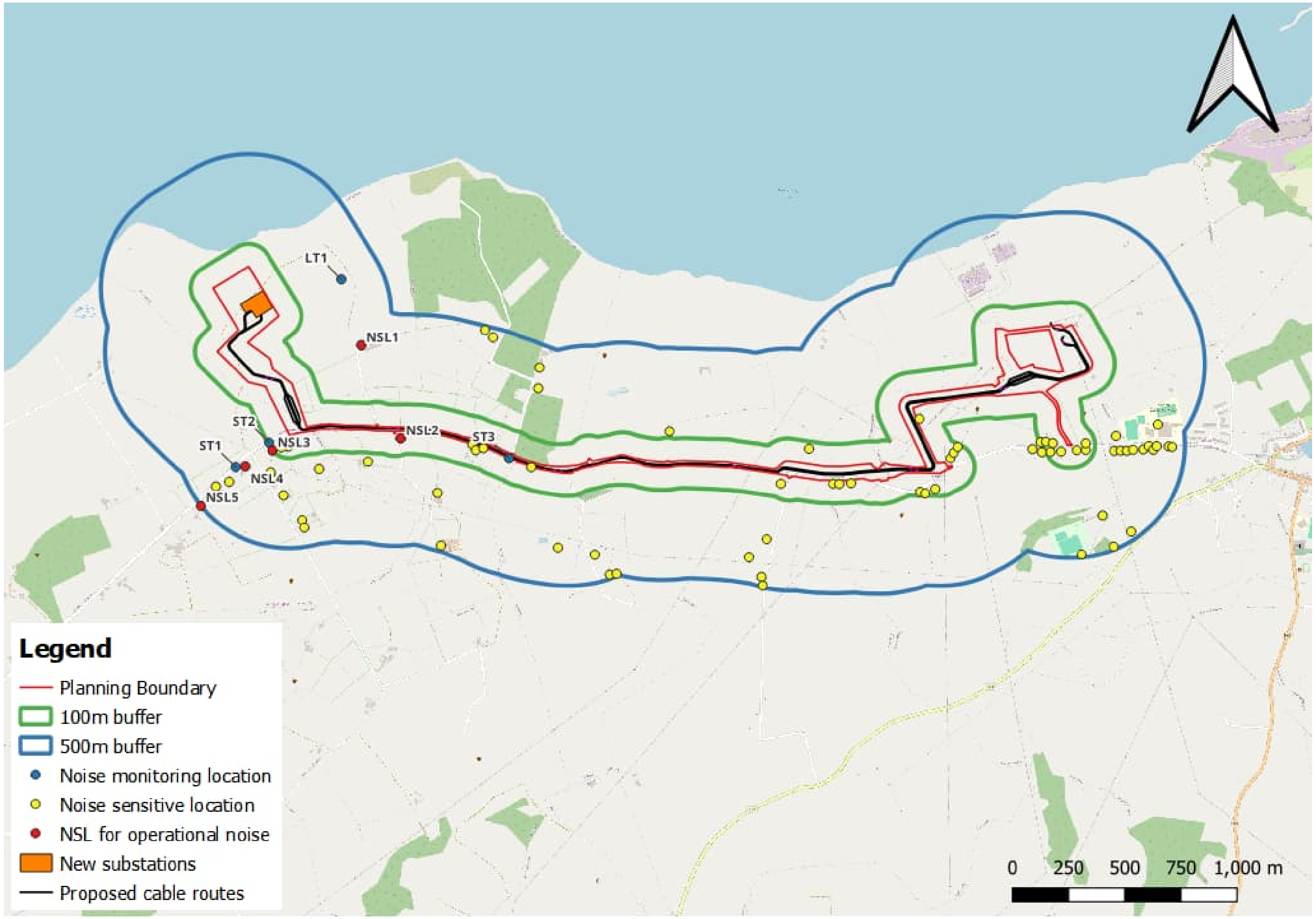
- Intermittent road traffic mainly on the L1010 road
- Birdsong, farm animals and wind rustling

Table 13.7: Description of NSLs for operational noise assessment

Receptor	No. of receptors represent	Description
NSL 1	1	NSL at the southeast of the site located in Ralappane
NSL 2	1	NSL at the southeast of the site at L1010 located in Carhoonakilla
NSL 3	3	NSLs at the south of the site at L1010 located in Kilcolgan Upper
NSL 4	3	NSLs at the south of the site at L1010 located in Kilcolgan Upper
NSL 5	5	NSLs at the south of the site at L1010 located in Kilcolgan Upper

Source: © Eircode 2015

Figure 13.1: Noise Sensitive Locations and Noise Monitoring Locations



Source: Mott MacDonald, © OpenStreetMap contributors and © Eircode 201

The background noise levels expressed as L_{A90} dB given in Table 13.6 indicate there is variance and the levels during some survey periods are below the screening criteria for Areas of Low Background Noise given in the NG4 Guidance. Potentially, the NSLs that are within these areas would be identified as Quiet Areas during some periods. Therefore, the more stringent Quiet Area Noise Criteria defined in the NG4 Guidance are applicable rather than the General Noise Criteria for the assessment of operational noise.

The acoustic character of this rural area may change in the future due to the area being zoned for marine-related industry as part of the Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary which is supported by Kerry Co. Council as identified in the Kerry CDP 2022-2028. So, while the more stringent 'area of low background noise' criteria have been adopted in this assessment, it may be appropriate to review these criteria in due course.

This baseline data is only used to derive the relevant criteria to be used for assessing. It is noted that the most stringent criteria possible was selected i.e. any change in baseline conditions could not result in a more onerous criteria. The adopted criteria are presented in Table 13.8.

Table 13.8: Operational Phase Noise Criteria

Location	Daytime Noise Criterion dB $L_{ar,T}$ (0700 to 1900 hours)	Evening Noise Criterion dB $L_{ar,T}$ (1900 to 2300 hours)	Night-time Noise Criterion dB $L_{ar,T}$ (2300 to 0700 hours)
Areas of Low Background Noise	45 dB	40 dB	35 dB

Operational noise will be continuous therefore the assessment is based on the proposed development operating at any time throughout the day, evening or night. Therefore, the most stringent noise criterion of 35 dB $L_{ar,T}$ for the night-time at the nearest sensitive receptor location has been adopted. Compliance with this night-time criterion will therefore ensure compliance with the higher criteria for daytime and evening periods.

13.5 Likely Significant Effects

13.5.1 Do Nothing

There would be no change to the receiving environment under the 'Do Nothing' scenario. The impacts are assessed as negligible and therefore not significant.

13.5.2 Construction Phase

13.5.2.1 Calculation Methodology

British Standard 5228 has been adopted for the assessment of effects at noise sensitive receptors during construction, the calculation details are provided in the Appendix A.1.

13.5.2.2 Construction Noise

An indicative list of construction plant is presented in Table 13.7 and has been compiled from the inventories for similar projects and through consultation with the project team. Reference Sound Pressure Levels (SPL) for continuous operation are presented. The level of noise emission is corrected for utilisation time based on the estimated percentage of time the plant is expected to be in use over a working day.

Table 13.9: Details of noise-emitting equipment considered for the construction of the proposed development and reference noise levels used for noise calculations

Phase	Activity	Plant item	BS5228 Reference	Qty	Utilisation %	$L_{Aeq,10m}$ dB	Corrected combined $L_{Aeq,10m}$ dB
1: Site Preparation (GIS Substation)	1A: Construction of new site entrance and preliminary site Drainage Works Site Preparation and Groundworks Drainage Permanent Fencing Installation	Tracked excavator	C2-14	1	50	79	85
		Backhoe loader	C2-8	1	50	68	
		Concrete truck	C4-29	1	25	80	
		Compactor	C2-42	1	25	78	
		Tipper lorry	C8-19	1	25	79	
		MEWP	C4-59	2	50	78	
		Mobile crane	C3-45	1	25	82	
		Small tools	C4-69	1	25	85	
		Generator	C4-78	1	100	66	
		Loader	C2-8	1	50	68	
		Forklift	C2-35	1	50	71	
		Tracked crane	C3-28	1	25	67	
	1B: Ducting for cable circuits to demand customer from substation to transition pit	Tracked excavator	C2-14	1	50	79	82
		Handheld gas cutter	C3-35	1	25	65	
		Fuel tanker pumping	C4-16	1	75	72	
		Petrol driven chainsaw	D2-14	1	25	86	
2: GIS Substations and reactor (civils)	2A: Civil construction of new GIS Substation Building Compound levelling and finishing surface	Tracked excavator	C2-14	1	50	79	85
		Backhoe loader	C2-8	1	50	68	
		Concrete truck	C4-29	1	25	80	
		Compactor	C2-42	1	25	78	
		Tipper lorry	C8-19	1	25	79	
		MEWP	C4-59	2	50	78	
		Mobile crane	C3-45	1	25	82	
		Small tools	C4-69	1	25	85	
		Generator	C4-78	1	100	66	
		Loader	C2-8	1	50	68	
		Forklift	C2-35	1	50	71	
		Tracked crane	C3-28	1	25	67	
3: GIS Substations and Reactor (electrical)	3A: Electrical Installation	Telescopic handler	C2-35	2	25	71	82
		Tracked mobile crane	C4-50	2	50	71	
		Small tools	C4-69	1	25	85	
		Compressor	D7-10	1	75	78	
		Tractor (towing trailer)	C4-74	1	25	73	
	3B: Pre-commissioning Final commissioning and energisation	Lifting platform, 8t	C4-57	2	50	67	80
		Diesel generator	C4-86	1	100	65	
		Small tools	C4-69	1	25	85	
		Water pump (diesel)	C4-88	1	100	68	
4: Underground	4A: Pre-construction vegetation clearance	Mini excavator with hydraulic breaker	C5-2	1	25	83	79

Phase	Activity	Plant item	BS5228 Reference	Qty	Utilisation %	$L_{Aeq,10m}$ dB	Corrected combined $L_{Aeq,10m}$ dB
Cabling (civil works and electrical works)		Tracked excavator	C2-7	1	25	70	
		Handheld gas cutter	C3-35	1	25	65	
		Generator	C4-78	1	100	66	
		Compressor	D7-29	1	75	74	
		Pump	C4-88	1	75	68	
	4B: Trenching and ducting works and temporary reinstatement	Horizontal Directional Drill (HDD)	Datasheet	1	50	83	83
		Compactor	C2-42	1	25	78	
		Jack Hammer	C1-6	1	25	83	
		Tracked excavator	C5-35	1	25	74	
		Vibratory roller	C5-35	1	25	75	
	4C: Cable Installation and Jointing	Hydraulic winch	Datasheet	1	100	56	74
		Tractor (towing trailer)	C4-74	1	25	79	
		Telescopic handler	C2-35	1	25	71	
	4D: HV cable commissioning (sheath test, cross bonding and HV/AC testing)	Small tools	C4-69	1	25	85	80
		Compactor	C2-42	1	25	78	

Source: Mott MacDonald

The sources of noise are assumed to be evenly distributed across the site at locations adjacent to site components scheduled for construction.

Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays.

It is proposed to stagger the various shift starting and ending times within the construction complex (for example civil employees 07:30 – 17:45, or 07:45 – 18:00). This small stagger in shift start and ending times will lessen the impact of traffic peaking.

Construction works outside these hours will only take place in exceptional circumstances (i.e., for specific engineering works e.g., concrete pours etc.). It is likely that a number of continuous construction phase works will also be required outside these hours on a limited number of occasions. These works will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities, in particular regarding the control of noise and traffic.

Table 13.8 shows the expected distances from the site boundary that the maximum noise from the works is predicted to exceed the daytime threshold value of 65 dB(A). It should be noted that, in accordance with the BS 5228 'Example method 2 – 5 dB(A) change' (see Section 13.3.2.2), the duration of exposure is also taken into account in identifying significant effects. The noise impacts were calculated assuming mixed ground conditions (G=0.5) and compared with the daytime construction threshold value of 65 dB L_{Aeq} in accordance with BS 5228-1.

Figure 13.2 and Figure 13.3 present the predicted 65 dB(A) construction noise thresholds calculated in accordance with the 'Example method 2 – 5 dB(A) change' from BS 5228-1 for Phase 1 to 3 and Phase 4 respectively. The number of affected NSLs within each of the construction phases that fall within the 65 dB(A) daytime threshold is shown in Table 13.8.

The results show that predicted noise levels at NSLs do not exceed 65 dB(A) except during phase 4 'Underground Cabling (civil works and electrical works)'. The relevant NSLs are indicated at Figure 13.3. However, these works are expected to move at approximately 50m a day therefore, on this basis, the threshold is not expected to be exceeded at any given receptor for a period of more than approximately three days. Therefore, in accordance with the approach set out in Section 13.3.2.2, it is concluded that no significant effects are identified due to construction activity.

Table 13.10: Predicted distance that noise levels exceed the 65 dB(A) threshold during each phase of the construction process and the number of NSLs with the area

Construction phase	Distance at which the daytime threshold is exceeded (65 dB L_{Aeq})	Number of NSLs falling within the distance buffer
1	84	0
2	84	0
3	62	0
4	67	5*
* before accounting for duration of exposure, 0 after accounting for duration of exposure		

Figure 13.2: Predicted 65 dB(A) construction noise threshold and affected NSLs for Phase 1 to Phase 3

Source: Mott MacDonald, © OpenStreetMap contributors and © Eircode 2015

Figure 13.3: Predicted 65 dB(A) construction noise threshold and affected NSLs for Phase 4

Source: Mott MacDonald, © OpenStreetMap contributors and © Eircode 2015

13.5.3 Construction vibration

Construction activities that are expected to generate ground-borne vibration associated with the construction phases for the underground cabling works and substation include:

- Excavation
- Vibratory compaction to fill materials and rolling of surfacing as part of reinstatement

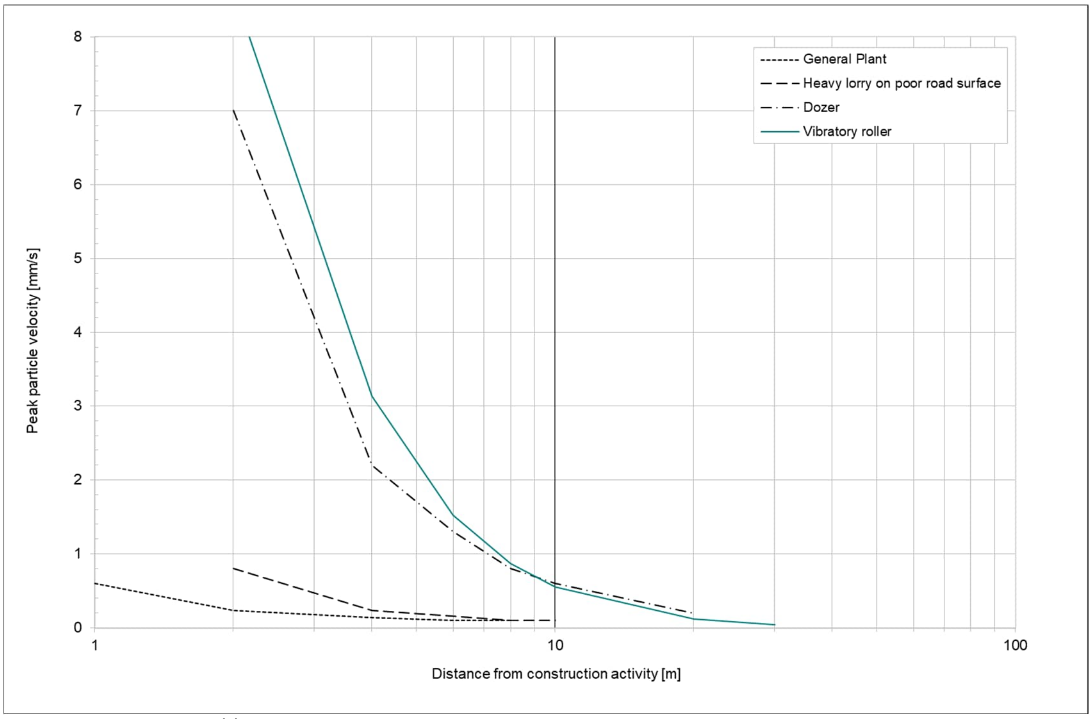
Vibration levels due to excavation is expected to be generally lower in magnitude than vibratory compaction. An assessment on the vibratory compaction activities will yield the worst-case scenario.

Along the planned cable installation route there are three properties within 40m of the cable route at Farranawana located at the south of the L1010 road and a property located at 25m of the cable route at Kilpaddoge. Table 13.9 presents the impact of vibration due to different construction activities. Annex E of BS 5228 Part 2:2009+A1:2014 includes an empirical method for the prediction of vibration arising from steady state vibratory compaction. Figure 13.4 presents levels of ground-borne vibration for various types of construction activities as a function of distance from the activity.

Table 13.11: Assessment of vibration at the closest dwelling to the extent of the works arising from different construction activities

Activity	Predicted ppv due to construction at the closest dwelling (mm/s)	Significance	
		Human perception	Cosmetic damage
Vibratory compaction	< 0.1	Not Significant	Not Significant
General construction	< 0.1	Not Significant	Not Significant
Heavy lorry on poor road	< 0.1	Not Significant	Not Significant
Dozer	< 0.1	Not Significant	Not Significant

Figure 13.4: Empirical Data on Ground-Borne Vibration From General Construction Works



Source: Mott MacDonald

There are two types of criteria applied to assess construction vibration: those dealing with human perception and those dealing with structural damage to buildings. Both types of criteria are considered relevant to the proposed development. Due to the large distance from the activities to the nearest properties, all activities are assessed as not having a significant impact in terms of both human perception or cosmetic damage to buildings.

13.5.4 Construction Traffic

In order to access the proposed development site, the contractors will be required to utilise a local public road that adjoins the L1010, R551, N67 and N69 roads. Traffic data as presented in Chapter 17 has been used to predict changes in road traffic noise during construction. The 'Do nothing' traffic data (without the implementation of the proposed development) is for year 2027, when the peak in construction traffic movements are expected to occur.

The predicted increases in the Basic Noise Level (BNL) for road traffic noise (L_{A10} dB), based on the daily average road traffic parameters in the year 2027 and forecasted additional movements range between 0 dB and +5.2 dB. The estimation is based on the peak traffic month of Light

Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs) and assumes all additional traffic would access the considered roads as a worst case.

Table 13.12 provides the details of the calculation of traffic noise levels expressed using the L_{den} descriptor. In most cases, the predicted, worst case changes are less than 1 dB and therefore increases in road traffic noise due to construction vehicles is assessed as Not Significant. Changes in predicted noise levels associated with two sections of the L-1010 road of more than 3 dB are assessed as moderate adverse. However, contextual factors are considered:

- The absolute noise levels for these two links (corrected from the BNL at 10m from nearest carriageway edge with the application of Method B presented in the TII 2004 guidance to convert from L_{A10} to L_{den} descript) are significantly less than 60 dB L_{den}. Noise levels at residential distances are also likely to be below 60 dB L_{den}.
- The duration of the greatest change in road traffic noise is during the construction of GIS buildings and substation compounds lasting approximately 11 months and is therefore temporary.

It is concluded that given the predicted absolute noise levels are relatively low and that the impacts are temporary, the noise impacts due to the changes in road traffic noise due to additional construction traffic are not significant.

Table 13.12: Analysis of traffic data and changes in basic noise levels

		Baseline				During construction					
Link	**km/h**	**Flow**	**HGV**	**HGV%**	**L_{den} dB**	**Additional LGV**	**Additional HGV**	**Flow**	**HGV%**	**L_{den} dB**	**Change**
L-1010 between Kilcolgan Upper and Ballylongford	80	231	18	7.7	46.7	96	16	343	9.9	51.2	**+4.5**
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper	80	286	18	6.2	48.7	96	16	398	8.5	52.5	**+3.8**
L-1010 between R551 and Tarbert Comprehensice School	80	1,412	59	4.2	61.9	96	16	1,524	4.9	62.5	+0.6
R551 between L-1010 and Ballybunnion	80	1,739	77	4.5	63.2	0	0	1,739	4.5	63.2	0
N67 between Tarbert Ferry Terminal and N67/R551 junction	100	1,295	129	10.0	63.7	5	0	1,300	9.9	63.7	0
N67 between N67/R551 junction and N67/N69 junction	100	3,718	232	6.2	68.8	91	16	3,825	6.5	68.9	+0.1
N69 between N67/N69 junction and Ahalana	100	3,332	232	7.0	68.4	24	3.2	3,359	7.0	68.5	+0.1

Link	km/h	Baseline Flow	Baseline HGV	Baseline HGV%	Baseline L_{den} dB	During construction Additional LGV	During construction Additional HGV	During construction Flow	During construction HGV%	During construction L_{den} dB	During construction Change
N69 between Ahalana and Listowel	100	4,100	157	3.8	68.8	24	3.2	4,127	3.9	68.8	0
N69 between N67/N69 junction and Glin	100	3,494	261	7.5	68.7	67	12.8	3,574	7.6	68.8	+0.1
N69 between Glin and Foyles	100	3,554	203	5.7	68.5	67	12.8	3,634	6.0	68.6	+0.1
N69 between Foyles and N18	100	6,645	642	9.7	71.4	67	12.8	6,725	9.7	71.5	+0.1

Source: Mott MacDonald

13.5.5 Operation and Maintenance Phase

13.5.5.1 Operational Noise

The operational noise assessment implements the procedures of ISO 9613-2[20] using a three-dimensional acoustic model developed using DataKustik CadnaA software. The detail of the calculation methodology and assumptions are provided in Appendix A.2.

The basic formula of the noise model to predict the noise level for each noise source is given below:

$$L_{fT}(DW) = L_w + D_c - A$$

Where

$L_{fT}(DW)$ is the equivalent continuous downwind octave-band sound pressure level at a receiver location in dB

L_w is the octave-band sound power level in dB, re 1pW

D_c is the directivity correction in dB

A is the octave-band attenuation in dB

The attenuation term A is given as follows:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc}$$

Where

A_{div} is the attenuation due to geometrical divergence in dB

A_{atm} is the attenuation due to atmospheric absorption in dB

A_{gr} is the attenuation due to ground effect in dB

[20] ISO 9613 (1996) Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.

A_{bar} is the attenuation due to a barrier in dB

A_{misc} is the attenuation due to miscellaneous other effects in dB, such as the attenuation due to propagation through foliage, an industical site or a built-up region of houses.

Sound reflections are also considered by using the image sources method to account for the contributions and the effect of obstacles. The overall noise level at each of the NSL are then calculated by logarithmic additions of all octave-band as well as all considered noise sources.

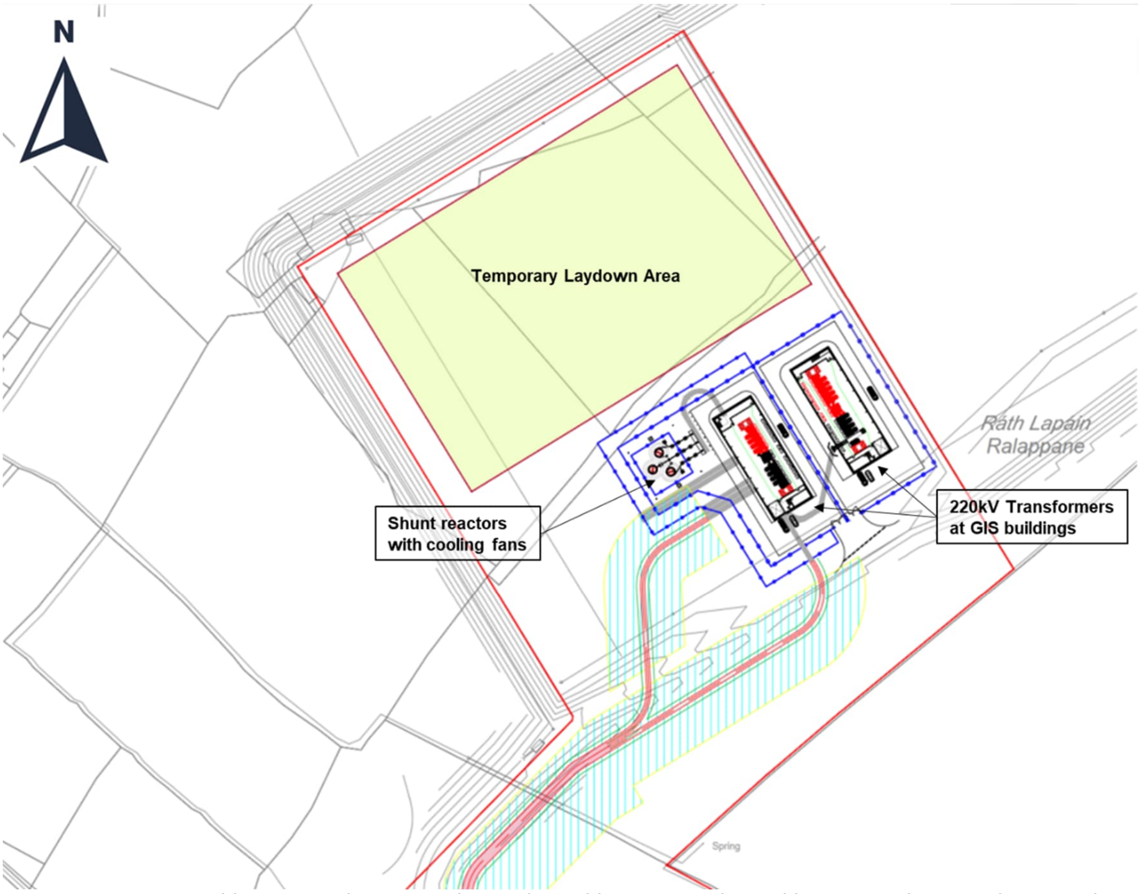
A list of operational noise sources is presented in Table 13.13 and the steady state sound power levels (SWL) that have been applied within the acoustic model. The item numbers correspond to the equipment layout presented at Figure 13.5. The noise emission data of plant items for the proposed development have been obtained for plant items specified within other similar projects and with similar specifications. On a precautionary basis, it is assumed that the GIS building provides no attenuation of the noise from the transformers, to consider worst case impacts. However, in practice this will reduce the transmission of noise into the environment. It is assumed that all plant will operate continuously with no significant tonal or impulsive features at NSL in accordance with the Section 5 of NG4 during the night-time period.

Table 13.13: List of noise sources considered within the acoustic model for the operation of the proposed development[21]

Item #	Description	Number of items	Sound power level dB(A)
01	220kV transformer	2	91
02	Cooling fans	3	87

[21] Sound power levels obtained from the Mott MacDonald database for representative items of equipment.

Figure 13.5: Site layout of the proposed development



Source: Mott MacDonald, STEP 220kV Connection 220kV Cable Route Design Cable Route - Sheet 01 of 06, Drawing number: 229100682-MMD-00-XX-DR-E-0111, March 2024

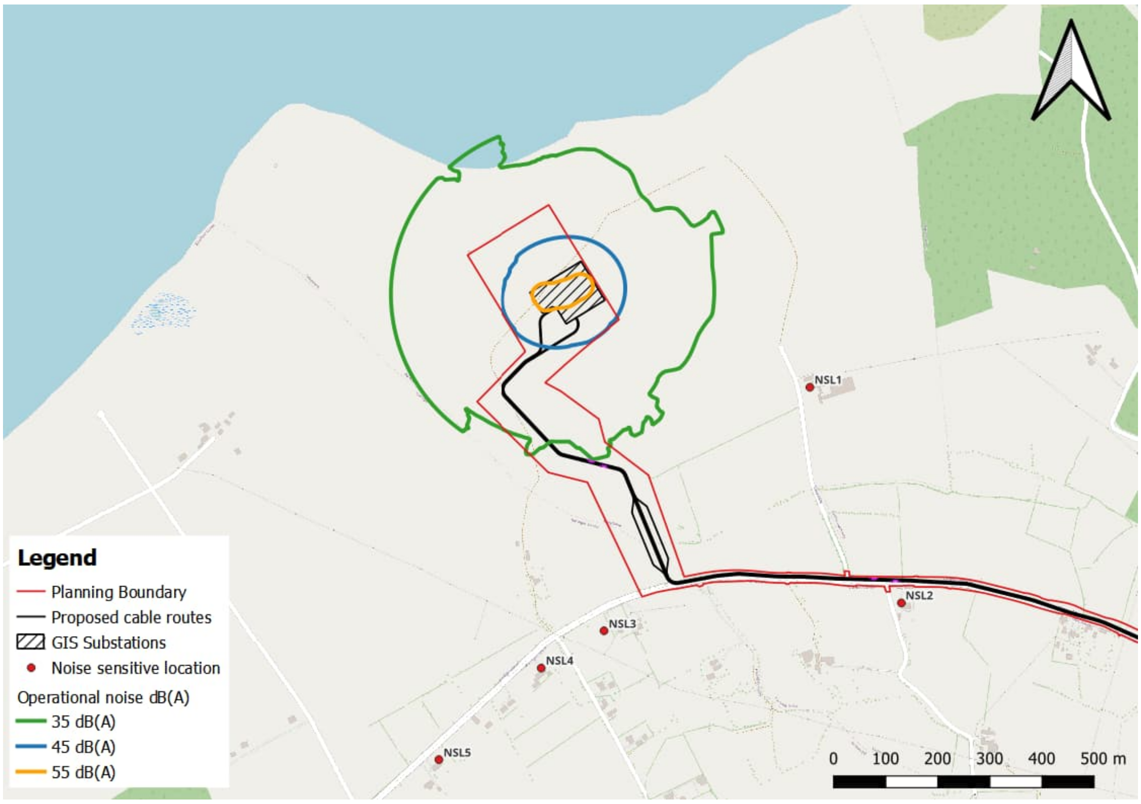
The predicted operational noise levels for each NSL are presented in Table 13.14. A noise contour plot produced by the acoustic model is presented in Figure 13.6.

Table 13.14: Predicted operational noise levels NSLs due to the proposed development

Noise Sensitive Location	Predicted noise level, dB $L_{Ar,T}$
NSL1	26
NSL2	20
NSL3	29
NSL4	27
NSL5	26

Source: Mott MacDonald

Figure 13.6: Contour plot of predicted operation noise levels



Source: Mott MacDonald

The predicted operational noise levels of the proposed development are significantly below the 35 dB(A) night-time criterion at all NSLs. Therefore, it is concluded that the impact due to operational noise of the proposed development is not significant.

13.5.6 Decommissioning Phase

Subject to the granting of statutory approval, the EirGrid/ESBN substation and grid connections will form part of the national electrical grid infrastructure. The design life of the substation is approximately 40 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

The SLNG substation is expected to have a design life of 25 years. Where decommissioning takes place, all above-ground components associated with the substation will be disassembled and removed from the site and the site will be restored in line with any requirements of the planning permission and IE licences. A condition of the IE licence for the STEP Power Plant will be that a closure and residuals management plan, including a detailed decommissioning plan, be submitted to the EPA for their approval. Therefore, specific details on decommissioning are not available at this stage of the project. Impacts during decommissioning from airborne noise and ground-borne vibration due to demolition activities are expected to be of a similar magnitude to those during construction but generally of shorter duration. Therefore, it is concluded that the noise and vibration impacts due to decommissioning are predicted to be not significant.

13.6 Cumulative Effects

13.6.1 Inter Project Effects

Potential cumulative effects due to operational noise from the proposed development and other existing or proposed sources of noise have been considered.

In addition to the proposed development, there are other developments proposed in the vicinity of the site that are within 2km of the considered sensitive noise locations. Table 13.15 describes the developments considered for cumulative impacts. Chapter 4 of this EIAR provides all the developments that are located within 10 km of the proposed development.

Table 13.15: Developments in the vicinity of the proposed development

Planning reference	Description	Date granted
ABP VA03.307798	Proposed 400kV electricity transmission cables, extension to the existing Kilpaddoge Electrical Substation and associated works, between the existing Moneypoint 400kV Electrical Substation in the townland of Carrowdoita South County Clare and existing Kilpaddoge 220/110kV Electrical Substation in the townland of Kilpaddoge County Kerry. The development includes work in the foreshore.	June 2021
KCC reference 19115	For a 10-year permission for a grid stabilisation facility comprising of: the construction up to 4 no. rotating stabilisers, 5 no. battery storage containers, 1 no. control room, 2 transformers and ancillary equipment within a site area of approx. 1.46 hectares.	February 2020

Source: Mott MacDonald

The inspector's report of October 2020[22] of the proposed 400KV electricity Transmission Cables and associated works (Carrowdotia South County Clare and Kilpaddoge County Kerry) indicates that the predicted operational noise at the nearby noise sensitive locations of this proposed development is in the range of 24 to 30 dB(A). Considering this site is at least 2km from the nearest NSL to the STEP 220kV Grid connection site, therefore an adverse impact is not considered likely.

The EirGrid Cross Shannon project (KCC planning reference 19115) between Kilpaddoge and Moneypoint regarding the proposed grid stabilisation facility and associated works, the planning and environmental report of February 2019 indicates that the predicted operational noise at the nearby noise sensitive locations of this proposed development is 33.5 dB(A). Considering this site is at least 2km from the nearest NSL to the STEP 220kV Grid connection site, an adverse impact is not considered likely. Cumulative impact of construction noise is expected to be before the construction stage of the proposed development, therefore, no significant noise impacts are expected.

13.6.2 Intra Project Effects

The following developments have been considered as cumulative assessment as part of the intra-project of overall STEP facility:

- Strategic Gas Reserve Facility – this is the subject of a SID pre-application (ABP-319717-24) comprising of a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works.
- STEP Power Plant (Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works) – a

22 An Bord Pleanala, Inspector's Report ABP-307798-20, October 2020

planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566).

- Gas Pipeline – planning permission (ABP Ref No. 08.GA0003) exists for the development of a 26km natural gas pipeline which will facilitate a connection from the STEP facility to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.
- Data Centre Campus – as part of the masterplan, a data centre campus is proposed to the west of the STEP site. This is a future development and will be subject to its own EIAR and planning application.

Based on the EIAR 2024[23], the construction programme of the CCGT and BESS is expected to begin in January 2026 and complete in August 2028. The construction of the proposed development is due to commence in late October 2026, with a 20-month programme until mid-2028 and the cabling would take approximately 11-months. No significant adverse effect is expected for construction noise mainly due to the distance of the site to the NSLs, and the mobile nature of the cabling works, although this shows some overlapping of the construction activities for both projects.

Table 13.16 shows the cumulative impacts of operational noise at the five NSLs. The noise levels at all NSLs comply with the night-time noise limit except at NSL1. It is noted that operational noise is predicted to be mainly due to the contribution from the STEP Power Plant. It is assumed that the contribution of operational noise from the Strategic Gas Reserve Facility, 26km Gas Pipeline and Data Centre Campus will be minor at these NSLs.

It is also noted that the closest NSLs are identified as being within an 'area of low background noise'.

Table 13.16: Cumulative impacts of operational noise

Noise Sensitive Location	Predicted noise level L_{Aeq} dB		Total L_{Aeq} dB	Complies with the night-time noise limit (35 dB $L_{Ar,T}$)
	Proposed Project	CCGT and BESS [1]		
NSL1	26	37	37	N
NSL2	20	32	32	Y
NSL3	29	33	34	Y
NSL4	27	32	33	Y
NSL5	26	32	33	Y

Remarks: [1] Based on Scenario 2 of the mitigated scenario of Chapter 9, Shannon Technology and Energy Park Power Plant – Volume 2 EIAR, AECOM, April 2024

There are various contextual factors, which indicate that the predicted exceedance at NSL1 may not give rise to a significant effect. They are:

- The predicted sound levels are readily compliant with the NG4 daytime and evening criteria at all receptor locations. The predicted levels also comply with the night-time criteria at all other receptors apart from NSL1.
- A 2 dB exceedance is relatively small. It is often considered difficult to detect a change in sound level of less than 3 dB outside of laboratory conditions. Therefore, the levels predicted at NLS1 are likely to be subjectively no different from compliant levels.
- A sound level of 37 dB $L_{Ar,T}$ is relatively low, identified in NG4 as comparable to the ambient levels you would expect in an empty bedroom or in a rural setting with no wind.

[23] Chapter 9, Shannon Technology and Energy Park – Volume 2 EIAR, AECOM, April 2024

- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' defines acceptable internal levels within bedrooms as being 30 dB $L_{Aeq,T}$ during the night-time. It also states that a façade with an open window will provide approximately 15 dB of sound attenuation. On this basis, the cumulative noise impact within the bedrooms of NSL1 is predicted to be 22 dB $L_{Ar,T}$ with windows open and even lower with windows shut.
- With windows open sound levels from the proposed development will be 8 dB below the BS 8233 criterion. It is noted that the BS 8233 criterion is applicable to anonymous sources only, however it is used in this context for reference.
- The criteria used are derived from sound level measurements taken in accordance with the weather condition requirements detailed in NG4 (i.e. low wind speeds and no rain). However, weather conditions during the survey periods indicate that these weather conditions are not typical for the area. Significantly higher ambient sound levels were measured during periods of wind and/ or rain. If sound levels during periods of wind and rain were factored into baseline levels, a different category of NG4 criteria would apply and the predicted levels would be readily compliant.

Therefore, considering the contextual factors such as the relatively low absolute noise level due to combined operation (37 dB $L_{Ar,T}$), no significant effects due to operational noise are expected.

The proposed development and the 26km Gas Pipeline, Data Centre Campus or Strategic Gas Reserve will all generate noise and vibration during both the construction and operational phases of each development.

However, cumulative impacts are not expected to be significant for the following reasons:

- The 26km Gas Pipeline is not considered to be a significant source of operational noise. The Data Centre Campus and Strategic Gas Reserve will be subject to their own impact assessments, meaning that noise and vibration emissions will be considered in combination with the proposed development. Any potential impacts can be identified and mitigated at this stage.
- All current and future applications at the development Site are on behalf of the same Applicant. A commitment has been made to ensure that noise and vibration emissions from all developments are considered cumulatively such that construction and / or operational noise emissions do not combine in such a way that relevant noise limits are breached.

13.7 Mitigation and Monitoring

13.7.1 Construction Phase

The assessment has indicated that although no significant effects are expected to arise during the construction phase, there is potential for noise levels during Phase 4 to temporarily exceed the daytime threshold value for a significant effect. This is based on reasonable, worst-case assumptions although specific details of the plant to be used and working methods are not known at this stage.

The majority of construction activity that generates noise is expected to be undertaken within daytime working hours. Where it is required that noise-emitting activities are undertaken at night, prior notification should be given to the occupiers of nearby dwellings and approved by Local Authority. A Construction Environmental Management Plan (CEMP) that includes noise and vibration mitigation is recommended during the construction phase.

Landscaping in the area of the GIS substation will provide some screening attenuation during the construction and operational phases. The quantitative assessments have not taken this into account.

The impact of noise and vibration on nearby sensitive receptors within the vicinity of the proposed development will be controlled by implementation of the principal of Best Practicable Means (BPM). This can be achieved by undertaking construction activities in accordance with good practice set out in BS 5228 Parts 1 and 2. The preferred approach for controlling construction noise is to reduce noise levels at source where possible but with due regard to practicality.

Typical means by which noise and vibration may be minimised include the following:

- prioritise the selection of quieter equipment and working methods;
- ensure equipment is maintained, in good working order, and is used in accordance with the manufacturer's instructions;
- members of the construction team will be advised during toolbox briefings on quiet working methods;
- equipment shall not be left running unnecessarily;
- equipment shall be fitted with silencers or mufflers where possible;
- the use of enclosures of temporary screens around static plant whenever feasible;
- materials shall be lowered instead of being dropped from height;
- inform nearby sensitive receptors in advance of construction activities and keep them up to date with progress and any changes;
- give nearby sensitive receptors a point of contact from the contractor; the contact will liaise with residents and maintain good communication between nearby residents and the contractor;
- manage deliveries to prevent queuing of site traffic at access points;
- use of adjustable or directional audible vehicle-reversing alarms and/or alternative warning systems (e.g. white noise alarms); and
- utilising low vibration working methods.

Good public relations are invaluable in securing public acceptance of construction noise. People are more tolerant of noise if they understand the reason behind it, the likely duration, start and completion dates, and mitigation measures used to minimise noise levels. Letter box drops explaining these will be undertaken. A dedicated site contact will be nominated to liaise with residents and establish good rapport. A complaint handling procedure will also be put in place.

Due to the close proximity of NSLs with the road during the underground cable installation, there is the potential for noise levels to exceed the 65 dB(A) daytime threshold value at up to five NSLs. However, the underground cable installation works are mobile and are expected to move at approximately 50m a day. Consequently, the threshold is not expected to be exceeded at any given receptor for a period of more than approximately three days. Therefore, the assessment of the impact, in accordance with the method described in Section 13.3.2.2 concludes that this would not result in a significant effect.

13.7.2 Operational Phase

No specific mitigation measures and monitoring measures are proposed for the mitigation of operational noise impacts at off-site sensitive receptors. However, noise levels within the site will be minimised (such as keeping access hatches closed and switching off equipment when not in use), to minimise the exposure site personnel to noise from operational plant.

Long-term monitoring will be undertaken for a period of at least 12 months from the commencement of site operations and again following any subsequent substantive change in site operations. After 12 months. the need for long-term monitoring will be reviewed with the relevant authority.

Short-term attended noise measurements will be taken at or near to the NSLs identified in this chapter. Measurements will be taken and reported in accordance with the guidance provided in NG4. Short-term measurements will take place at the commencement of site operations and again following any subsequent substantive change in site operations. They will then be repeated no less than once a year.

13.8 Residual Effects

The proposed development is expected to generate noise during both the construction and operational stages, and vibration during construction.

The assessment has considered the likelihood of significant effects based on predictions of noise where the noise emissions of construction and operational plant have been assumed.

The assessment of construction phases impacts due to noise and vibration indicates that significant adverse effects are not predicted arise. Short-term noise levels during Phase 4 may exceed the daytime threshold value at a small number of dwellings adjacent to the works for around three days. However, this is expected to be tolerated given the short duration of exposure and with prior notification to the occupants on the duration and timing of the works.

The assessment of operational noise has indicated that predicted noise levels are not expected to significant both due to the proposed development alone and cumulatively.

Table 13.17 summarises the significance of the effect pre and post mitigation.

Table 13.17: Matrix of impacts and significance pre and post mitigation

Phase	Potential impact	Significance Pre-mitigation	Mitigation	Significance Post-mitigation
Construction	Noise from activity on site	Not significant	None	Not significant
	Road traffic noise	Not significant	None	Not significant
	Vibration from activity on site – human perception	Not significant	None	Not significant
	Vibration from activity on site – cosmetic damage	Not significant	None	Not significant
Operation	Noise from GIS substations	Not significant	None	Not significant
Decommissioning	Noise and vibration from activity on site	Not significant	None	Not significant

13.9 Conclusion

The proposed development is expected to generate noise during both the construction, operational and decommissioning stages, and vibration during the construction and decommissioning stages.

The assessment considered the likelihood of significant effects based on predictions of noise where the noise emissions of construction and operational plant have been assumed.

A Construction Traffic Management Plan (TMP) has been included in the accompanying CEMP. This will be further developed by the contractor.

The short-term impacts during the construction phase have been assessed. During the civil works for the underground cable installation, NSLs close to the works may be exposed to noise levels exceeding the daytime threshold value of 65 dB(A). However, as the works are mobile, no NSL should be exposed to this for more than three days. Therefore, no significant effect is expected to arise.

Vibration impacts during the construction phase are assessed as not significant due to the large distances from the proposed cable route the nearest NSLs. A CEMP and implementation of BPM are recommended to minimise the impacts to NSLs as far as is reasonably practicable.

The operational noise sources of the proposed development are located at least 350m from the nearest dwellings in Kilcolgan UpperRalappane and Carhoonakilla. As a result, the received noise levels are predicted to be relatively low and it is concluded that operational phase impacts are predicted to be as not significant even when accounting for inter and intra project cumulative effects.

13.10 References

An Bord Pleanála, Inspector's Report ABP-307798-20, October 2020

British Standard Institution BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.

British Standard Institution BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

EC Noise Emission by Equipment for Use Outdoors (Amendment) Regulations (S.I. No. 241 / 2006)

Environmental Noise Regulations, 2006 (S.I. No. 140 of 2006)

EPA (2022). *Guidelines on the Information to be contained in Environmental Impact Assessment Reports.*

EPA (2015). *Draft EPA Advice Notes for Preparing Environmental Impact Statements*.

EPA. Industrial Emission Licence, P0605-04

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Government of Ireland. Environmental Protection Agency Act, 1992 (amended).

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IEMA (2014). *Guidelines for Environmental Noise Assessment*

ISO 9613 (1996) Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.

National Roads Authority (2004). *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1*.

National Roads Authority (2014) *Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes Noise Guidelines*.

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The European Communities (Environmental Noise) Regulations 2018 (Statutory Instrument No. 549/2018).

The European Parliament and the Council of the European Union, 2002. Directive 2002/49/EC of 25 June 2002 relating to the assessment and management of environmental noise.

TII Publications (October 2021). *Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections*, PE-PAG-02017.

UK Department of Transport and Welsh Office (1988) Calculation of Road Traffic Noise (CRTN)

WHO (2018). *Environmental Noise Guidelines for the European Region*

A. Calculation Methodology

A.1 Construction Noise

British Standard 5228 has been adopted for the assessment of effects at noise sensitive receptors during construction phase.

The calculation assumptions include:

- Method for activity $L_{Aeq,T}$ in Appendix F.2.2 of BS 5228;
- List of plant for each of the construction activity;
- Quantity and utilisation corrections of the plant;
- Combined noise levels of all plants for each construction activity;
- Distances between the boundary of the construction activities and receptors;
- 50% of soft and hard ground attenuation; and
- Stationary plant.

A.2 Operational Noise

The operational noise assessment implements the procedures of ISO 9613-2[24] using a three-dimensional acoustic model developed using DataKustik CadnaA software.

The model includes:

- Noise source elements which represent operational activities;
- Topographic data;
- Downward-curving propagation path (downwind) according to ISO 9613-2;
- Sensitive receptor elements at first floor level;
- Ground absorptive (G=0.5); and
- Temperature (10 °C) and Humidity (70%);

Table A.1: List of noise sources considered within the acoustic model for the operation of the proposed development

Item #	Description	Number of items	Octave band centre frequency (Hz)								Sound power level dB(A)
			63	125	250	500	1k	2k	4k	8k	
01	220kV transformer	2	79	96	93	92	74	69	73	65	91
02	Cooling fans	3	93	89	86	86	81	79	69	59	87

Source: Mott MacDonald

[24] ISO 9613 (1996) Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.

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Chapter 14 - The Landscape

July 2024

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Contents

Tables

Figures

14 The Landscape

14.1 Introduction

This Landscape and Visual Impact Assessment (LVIA) describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the proposed development on the receiving environment (Refer to Chapter 5). Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to assessing effects of the proposed development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; visual obstruction (blocking of a view, be it full, partial or intermittent) or; visual intrusion (interruption of a view without blocking).

14.1.1 Statement of authority

This landscape and visual assessment was prepared by Rory Curtis BA BEng GDip MILI a Landscape Architect with 9-years of experience in the industry. Rory works for Macro Works Ltd, a specialist LVIA company with over 20-years of experience in the appraisal of effects from a variety of energy, infrastructure and commercial developments. Experience extends to numerous electrical infrastructure developments including transmission lines and substations as well as the assessment of over 120 wind energy developments and 100 solar energy developments. Relevant experience includes LVIA work on six Strategic Infrastructure Developments (SID). Macro Works is also affiliated with the Irish Landscape Institute.

14.2 Policy and Guidance

14.2.1 Policy

14.2.1.1 International

The Council of Europe Landscape Convention (Treaty No. 176) (as amended) (the Convention) provides guidelines for managing landscapes. The Convention is not an EU Directive. Countries that sign and ratify the Convention make a commitment to upholding the principles it contains within the context of their own domestic legal and policy frameworks. The Convention was ratified by Ireland in March 2002 and came into effect in Ireland in 2004. The Convention requires '*landscape to be integrated into regional and town planning policies and in cultural, environmental, agricultural, social and economic policies, as well as any other policies with possible direct or indirect impacts on Landscape*'.

14.2.1.2 National

National Landscape Strategy

The National Landscape Strategy (NLS) for Ireland 2015-2025 was launched in May 2015 and is to be implemented by the Government in the future. The NLS promotes the sustainable protection, management and planning for the landscape. The NLS states that the '*National*

Landscape Strategy will be used to ensure compliance with the European Landscape Convention and to establish principles for protecting and enhancing the landscape (landscape) while positively managing its change. It will provide a high-level policy framework to achieve balance between the protection, management and planning of the landscape by way of supporting actions'. It also states that 'The Strategy sets out Ireland's high-level objectives and actions with regard to landscape (landscape). It also positions landscape in the context of existing Irish and European strategies, policies and objectives, and outlines methods of ensuring co-operation at a sectoral and at a European level by the State'.

Strategic Integrated Framework Plan for the Shannon Estuary

This plan has been developed by an interjurisdictional steering group to produce a land and marine based framework to guide the future development and management of the Shannon Estuary and was launched on the 22nd of November 2013.

In terms of Marine Related Industry, the Tarbert-Ballylongford Land Bank, Co. Kerry has been considered as an area of interest for a wide range of small-scale commercial to major commercial developments. This area is already designated as a strategic zone for development. The framework plan provides a range of guidance including guiding principles, objectives, and mitigation measures for development in this zone.

In terms of landscape and visual impact mitigation measures it states the following:

'*L MM 5: To mitigate the minimal impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements*'.

14.2.1.3 Regional

Kerry County Development Plan 2022-2028 (CDP)

This is the main strategic planning policy document which guides the future renewal and development of County Kerry to 2028 and beyond. The proposed development is located within the jurisdiction of the Kerry CDP.

Clare County Development Plan 2023-2029 (CDP)

This is the main strategic planning policy document which guides the future renewal and development of County Clare to 2029 and beyond. The proposed development is not located in Co. Clare; however, the study area includes a portion of south Clare.

14.2.2 Guidance

The assessment was carried out in line with the Landscape Institute and the Institute of Environmental Management and Assessment (eds.) (2013) Guidelines for Landscape and Visual Impact Assessment[1]. It was also undertaken having regard to the Environmental Protection Agency (EPA), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022.

14.3 Assessment Methodology

Production of this assessment involved:

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the County Development Plans for County Kerry and County Clare, as well

[1] Landscape Institute and the Institute of Environmental Management and Assessment (eds.) (2013) Guidelines for Landscape and Visual Impact Assessment. Routledge, Oxon

as other sensitive visual receptors. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposed development;

- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape impact of the proposed development as a function of landscape sensitivity weighed against the magnitude of the landscape impact;
- Assessment of the significance of the visual impact of the proposed development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact. This aspect of the assessment is supported by photomontages prepared in respect of the selected viewpoints; and
- Incorporation of mitigation measures, if required to reduce potential significant effects.

14.3.1 Approach to Data Collection

The desk study element of data collection involved review of project documents (including the project description as detailed in Chapter 5 of this EIAR) and Geographical Information System files for the proposed development. These were read against a backdrop of aerial photography and topographical information. Geographical Information System datasets included highly sensitive landscape areas scenic designations, and these were cross-checked against the relevant CDPs, in the interests of thoroughness. Various datasets were also reviewed in relation to the landscape and visual desk study. Data to inform the assessment was extracted from the following data sources:

- Kerry County Development Plan 2022-2028[2];
- Clare County Development Plan 2023-2029[3];
- STEP Power Plant EIAR[4];
- National Parks and Wildlife Service[5];
- The Heritage Council[6];
- Ordnance Survey maps;
- Coillte Recreation[7];
- Discover Ireland[8];
- Sport Ireland Trails[9]; and
- Google Maps[10].

Fieldwork was undertaken on 9th April 2024 as part of the preparation of this assessment. This involved reviewing and recording aspects of landscape character as well as the capture of high-resolution photography in clear viewing conditions, at selected viewpoint locations, for later use in photomontage preparation.

[2] https://cdp.kerrycoco.ie/
[3] https://www.clarecoco.ie/services/planning/clarecountydevelopmentplan23-2029/
[4] https://steppowerplant.com/
[5] https://www.npws.ie/
[6] https://heritagemaps.ie/
[7] https://www.coillte.ie/our-forests/recreation-map/
[8] https://discoverIreland.ie
[9] https://www.sportireland.ie/outdoors/find-your-trails
[10] https://www.google.com/maps

14.3.2 Approach to Impact Assessment

The landscape and visual impact assessment methodology is outlined separately for landscape and for visual.

14.3.2.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from the proposed development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts; and
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape value and sensitivity are classified using the following criteria set out in Table 14.1.

Table 14.1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the application site boundary that may have an effect on the landscape character of the area (Table 14.2 refers).

Table 14.2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or

Magnitude of Impact	Description
	features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 14.3.

Table 14.3: Impact significance matrix

	Sensitivity of Receptor				
Scale/Magnitude	*Very High*	*High*	*Medium*	*Low*	*Negligible*
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: Judgements deemed ‘substantial’ and above are considered to be ‘significant impacts’ in EIA terms.

14.3.2.2 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the proposed development will be assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

14.3.2.3 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor to establish visual receptor sensitivity at each viewshed reference point are:

1. Susceptibility of Receptors - In accordance with the Institute of Environmental Management and Assessment (“IEMA”) Guidelines for Landscape and Visual Assessment (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are;
   – “*Residents at home;*
   – *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;*

- *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area; and*
- *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened*".

Visual receptors that are less susceptible to changes in views and visual amenity include;

- "*People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and*
- *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life*".

2. Recognised scenic value of the view (County Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;
3. Views from within highly sensitive landscape areas. Again, highly sensitive landscape designations are usually part of a county's Landscape Character Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
4. Primary views from dwellings. A proposed development might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates, has been influenced by the desire to take in a particular view. This might involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;
5. Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;
6. Connection with the landscape. This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;
7. Provision of elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
8. Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
9. Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
10. Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;
11. Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
12. Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;

13. Integrity of the landscape character. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
14. Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location; and
15. Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

14.3.2.4 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity. The magnitude of visual impacts is classified in Table 14.4.

Table 14.4: Magnitude of Visual Impact

Magnitude of Impact	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene.
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity.
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene.
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene.

14.3.2.5 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used earlier in respect of landscape impacts (Table 14.3 refers).

14.3.3 Study Area

According to the Guidelines for Landscape and Visual Impact Assessment, the first step in the process of LVIA is to determine a bespoke study area which is appropriate to the combination of the development type and the receiving landscape and visual context based on professional experience. From similar studies it is anticipated that the proposed works at the proposed GIS Substations are likely to be difficult to discern beyond approximately 3km and are not likely to give rise to significant landscape or visual impacts beyond 1km distance. However, in the interests of a comprehensive appraisal, a 5km radius study area (from the proposed GIS Substations) was selected (Figure 14.1). A 500m radius area of interest was applied to the proposed Underground Cable because significant landscape or visual effects are highly unlikely beyond this 1km wide swathe due to the subterranean nature of the proposed infrastructure and the transient nature of the proposed construction works. The entirety of this area of interest occurs within the study area generated by the 5km radius buffer from the proposed GIS Substations.

Figure 14.1: Study area map

Source: Macro Works Ltd. 2024 - Ordnance Survey Ireland Licence No. EN 0093120

14.3.4 Limitations of this EIAR

There are not considered to be any particular material limitations to this assessment but note that construction phase photomontages were not prepared as static images are very limited in their ability to portray the movement of the constantly changing and transitory nature of construction works. Furthermore, they relate to temporary – short-term impacts and it is considered more pertinent to prepare photomontages in respect of permanent above-ground features in this instance.

14.4 Receiving environment

The first step in the assessment process is to review the baseline context and to make an assessment of the landscape sensitivity of the receiving landscape and assessments of the visual sensitivity at each of the selected viewpoints. The landscape is the visible environment in its entirety, comprised of both natural and built elements including topography, water bodies, vegetation, wildlife habitats, open spaces, buildings and structures. Landscape and visual sensitivities considered include statutory and non-statutory landscape designations, natural features, landscape character areas, notable deciduous trees of woodland, amenities and historic landscapes.

The proposed development is located within County Kerry. Portions of the study area occur within County Kerry and County Clare as it is based on a 5km buffer from the location of the proposed GIS Substations and County Clare is located less than 5km to the north.

14.4.1 Policy context – landscape

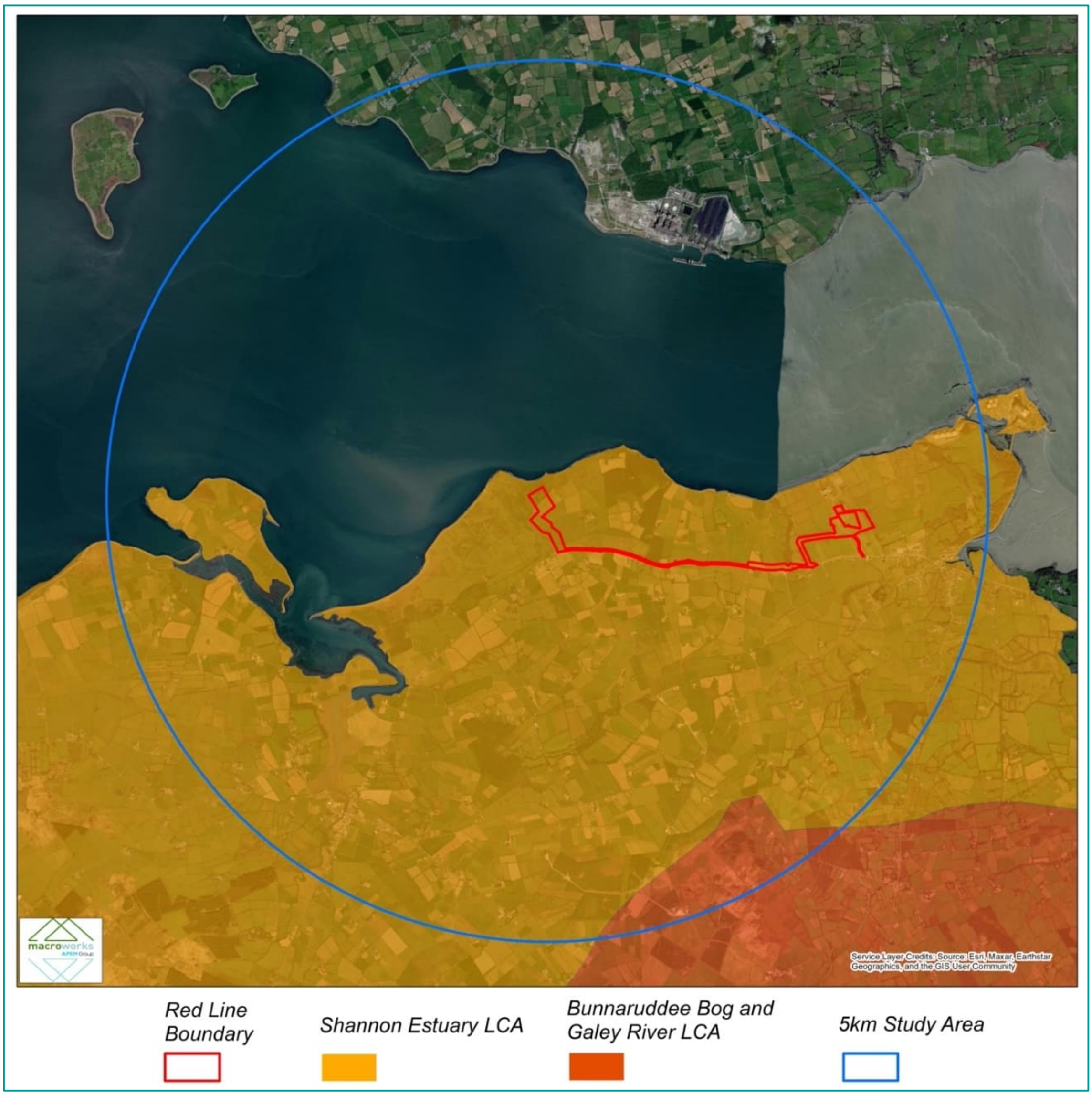
14.4.1.1 Kerry County Development Plan

Within Appendix 7[11] in Volume One of the Kerry CDP 2022-2028, Kerry Co. Co. has prepared a Landscape Review, which replaces the Landscape Character Assessment within the Renewable Energy Strategy 2012. Based on this review, the proposed development is located within the '2 - The Shannon Estuary' Landscape Character Area (LCA) (Figure 14.2).

The study area also covers a portion of the '3—Bunnaruddee Bog and Galey River' LCA, but it has no potential to be materially impacted as it is located more than 2.5km from the proposed development at the closest point. There will be no physical impact on this LCA and due to the scale of the proposed development as a result of the intervening distance, there will be no impact on the landscape character. For these reasons, this LCA has been scoped out of the assessment.

[11] http://docstore.kerrycoco.ie/KCCWebsite/planning/devplan/voloneappendix.pdf

Figure 14.2: Showing the study area (blue circle) in relation to Kerry Landscape Character Area 3



Source: Macro Works Ltd. 2024 - / Google Earth / Kerry CDP

Shannon Estuary

The Landscape Review prepared as part of the Kerry CDP 2022-2028 describes this character area as follows (extract only):

"Subtle changes in topography create the southern limit to this area. These changes run from Letter Point on Bunaclugga Bay to the summit of Knockanore Mountain before falling east to Tullahennel. The boundary of the area then follows the county boundary north to the Shannon Estuary.

- *Context: This is an area where the main interaction with adjacent areas is on its southern side as the northern boundary is the Shannon Estuary. It also has a border with County Limerick on its eastern side. Sensitivity = Low / Medium.*
- *Scale: Area is enclosed by higher ground in Limerick. The central part of the area is flat in nature with little change in relief. As the central part of the area is large and mostly flat, it*

results in the landscape having a greater ability to relate to development. Sensitivity = Medium.

- *Landform: Knockanore (267 m) is a very distinctive feature in the northwestern part of the area. Lands also rise on the eastern boundary of the area. In between there are a number of rivers, but these rivers have minimal impact on the landform. Sensitivity = Low / Medium.*
- *Landcover: In general pasture covers the majority of the area. Some pockets of forestry (coniferous plantations) can also be found. Broad-leaved forestry is found to the north of Tarbert, between the town and the port area on the estuary. Some large peat bogs are also found in the area. Sensitivity = Medium.*
- *Built Environment: There are a number of villages in the area. Outside of them houses are found in a linear fashion along the road network. Energy infrastructure in the form of wind turbines, pylons associated with high voltage transmission lines, and a power plant in Tarbert are all found. The Ballylongford/Tarbert Landbank is zoned for marine-related industry. Sensitivity = Medium.*
- *Perceptual Qualities: The landscape has been modified by the number of constructed elements found within it. Sensitivity = Low / Medium.*
- *Visual Amenity: Quite an open landscape with wide vistas across the area influenced by its topography. Landcover also contributes to its openness. Sensitivity = Medium.*
- *Landscape Values: The northwest of the area is designated as Secondary Special Amenity in the Kerry County Development Plan 2015-2021. There are views & prospects eastwards from a local road on the western side of Knockanore, and northwards from the coast road towards the Shannon Estuary. This coast road is also part of the Wild Atlantic Way. This area includes Knockanore which currently has no landscape designation. Due to its elevation and prominent position in a predominantly flat landscape it could therefore be considered for a landscape designation. The southeastern part of the area is flat and open, which is overlooked by higher ground, it could therefore be considered for a landscape designation. Sensitivity = Medium / High.*
- *Overall Sensitivity: Medium / High. Based on the sensitivity of each criteria and the nature of this landscape, part of the landscape is an overall sensitivity of Medium, with the remainder Medium / High*".

The area has scenic value. While the overall landbank may lack prominent landscape features, it is part of the intrinsic open character of the River Shannon Estuary leading west towards the Atlantic. Its low but undulating coastline with shallow sandy cliffs and beaches within the study area form part of a transition zone between land and sea and provide scenic views between the shores of Co. Kerry and Co. Clare, which can be appreciated from either shore or islands such as Scattery Island. This has been recognised by the designation of the R551 as part of the Wild Atlantic Way. While the Shannon Estuary features major and visually prominent industrial developments such as Moneypoint and Tarbert Power Stations, it has retained its rural character along the coastline further west. The coastline has capacity for recreational use in terms of scenic coastal walking routes if access to the land could be facilitated. The interaction between land and estuary are important features along the coastline and elevated areas in the hinterland. Open views of the Shannon Estuary are scenic as well as the small-scale undulating landscape. While section of the coast is low rise or flat, they bare a tranquil and pleasant setting. The sandy beaches, as well as Carrick Island and Carrigafoyle Castle, are scenic features in the landscape character area and provide long distance views across the Shannon estuary. The coastline has capacity for recreational use in terms of scenic coastal walking routes if access to the land could be facilitated.

14.4.1.2 Clare County Development Plan

The study area covers a portion of the landscape within County Clare, but it has no potential to be materially or significantly impacted as it is located more than 3km from the proposed development at the closest point. Although there is no potential for the salient landscape character within County Clare to be materially impacted by the proposed development on the opposite side of the Shannon, sensitive visual receptors will still be considered (see section 14.4.4).

14.4.2 Baseline context – landscape

At a macro level, the study area is located in north County Kerry, on the south bank of the Shannon Estuary, and extends to the north to include the north bank in County Clare.

The study area has a gently undulating topography. Watercourses in the area generally drain in a northerly direction. The most notable watercourse in the study area is the Ballyline River which flow to the west of the proposed development, through the settlements of Ballylongford in a south-to-north direction.

Agricultural fields occupy a large proportion of the study area. Field patterns generally comprise small to medium-sized fields demarcated by mature hedgerows. Outside of agricultural land use, the predominant land use is the industrial facilities at Moneypoint and Tarbert Island.

The area's greatest population densities are in the settlements of Ballylongford and Tarbert, but there are also one-off houses dispersed along the local roads throughout the study area.

The N67 and N69 national secondary roads are the most significant transport routes within the study area. The R551 is the most notable regional route, but a short section of the R552 also falls within the study area. The L-1010 is the closest local road to the proposed development.

Carrig Island is likely the study area's most notable landscape-related tourism or heritage amenity.

14.4.3 Sensitivity – landscape

The proposed development is in an undulating coastal zone where there is a transition between land and sea. The Shannon Estuary is located to the north and the area to the south is a more typical rural landscape. The immediate surroundings of the proposed GIS Substations are a relatively distinctive and visually open, with a windswept coastal farmland character. While the area immediately surrounding the proposed development may lack prominent landscape features, it is part of the intrinsic open character of the River Shannon Estuary leading west towards the Atlantic. The rolling nature of the terrain means that long-distance views are often limited to the elevated areas and along the shore of the Shannon Estuary. The interaction between land and estuary is an essential feature of the study area.

The southern perimeter of the study area features a typical rural landscape of fields, hedgerows, and some peatland. The open elevated landscape at Glancullare North is a distinctive feature located approximately 2km south of the proposed GIS Substations providing a backdrop to the lower-lying landscape that surrounds it.

While the Shannon Estuary features major and visually prominent industrial developments such as Moneypoint and Tarbert Power Stations, it has retained its rural character, especially to the south of Tarbert Power Station and further west along the coastline near the Ballyline River.

Most open views of the Shannon Estuary have scenic qualities. Coastal areas near the Ballyline River are pleasant and have a degree of tranquillity. The sandy beaches, Carrick Island, and Carrigafoyle Castle are scenic features in the landscape as well as locations that afford long-distance views across the Shannon estuary. Parts of the study area provide scenic views between the shores of Co. Kerry and Co. Clare, which can be appreciated from either shore. The scenic quality of the area has been recognised by the designation of the R551 regional road and the N67 national secondary road as part of the Wild Atlantic Way, with sections of these roads also designated in the respective CDPs. The scenic route designations generally correspond with views across the waterways (but do not occur near the proposed development.)

Although the landscape in the vicinity of the proposed development is principally that of a working rural landscape, there is some sense of remoteness and tranquillity due to the area's low population levels. Houses in the study area are generally located on elevated ground and oriented to take advantage of open views, particularly towards the Shannon when available. For these reasons, it is considered that residents enjoy a notable sense of rural amenity.

On the basis of the reasons outlined above and in accordance with the criteria contained in Section 14.3.2, the sensitivity[12] of the receiving landscape is considered to be Medium.

14.4.4 Policy context – visual

14.4.4.1 Kerry County Development Plan

Kerry CDP 2022-2028 identifies a number of Visually Sensitive Areas and Views and Prospects. Relevant designations located within the study area are indicated in Figure 14.3 and are listed below:

Visually Sensitive Areas:

- Area bordering the estuary from Ballybunion north-east to Carrigafoyle, encompassing Kilconly, Beal, Corcas and Sandhills, and Littor. This section also covers part of the Wild Atlantic Way driving route.
- Area bordering the estuary between Tarbert Island and Tarbert.

Relevant extracts of the development plan state the following:

“Visually sensitive landscape areas comprise the outstanding landscapes throughout the County which are sensitive to alteration. Rugged mountain ranges, spectacular coastal vistas and unspoilt wilderness areas are some of the features within this designation. These areas are particularly sensitive to development. In these areas, development will only be considered subject to satisfactory integration into the landscape and compliance with the proper planning and sustainable development of the area. The County enjoys both a national and international reputation for its scenic beauty. It is imperative in order to maintain the natural beauty and character of the County, that these areas be protected”.

Views and Prospects:

- Estuarine views east and north-east along sections of the L6010 towards Carrigafoyle Castle north of Ballylongford. This section is also part of the Wild Atlantic Way driving route.
- Views west of Lislaughtin Abbey from a short section of the L-1010 north-east of Ballylongford.

[12] Whilst influenced by the value and sensitivity judgements for particular Landscape Policy Areas, Landscape Units and Landscape Character Areas in the County Landscape Character Assessments that may be noted within a County Development Plan, independent landscape sensitivity judgements are provided for this assessment based on the more universal criteria, which are derived from the Guidelines for Landscape and Visual Impact Assessment-2013 Guidelines (Landscape Institute and Institute of Environmental Management & Assessment 2013) and accounts for the susceptibility of the landscape to the proposed development. This approach is consistent with best practice and also accounts for the inconsistency that commonly occurs in assigning landscape sensitivity to similar or adjoining landscape units between Counties.

- Views east and south-east of Tarbert Bay along sections of the N69 including its section on Tarbert Island to the ferry terminal. This section is also part of the Wild Atlantic Way driving route.

Relevant extracts of the Kerry CDP state the following:

“County Kerry contains views and prospects of outstanding natural beauty which are recognised internationally. There is a need to protect and conserve these adjoining public roads throughout the County. Any development which hinders or materially affects these views/prospects will not be permitted. The Wild Atlantic Way has a number of existing viewing points along its route. In order to maximise the potential of the Wild Atlantic Way these existing viewing points will be protected. The Council will work with Fáilte Ireland in the sustainable development of these viewing points, and the identification of additional viewing locations along the route ...”.

It is an objective of the Council to:

- *‘KCDP 11-79 Preserve the views and prospects as defined on Maps contained in Volume 4.*
- *KCDP 11-80 Facilitate the sustainable development of existing and the identification of new Viewing Points along the route of the Wild Atlantic Way in conjunction with Fáilte Ireland, while ensuring the protection of environmental attributes in the area through the implementation of environmental protection objectives, standards and guidelines of this Plan.*
- *KCDP 11-81 Prohibit developments that have a material effect on views designated in this plan from the public road or greenways towards scenic features and/or public areas’.*

Figure 14.3: Visual designations within the study area

Source: Macro Works Ltd. 2024 - / Google Earth / Kerry CDP / Clare CDP

14.4.4.2 Clare County Development Plan

Clare County Council recognises that the Shannon Estuary is an important tourist asset and designated a number of Scenic Routes along the River Shannon estuary, along which most valuable views are located. The following Scenic Route is located within the study area:

- 19: Coast road south-east of Cappagh to Carrowdotia South.

This designated Scenic Route is also part of the Wild Atlantic Way and includes sections of the N67 (Figure 14.3). Objective CDP14.7 Scenic Routes from the Clare CDP states that:

'*It is an objective of the Development Plan:*

A. To protect sensitive areas from inappropriate development while providing for development and change that will benefit the rural community;

B. To ensure that proposed developments take into consideration their effects on views from the public road towards scenic features or areas and are designed and located to minimise their impact; and

C. To ensure that appropriate standards of location, siting, design, finishing and landscaping are achieved'.

14.4.4.3 Wild Atlantic Way

According to Fáilte Ireland, the Wild Atlantic Way is a *'defined touring route, stretching along the Atlantic coast from Donegal to West Cork'.*

Sections of this touring route are located within the study area in Co. Kerry and Co. Clare as mapped in Figure 14.3. Some sections of designated Views and Prospects (Kerry CDP) as well as Scenic Routes (Clare CDP) use the same route / locations as the Wild Atlantic Way.

Sections of the Wild Atlantic Way located within the study area follow the route of the R551 in either direction to Ballylongford and Tarbert, the L-6010 to Carrigafoyle Castle, the N67 between Tarbert and Tarbert Ferry Port, the Tarbert-Killimer Ferry Route, sections of the N67 between Killimer and Kilrush but deviating from N67 to the coastal road and the R473 into Kilrush before joining the N67 again. It also extends east from Tarbert towards Foynes along the N69.

The Kerry CDP states the following:

'The Wild Atlantic Way has a number of existing viewing points along its route. In order to maximise the potential of the Wild Atlantic Way these existing viewing points will be protected. The Council will work with Fáilte Ireland in the sustainable development of these viewing points, and the identification of additional viewing locations along the route'.

14.4.5 Baseline context – visual

The visual assessment focused on the proximity of the proposed development to specific receptors. There is the potential for visual impacts at scenic designations, residential dwellings and along public roads, with scenic designations carrying a greater potential for negative adverse impacts.

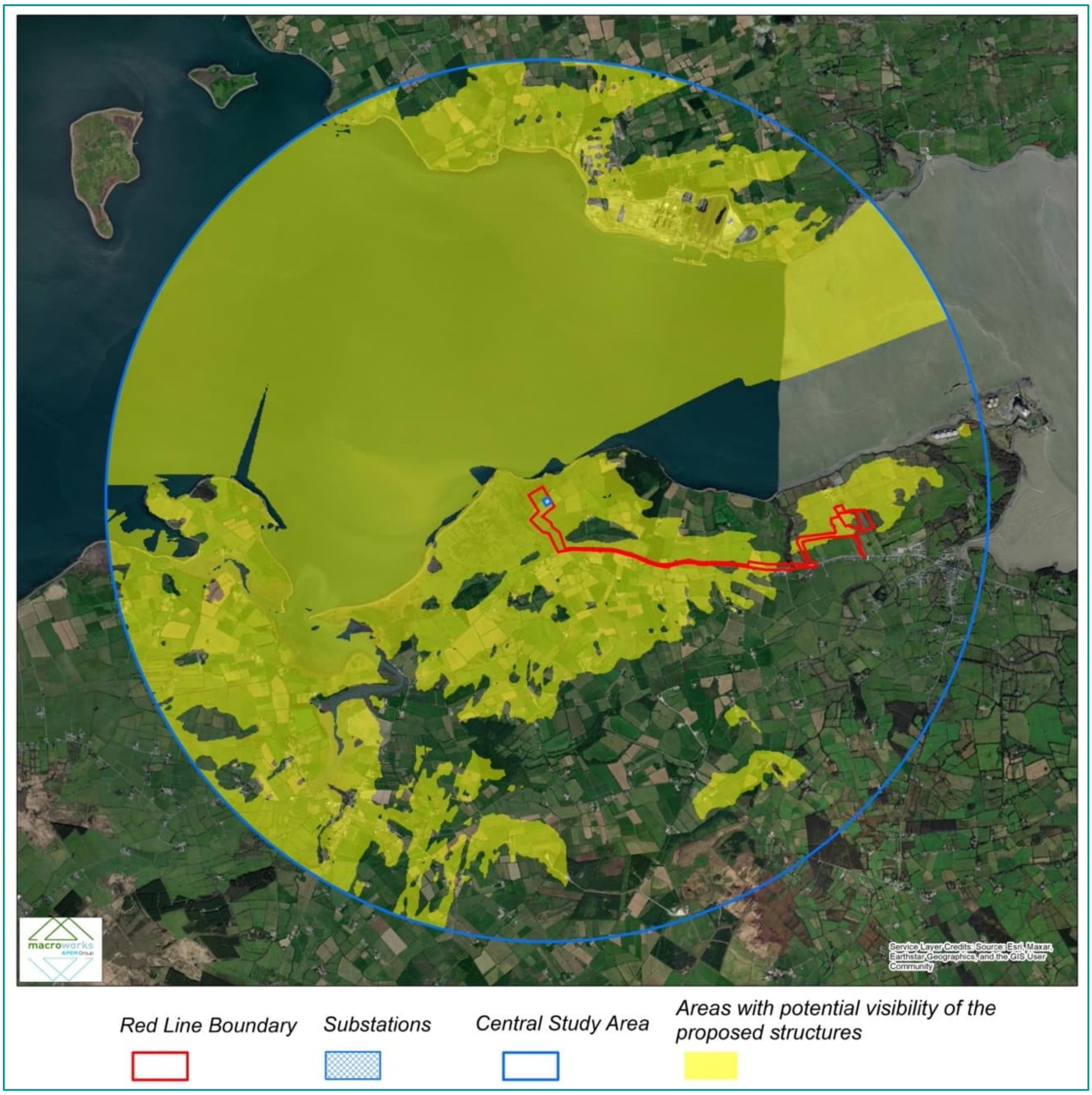
The greatest potential for negative adverse effects due to the proposed underground cable will be during the construction phase. These would relate to construction-related activities, which by their nature would be temporary, transitory and localised. During the operation phase, any noticeable, permanent change to the views will be highly localised and very limited in scale and are not anticipated to have the potential to result in any material adverse visual impacts.

Any potential visual impacts on people in the vicinity of the proposed GIS Substations will be assessed by way of a selection of representative viewshed reference points located in the landscape surrounding the proposed GIS Substations.

14.4.5.1 Zone of theoretical visibility

Only those parts of the receiving environment that potentially afford views of the proposed development are of concern to this section of the assessment. A computer-generated Zone of Theoretical Visibility (ZTV) map has been prepared to illustrate where the proposed development is potentially visible from. The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the proposed development will definitely not be visible, due to terrain screening within the 5km study area.

Figure 14.4: Standard (bare-ground) ZTV map



Source: Macro Works Ltd. 2024 - ESRI

The following key points are illustrated by the 'bare-ground' ZTV map (Figure 14.4 refers);

- There is little or no potential for visibility (no yellow ZTV pattern) in the Ballyline River valleys or in swathes of the southern and eastern portions of the study area due to the intervening elevated terrain.
- The potential for views is more intermittent in the southwestern portion of the study area, with a large section of the Ballyline River valley falling completely outside the ZTV pattern due to the low elevation along route of the watercourse.
- There will be no potential for views from any section of the position of the N69 national secondary roads that pass within the study area.
- The majority of the portion of the N67 national secondary road that occurs in County Clare in the northern portion of the study area will have the potential for views.
- Most of the R551 regional road will not have the potential for views, apart from portions in the vicinity of Ballylongford, where both the R551 and the R552 regional roads occur within the ZTV pattern thus indicating a theoretical potential for views at these locations.

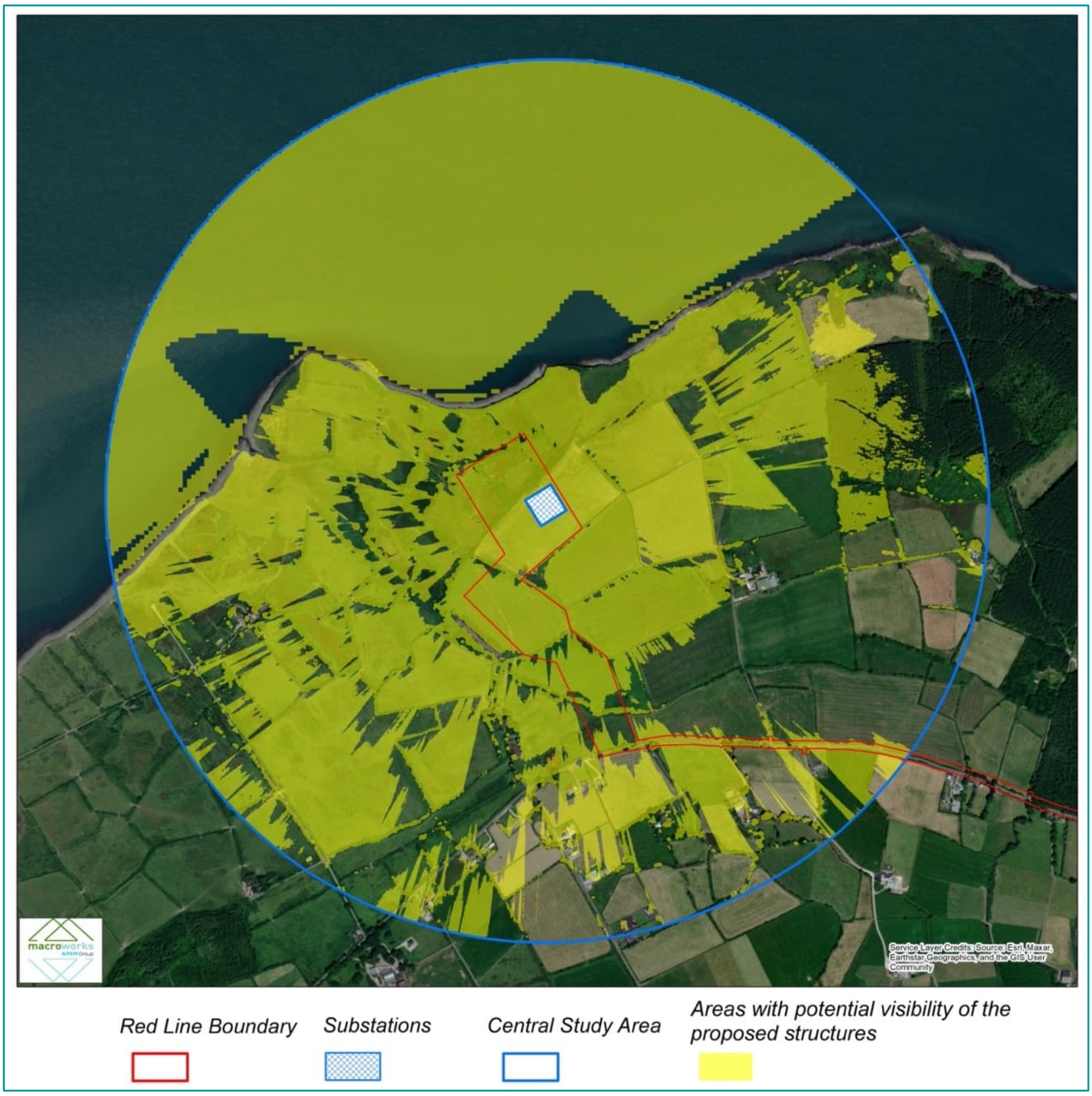
The most important point to make in respect of this 'bare-ground' ZTV map is that it is theoretical. It does not account for screening provided by surrounding hedgerow vegetation. Thus, it is necessary to compare the terrain based ZTV map to the terrain and land cover based ZTV maps (Figure 14.5 and Figure 14.6 below refer).

The second form of ZTV mapping relies on a Digital Surface Model ("DSM"), which also maps the terrestrial land cover elements such as hedgerows and buildings with accuracy down to 2cm. This is of far more value in determining the likely visibility of the proposed development. It was not practical to analyse the entire study area so a more consolidated area incorporating the surrounding network of roads and dwellings within approximately 1km of Application Site boundaries was the focus of this more intensive level of spatial data capture. Analysis of both forms of ZTV map and a comparison between them is provided below (Figure 14.5 and Figure 14.6 below refer).

Figure 14.5: A 'bare-ground' ZTV map overlaid on the central study area for comparison with the land cover-based ZTV map at Figure below.

Source: Macro Works Ltd. 2024 - ESRI

Figure 14.6: Digital Surface Model (DSM) based ZTV map accounting for screening by surface elements such as hedgerows and trees lines.



Source: Macro Works Ltd. 2024 - ESRI

As can be seen from the comparison of the 'bare-ground' ZTV map (Figure 14.5) and the Digital Surface Model based ZTV map (Figure 14.6):

- Whilst there are relatively few areas in the study area where the proposed GIS Substations will be entirely screened from intervening vegetation, a reduction in visibility occurs throughout the entire central portion of the study area when compared with the DTM ZTV.
- The most noticeable reduction in potential for views of the substation occurs in the east and south of the study area.
- Even while there are many areas where the proposed GIS Substations will be visible, it is likely that in many instances this would be limited to the upper portions of the proposed GIS Substations, while the lower portions of the proposed GIS Substations would be heavily screened by the intervening vegetation.

It is important to note that the DSM ZTV map is conservative in its analysis of potential for visibility of the proposed development, as the ZTV patterns (yellow areas) includes the tops of trees and buildings within the Digital Surface Model that are not necessarily accessible.

The ZTV maps were part of the initial desktop study and were utilised to establish a high-level understanding of the extent of the visibility of the proposed development. It provides an indication of the areas with the highest potential for suitability as potential viewshed reference points. A viewshed reference point is a location selected from a specific vantage point used to assess the potential visibility of a proposed development. After the viewshed reference points have been selected in the field, the visual impact assessment transitions to a focused analysis of the specific visual impact on these viewpoints with reference to the accompanying verified photomontages (Volume 4) and the ZTV becomes less relevant.

14.4.5.2 Identification of viewshed reference points as a basis for assessment

Viewshed reference points are the locations used to study the visual impacts of the proposed development in detail. It is not warranted to include each and every location that provides a view of a development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the proposed development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles. The visual impact of a proposed development is assessed by Macro Works using up to six categories of receptor type as listed below:

- Key views (from features of national or international importance);
- Designated scenic routes and views;
- Local community views;
- Centres of population;
- Major routes; and
- Amenity and heritage features.

Viewshed reference points might be relevant to more than one category and this makes them even more valid for inclusion in the assessment. The receptors intended to be represented by particular viewshed reference points are listed at the beginning of each viewpoint appraisal.

The viewshed reference points selected in this instance are set out in Table 14.5 and indicated on Figure 14.7 below.

Table 14.5: Outline Description of Selected Viewshed Reference Points

Ref.	Location	Direction of view
VP1	Local road, Ballynote West	South
VP2	National road, Moyne	South
VP3	National road, Ballymacrinay	South
VP4	National road, Carrowdotia South	South
VP5	Local road, Carrig Island	East
VP6	Local road, Kilcolgan Lower	East
VP7	Local road, Kilcolgan Upper	North
VP8	Local road, Carhoonakilla	North
VP9	Local road, Carhoonakineely	North-west
VP10	Local road, Coolnanoonagh	West
VP11	Local road, Kilpaddoge	West
VP12	Local road, Carrigfoyle	East

Ref.	Location	Direction of view
VP13	Local road, Glancullare North	North
VP14	Regional road, Aghanagran Middle	East

Figure 14.7: Viewshed Reference Point Map

Source: Macro Works Ltd. 2024 - Ordnance Survey Ireland Licence No. EN 0093120

14.4.6 Sensitivity – visual

Table 14.6 uses the criteria set out in Section 14.3.2 to determine sensitivity at each of the viewshed reference points selected to represent visual receptors.

Table 14.6: Analysis of Visual Receptor Sensitivity at Viewshed Reference Points

Scale of value for each criterion

Strong association	Moderate association	Mild association	Negligible association

Values associated with the view	**VP 1**	**VP 2**	**VP 3**	**VP 4**	**VP 5**	**VP 6**	**VP 7**	**VP 8**	**VP 9**	**VP 10**	**VP 11**	**VP 12**	**VP 13**	**VP 14**
Susceptibility of viewers to changes in views	Strong	Strong	Strong	Strong	Strong	Strong	Strong	Moderate	Moderate	Moderate	Strong	Strong	Strong	Strong
Recognised scenic value of the view	Strong	Strong	Strong	Moderate				Mild	Mild	Mild		Strong		Mild
Views from within highly sensitive landscape areas	Moderate		Moderate		Moderate	Moderate						Strong	Mild	Mild
Primary views from residences				Strong			Moderate	Moderate					Mild	
Intensity of use, popularity (number of viewers)	Strong	Strong	Mild	Strong			Mild	Moderate	Moderate	Moderate				Mild
Viewer connection with the landscape	Moderate	Moderate	Moderate	Mild	Strong	Mild						Strong	Mild	Moderate
Provision of vast, elevated panoramic views	Mild	Moderate	Mild	Mild	Mild	Mild						Mild	Strong	
Sense of remoteness / tranquillity at the viewing location			Mild		Mild						Moderate	Mild	Moderate	
Degree of perceived naturalness	Moderate		Moderate		Moderate						Mild	Mild		Strong
Presence of striking or noteworthy features	Mild		Mild										Mild	Moderate
Sense of historical, cultural and / or spiritual significance					Mild									
Rarity or uniqueness of the view														
Integrity of the landscape character within the view		Mild					Mild		Mild	Mild		Mild	Mild	Strong
Sense of place at the viewing location	Mild	Mild	Mild	Mild										
Sense of awe	Mild		Mild		Mild									
Overall sensitivity assessment	**HM**	**HM**	**HM**	**ML**	**M**	**ML**	**ML**	**ML**	**ML**	**ML**	**ML**	**M**	**M**	**M**

N = Negligible; L = low sensitivity; ML = medium-low sensitivity M = medium sensitivity; HM = High-medium sensitivity; H = high sensitivity; VH = very high sensitivity

14.5 Likely Significant Effects

Using the methodology outlined in Section 14.3.2 potential effects as a result of the proposed development will be undertaken by examining it in two separate parts, the proposed Underground Cable and proposed GIS Substations, as per descriptions in Chapter 5.

14.5.1 Construction Phase

14.5.1.1 Landscape

Magnitude of landscape impact - Underground Cable

Trenches will be excavated so the conductors can be installed below the ground. There will be associated and ancillary development, including temporary construction compounds and laydown areas, tracks, site development, landscaping works, fencing and vegetation removal. There will also be joint bays and associated temporary passing bays positioned at intervals along the route. The physical impact of the trench on the landscape will be modest in scale. There will be an increase of heavy good vehicle movements within the road network in the vicinity of the proposed development, which will be more noticeable along the local roads within the study area. Impacts on the land cover for the off-road (cross-country) portions of the proposed underground cable will be limited to a relatively narrow swathe within which some grassland and hedgerow vegetation will need to be removed. To assess a worst-case scenario, it is assumed that all vegetation within the planning application boundary will have to be removed, but this is unlikely to be the case as it would be easier for the construction contractor to remove only a necessary minimum. An additional worst-case scenario is adoption of the open cut technique for crossing the Ralappane stream. During the construction phase, there may be impacts at certain locations along the route of the proposed underground cable. However, it would not be at a scale that would have any material impact on the overall landscape fabric or on the landscape character in the study area. Although construction activity may alter the landscape character in the immediate vicinity of where the cable is being installed, it will be transitory and temporary. Open cut trenching and joint bay construction works will involve localised vegetation removal, but, where possible, the felling of healthy mature trees will be avoided.

There may be some instances where the removal of vegetation may open up views that were previously screened. Any hedgerow removal between the permanent wayleave and the planning application boundary on the off-road (cross-country) portions of the proposed Underground Cable will be replanted but this will not be possible within the permanent wayleave, resulting in a permanent but very localised change at these locations.

At most other locations, any vegetation removed will be replanted but there may be occasions where this is not practical, resulting in a permanent but very localised change. The trenches will be backfilled with earth, then top soiled and re-vegetated, having regard for agricultural land-use and/or biodiversity requirements. Construction phase works will be negative, transient, reversible and, in terms of duration, temporary (less than or equal to one-year duration). During the construction phase, the proposed underground cable pulling will result in a low magnitude of impact along the sections of the route that follow the existing road network, but the magnitude of impact will be medium-low along the off-road (cross-country) sections of the proposed Underground Cable.

Magnitude of landscape impact - GIS Substations

Physical landscape impacts will occur during the construction phase at the site of the proposed GIS Substations. This will result from disturbance to the landform and land cover for the various structures, buildings and associated access and egress roads. Works will begin with the erection of site perimeter fencing (temporary construction fencing). There will be excavation of subsoil as required for the foundations of buildings within the site of the proposed GIS Substations. This is a gently sloping site; therefore there it is not envisaged that there will be a need to significantly modify or redistribute subsoil material around the site to facilitate access road gradients or the ground level of buildings. The existing land cover to be disturbed as part of the construction operations within the site is predominantly agricultural grassland. The southwest – northeast running hedgerow along the site will be removed, and a section of the northwest – southeast hedgerow will be removed to facilitate construction of a new entrance into the site.

In addition to the permanent, physical disturbance of the landform and land cover of the proposed site during construction, there will also be temporary effects on the landscape character of the site and its immediate surrounds. This will occur due to the intensity of construction activities which will involve the movement of heavy vehicles to and from the site and also within the site. There will be site welfare facilities and vehicle parking as well as areas of the site dedicated to the storage of excavated earth and building materials. Tower cranes and partially completed structures will also be characteristic elements of the construction phase which will be more visible from a broader area than surface level construction activities. These are all typical construction phase activities for a facility of this scale, but they represent a noticeable increase in the baseline levels of activity experienced in and immediately around this rural site.

The construction stage works required at the site will be relatively modest in scale and short term in duration. There will be a noticeably increased level of activity from workers and construction machinery during the period of the construction works, but there are few visual receptors within close proximity to the works. There is potential for construction phase works to temporarily impact on landscape character. This will result from the movement of heavy machinery, excavation and stockpiling of material as well as the temporary storage of construction materials in the immediate vicinity of the site.

On the basis of the factors discussed above, it is considered that the magnitude of construction phase landscape impacts as a result of the proposed GIS Substations are deemed to be Medium.

Significance of landscape effect

Construction phase landscape impacts as a result of the proposed development will be negative. The duration of the landscape impacts is deemed to be temporary for the proposed underground cable route as the works will be transitory and short-term for the works at the proposed GIS Substations. Based on the impact significance matrix (Section 14.3.2), the significance of landscape effect during the construction phase is summarised in the Table 14.7.

Table 14.7: Significance of landscape effect – construction phase

Aspect	Landscape sensitivity	Quality	Magnitude of landscape impact	Significance of landscape effect	Duration
Underground Cable	Medium	Negative	Medium-low	Slight (Not significant)	Temporary
GIS Substations	Medium	Negative	Medium	Moderate (Not significant)	Short-Term

14.5.1.2 Visual

It is not considered beneficial to assess construction phase visual impacts from specific receptor locations using photomontages, which is instead reserved for the operational phase of the proposed development. This approach is partly on the basis that construction phase visual effects are constantly changing in nature, intensity and location. Furthermore, many potential construction-related visual effects (such as dust, lighting and heavy vehicle movements, etc.) are also not easily depicted or readily experienced through the use of static photomontages.

14.5.2 Operation and Maintenance Phase

14.5.2.1 Landscape

Magnitude of landscape impact - Underground Cable

As the proposed underground cable will largely occur within existing ducting in the road network and the off-road (cross-country) sections will not materially rise above the existing terrain, it is deemed not to have the potential to result in any notable adverse impacts on the physical landscape or on landscape character within the receiving landscape. Any potentially noticeable permanent changes will be negative but highly localised and will generally be limited to where it was not possible to reinstate vegetation directly over the cable trench or within the permanent wayleave of the off-road (cross-country) sections of the proposed underground cable.

For these reasons, the magnitude of impact on the landscape character within the study area of the proposed Underground Cable due to the proposed development will be low-negligible during the operational phase and will be permanent in duration.

Magnitude of landscape effect – GIS Substations

Due to its relative height and bulk compared to other surface level features within the site, the proposed GIS Substations have the potential to generate effects on landscape character. The main effect will be an increased sense of industrialisation within the predominantly rural setting of the site, particularly in relation to the open coastal pastoral landscape context.

From a landscape character perspective, the proposed GIS Substations will increase the intensity of industrialisation within the landscape, but only to a limited extent and will not markedly alter the wider landscape setting which is already influenced by notable industrial facilities. The southern, northern and western site perimeter will incorporate screen planting (embedded mitigation) which will help the GIS Substations ‘bed into’ the site and surrounding vegetation.

On the basis of the factors discussed above, it is considered that the operational phase magnitude of landscape impact is medium within the immediate vicinity of the site (being those lands contained within approximately 1km). Thereafter, the magnitude of landscape impact is deemed to reduce, as it becomes a progressively smaller component of the overall landscape fabric.

Significance of landscape effect

Operational phase landscape impacts as a result of the proposed development will be negative-neutral for the proposed Underground Cable and negative for the proposed GIS Substations. The duration of the landscape impacts is deemed to be permanent for both the proposed underground cable route and two proposed GIS Substations. Based on the impact significance matrix (Section 14.3.2), the significance of landscape effect during the construction phase is outlined in the Table 14.8.

Table 14.8: Significance of landscape effect – operational phase

Aspect	Landscape sensitivity	Quality	Magnitude of landscape impact	Significance of landscape effect	Duration
Underground Cable	Medium	Negative-Neutral	Low-negligible	Slight-imperceptible (Not significant)	Permanent
GIS Substations	Medium	Negative	Medium	Moderate (Not significant)	Permanent

14.5.2.2 Visual

The assessment of visual impacts at each of the selected viewpoints is aided by photomontages of the proposed development (refer to Volume 4 (Verified Photomontages) of this EIAR). Photomontages are a 'photo-real' depiction of the proposed development within the view, utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. These were prepared in accordance with Landscape Institute and the Institute of Environmental Management and Assessment (2019) Landscape Institute Technical Guidance Note TGN 06/19 on Visual Representation of development proposals (Landscape Institute 2019). Table 14.9 presents the operational phase visual impacts and resulting impact significance. All selected viewpoints relate to the proposed GIS Substations, apart from VP11 which was selected as the closest publicly accessible location to the proposed connection to Kilpaddoge substation.

Table 14.9:Visual magnitude of impact and Significance of effect - operational phase

VP	Title and description of existing view	Receptor Sensitivity	Description and Magnitude of Visual impact	Quality / Significance / Duration of Visual Effect
VP 1	**Local road, Ballynote West** This viewpoint, located at an approximate 4.8km distance to the centre of the Site, is representative of views along the Coast Road from at Aylevarroo Bay. This open view across the Shannon Estuary and of the southern shoreline at Co. Kerry as well as other views along the Coast Road are designated as a scenic route in Clare CDP and form also part of the Wild Atlantic Way touring route. The view contains a number of wind turbines setback from the shores in Co. Kerry. The wider panoramic view further left and contains the prominent built structures including chimney stacks of Moneypoint Power Station and the associated wind turbines. Tarbert Power Station would also become visible further left to this view.	HM	The proposed development will be visible on the opposite bank of the Shannon Estuary. At this distance the scale of the proposed GIS Substations will be greatly diminished. Their roofs will not protrude above the skyline. The visual change will be barely noticeable, thus the development is deemed to have a minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Negligible.	Negative-neutral Slight-imperceptible (Not significant) Permanent
VP 2	**National road, Moyne** This viewpoint, located at an approximate 4.5km distance to the centre of the Site, is representative of elevated views from the N67 at Moyne Court, looking south, south-east across the Shannon Estuary in the direction of the Site. This view as well as other views along the N67 are designated as a scenic route in Clare CDP and form also part of the Wild Atlantic Way touring route. The south sloping terrain towards the Shannon estuary contains generally low vegetation, clusters of small trees, low voltage transmission lines and some dwellings. The appearance of the existing vegetation is windswept. While Moneypoint Power Station and wind farm are vertical prominent features in the overall setting of the area. In the distance across the Shannon, the Co. Kerry shoreline and undulating landform form the backdrop and include wind turbines including Leanamore Wind Farm.	HM	The proposed development will be visible on the opposite bank of the Shannon Estuary. At this distance the scale of the proposed GIS Substations will be greatly diminished. Their roofs will not protrude above the skyline. The visual change will not be barely noticeable, thus the development is deemed to have a minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Negligible.	Negative-neutral Slight-imperceptible (Not significant) Permanent

VP 3	**National road, Ballymacrinay** This viewpoint, located at an approximate 3.7km distance to the centre of the Site, is representative of shore views from the northern banks of the Shannon Estuary of the study area, looking south across the Shannon Estuary of the Site. The foreground of the view comprises a pebble shoreline with the waters of Shannon Estuary spanning across the scene. A wind turbine associated with Moneypoint Power Station can be seen left in the view. The tall verticality of these structures contrast with wide open view across the Shannon Estuary and its low shorelines from this location. The distant shoreline and hillsides of County Kerry define the background of this view and includes a conifer plantation and a number of clusters of wind turbines (Leanamore Wind Farm and Tullahennel Wind Farm.) This view as well as other views along the N67 in this area are designated as a scenic route in Clare CDP and form also part of the Wild Atlantic Way touring route.	HM	The proposed development will be visible on the opposite bank of the Shannon Estuary. At this distance the scale of the proposed GIS Substations will be greatly diminished. Their roofs will not protrude above the skyline. The visual change will not be barely noticeable, thus the development is deemed to have a minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Negligible.	Negative-neutral Slight-imperceptible (Not significant) Permanent
VP 4	**National road, Carrowdotia South** This viewpoint, located at an approximate 4.3km distance to the centre of the Site. It is representative of elevated views from a car park located along the N67 opposite the Church of St. Imy at Carrowdotia, west of Killimer in Co. Clare. Views along the N67 across the Shannon Estuary are generally intermittent due to road side vegetation and an undulating land profile in this area. This viewpoint location provides an open view passing a residential property and across the existing Moneypoint Power Station facilities including coal storage, loading cranes and a wind turbine. The Shannon estuary is located in the middle distance and an elevated panoramic long-distance view opens up along the shores of Co. Kerry and beyond in the background. A number of clusters of wind turbines including Leanamore Wind Farm and Tullahennel Wind Farm can be seen in the distance on the Co. Kerry side. This viewpoint at the N67 is	ML	The proposed development will not be visible from this location due to a high degree of intervening screening. Even if it was visible, there would be no impact on visual amenity due to the very high degree of visual complexity in the view. Therefore, by default, the magnitude of visual impact is Negligible.	Neutral Imperceptible (Not significant) Permanent

	located along a part of the Wild Atlantic Way touring route.			
VP 5	**Local road, Carrig Island** This viewpoint is located at an approximate 3.4km distance to the centre of the Site. The open view looks east from the shores of Carrig Island upstream along the River Shannon Estuary. The estuarine views include the coastline and headlands of the Co. Kerry shoreline as well as the Co. Clare shoreline in the distance. Moneypoint Power Station with its 2 stacks and prominent ancillary building structures including loading terminals in the River Shannon as well as the adjacent wind farm development will be clearly visible. Wind turbines associated with the Leanamore Wind Farm on the Co. Kerry side are also discernible. This viewpoint is within a 'visually sensitive area' as identified in the Kerry CDP.	M	The proposed development will be visible on the far side of the Ballyline River estuary. At this distance the scale of the proposed GIS Substations will be greatly diminished. Their roofs will not protrude above the skyline and will be viewed against a backcloth of conifer plantation. The visual change will be noticeable but the proposed GIS Substations will present at a small scale and will not necessarily be the first thing to be noticed in the view, thus the development is deemed to have a sub-dominant to minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Low-negligible.	Negative-neutral Slight-imperceptible (Not significant) Permanent
VP 6	**Local road, Kilcolgan Lower** This viewpoint is located at an approximate 1.1km distance to the centre of the Site along a local access road north of the L-1010 in the townland of Kilcolgan Lower. The view is orientated east / north-east and is representative of views in this area, which include partially open views along the Shannon Estuary. The existing Moneypoint Power Station with its two chimney stacks as well as the associated wind farm are prominent features in the background of this view.	ML	The proposed development will be visible in the background of the view against a backcloth of a conifer plantation. At this distance the scale of the proposed GIS Substations will be modest. Their roofs will marginally protrude above the skyline. The visual change will be noticeable but will not necessarily be the first thing to be noticed in the view, thus the development is deemed to have a sub-dominant visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Low.	Negative Slight (Not significant) Permanent
VP 7	**Local road, Kilcolgan Upper** This is a slightly elevated location to the south of the Site of the proposed GIS Substations. The local road in the foreground is flanked by a low-trimmed roadside hedgerow. A row of hedgerow trees in the fore to middle ground screen views directly to the north. A low farmed ridge sweeps through the middle ground. Moneypoint Power Station and associated wind farm are identifiable on the far side of the Shannon Estuary.	ML	The proposed substation buildings will be located just beyond the low intervening low ridge. The lower portions of the proposed GIS Substations will be screened from view by this ridge and the trees in the fore-to-middle ground will partially veil the view of the upper portions of the proposed GIS Substations. The roofs of the proposed GIS Substations will trace the skyline generated by the landform on the north side of the Shannon Estuary. The proposed GIS Substations will present at a modest scale and will not necessarily be the first thing to be noticed in the view, thus the development is deemed to have a sub-dominant visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Additionally, the visual complexity associated with the Moneypoint Power Station and associated wind farm helps	Negative Moderate-slight (Not significant) Permanent

			the proposed GIS Substations to be visually absorbed. There is also a thematic link between the proposed GIS Substations and the other electrical infrastructure in the view. Therefore, the magnitude of visual impact is Medium-low.	
VP 8	**Local road, Carhoonakilla** This is a broad view from the L-1010 local road. The grassy roadside verge merges with a banked low-trimmed hedge. Above which glimpses are possible of agricultural fields across the middle ground that form a locally elevated ridge. Portions of the Moneypoint Power Station and associated wind farm rise above this low ridge.	ML	The proposed development will be almost completely screened from view by at this location due to intervening vegetation. It will hardly be noticeable and due to the colour scheme of the proposed GIS Substations it will blend in with the intervening and surrounding vegetation. Therefore, there will be no reduction to the visual amenity. For these reasons, the magnitude of visual impact is Negligible. However, if the viewpoint was positioned a few meters further east along this local road then there would be no vegetation in the foreground providing a screening effect so the upper portions of the proposed GIS Substations would protrude above the locally elevated ridge in the middle ground. As a consequence of the intervening ridge the sale of the proposed GIS Substations is not perceptible and therefore will not necessarily be the first thing to be noticed in the view, thus the proposed GIS Substations are deemed to have a minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Additionally, the visual complexity associated with the Moneypoint Power Station and associated wind farm helps the proposed GIS Substations to be visually absorbed. There is also a thematic link between the proposed GIS Substations and the other electrical infrastructure in the view. Therefore, the magnitude of visual impact is Low. The proposed embedded mitigation planting to south of the proposed GIS Substations is on an elevated portion of the site so will be particularly effective at providing screening, thus will progressively reduce visual impacts as it matures.	Neutral Slight-imperceptible (Not significant) Permanent
VP 9	**Local road, Carhoonakineely** This is a broad view containing several medium-sized agricultural fields on a landform that gently rises to form a low ridge in the background upon which dwellings and adjoining agricultural buildings are perched.	ML	The proposed development will be almost completely screened from view by at this location due to intervening vegetation. It will hardly be noticeable and due to the colour scheme of the proposed GIS Substations it will blend in with the intervening and surrounding vegetation. Therefore, there will be no reduction to the visual amenity. For these reasons, the magnitude of visual impact is Negligible.	Neutral Imperceptible (Not significant) Permanent
VP 10	**Local road, Coolnanoonagh** This viewpoint is on a locally elevated section of the L-1010 local road. The road corridor passes through an undulating farmed and settled landscape as it leads the eye from the foreground into the background of the view. A low ridge is identifiable in the background.	ML	The proposed development will not be visible from this location due to a high degree of intervening screening. Therefore, by default, the magnitude of visual impact is Negligible.	Neutral Imperceptible (Not significant)

				Permanent
VP 11	**Local road, Kilpaddoge** This viewpoint is located on a local road to the east of the proposed connection to Kilpaddoge substation. The view towards the proposed development and the existing LCIMs is entirely screened by a roadside hedgerow in the foreground.	ML	The proposed development will not be visible from this location due to a high degree of intervening screening. Therefore, by default, the magnitude of visual impact is Negligible.	Neutral Imperceptible (Not significant) Permanent
VP 12	**Local road, Carrigfoyle** This viewpoint is located at an approximate 3.5 km distance to the centre of the Site. The open view looks east from Ballyline River. The estuarine views include the coastline and headlands of the Co. Kerry shoreline as well as the Co. Clare shoreline in the distance. Moneypoint Power Station with its 2 stacks and prominent ancillary building structures including loading terminals in the River Shannon as well as the adjacent wind farm development are clearly visible. Wind turbines associated with the Leanamore Wind Farm on the Co. Kerry side are also discernible. This viewpoint is on a designated scenic route within a 'visually sensitive area' as identified in the Kerry CDP.	M	The proposed development will be visible on the opposite bank of the Ballyline River estuary. At this distance the scale of the proposed GIS Substations will be greatly diminished. Their roofs will not protrude above the skyline. The visual change will not be barely noticeable, thus the development is deemed to have a minimal visual presence. The form of the proposed GIS Substations is not dis-similar to typical agricultural buildings commonly visible across rural Ireland and the colour on the finish of the façades helps them blend in with their surroundings. Therefore, the magnitude of visual impact is Negligible.	Neutral Imperceptible (Not significant) Permanent
VP 13	**Local road, Glancullare North** This is a broad view from the most elevated viewpoint and. A timber post and rail fence encloses the large field in the foreground. Landform falls away to the north, east and west to reveal a undulating farmed and settled landscape. From this locations expansive views are afforded over the Shannon Estuary and of Co. Clare beyond. Moneypoint Power Station and associated windfarm are readily identifiable.	M	The proposed GIS Substations will be located in the middle ground of the view, on the southern bank of the Shannon Estuary. The structures within the site will benefit from screening provided by intervening landform and vegetation but the shunt reactors and proposed GIS Substations will still be identifiable. These structures are contrasted against the backcloth of the waterbody in the Shannon Estuary, which make them more legible but because of the distance of this viewpoint from the site, the structures present at a relatively small scale, not dissimilar to the agricultural structures also in the view. For these reasons, the development is therefore deemed to be sub-dominant to minimal. Although the proposed GIS Substations are new and noticeable features within a previously undeveloped portion of the view, there is an overall a degree of visual complexity that helps to visually absorb and integrate them, thus the effect on the visual amenity is limited. On balance, the magnitude of visual effect is deemed to be Low.	Negative Slight (Not significant) Permanent
VP 14	**Regional road, Aghanagran Middle** This viewpoint, located at an approximate 4.6km distance to the centre of the Site, is representative of	M	The proposed development will not be visible from this location due to a high degree of intervening screening. Therefore, by default, the magnitude of visual impact is Low-negligible.	Neutral

	views looking north-east from the R551 overlooking wetlands. Moneypoint Power Station with its 2 stacks and associated wind farm are prominent focus points in the background. This section of the R551 is part of the Wild Atlantic Way touring route.	Imperceptible (Not significant) Permanent

14.5.3 Decommissioning Phase

The SLNG GIS Substation has a design life of 25 years and the effects of decommissioning at the end of that period would be similar to, but less than, those assessed during construction phase, thus not significant. It is not intended to decommission the electricity infrastructure associated with the proposed EirGrid/ESBN 220kV substation within the STEP Power Plant Site boundary and the associated underground cable route, as outlined in Chapter 5 Description of the Proposed Development. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables and proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation and considered not significant.

14.5.4 Do Nothing Scenario

If the proposed development does not proceed, the ‘do nothing’ scenario is that the existing environment and visual receptors identified in Section 14.4 are likely to remain as described in that section.

14.6 Cumulative Effects

An assessment of the potential cumulative intra-project effects has been undertaken. The assessment includes the following key projects:

- Strategic Gas Reserve Facility - this is the subject of a SID pre-application (ABP-319245-24) comprising of a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works.
- STEP Power Plant - The 600MW Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566).
- Gas Pipeline - Planning permission exists for the development of a 26 km natural gas pipeline which will facilitate connection from the Site to the GNI transmission network at Leahy’s, located to the west of Foynes, Co. Limerick.
- Data Centre Campus - as part of the Masterplan, a data centre campus is proposed to the west of the STEP site.
- L-1010 Road Widening – additional details in Chapter 4 (Table 4.2).

A full list of proposed developments within 10km of the project is provided in Chapter 4. This list has been reviewed with regard to potential cumulative effects in relation to landscape and visual effects. Due to the nature of the proposed development with respect to the other projects, and the intervening distances between these developments and the proposed development, it is deemed that there is no potential for significant cumulative landscape or visual effects in relation to these projects during the construction phase or operational phase of the proposed development.

Kerry County Council has obtained Part 8 planning for the widening of the L-1010;. The construction phase of the proposed development would not coincide with that of the L-1010 works (Kerry County Council Part 8 application) thus no cumulative landscape or visual construction phase effects are anticipated. There is no potential for significant cumulative landscape or visual effects in relation to the L-1010 Road Widening during the operational phase of the proposed development as the proposed Underground Cable would be below ground, and the proposed GIS Substations would be located sufficiently far away from the L-1010 Road Widening.

In 'Figure F1.1—Campus Site Plan[13]' from the planning application for the STEP Power Plant, a Data Centre Campus comprising eight main buildings southwest of the STEP Power Plant is indicated and a Strategic Gas Reserve facility comprising of a Floating Storage Regasification Unit (FSRU) and associated development works located at north east of the STEP Power Plant site . However, both these developments are not a permitted development, nor has a planning application been submitted; thus, insufficient details are available to progress with an informed cumulative assessment.

The assessment undertaken for the proposed development in Section 14.5 assessed is in isolation. However, the proposed development, STEP Power Plant and Gas Pipeline are linked in that the proposed development would not proceed if these other projects do not proceed. For this reason the focus of this cumulative assessment is on what additional effects the proposed development would have cumulatively in addition to the effects that would occur as a result of the presence of these other projects, particularly the adjoining STEP Power Plant.

14.6.1 Construction Phase

Construction phase of the STEP Power Plant will be from January 2026 to August 2028. The proposed development will start in late 2026 and will take ca. 27 months to complete. The impact of the construction phase of the STEP Power Plant in isolation will be greater than that of the construction phase of the proposed development in isolation. The effect of the STEP Power Plant will be significant on the landscape and on visual receptors. The impacts of the proposed development will be no greater than Negative, Moderate and Short-Term, which is not a significant effect. The landscape and visual effects of the proposed development due to construction activities will be a modest addition to those occurring due to the STEP Power Plant, and Gas Pipeline. The eastern portion of the underground cable will not be in the same landscape context as the Gas Pipeline and will take place approximately 2 km from the other elements of the STEP Power Plant , so the cumulative effects will not be significant due to the intervening distances. The western portion of the underground cable will occur within the new access road corridor created as part of the STEP Power Plant. The construction activities and physical effects related to the western portion of the underground cable and the proposed GIS Substations will be subsumed by those associated with the STEP Power Plant. The addition of the construction phase of the proposed development within the same timeframe as that of the STEP Power Plant will not be significant. Indeed, it is anticipated they will be no greater than the maximum determined for the proposed development in isolation; Negative, Moderate-slight and Permanent.

14.6.2 Operational Phase

Due to the sub-terrain nature of the proposed underground cable there is no potential for significant landscape or visual cumulative effects to occur in conjunction with the STEP Power Plant, or Gas Pipeline during the operational phase. Potential cumulative landscape and visual effects as a result of the proposed GIS Substations in conjunction with the STEP Power Plant are possible, but not with the Gas Pipeline as it will be below ground.

14.6.2.1 Landscape

The proposed GIS substations are located within the red line planning boundary of the STEP Power Plant project. The lands at this location within the STEP Power Plant application are identified as a temporary compound. The proposed GIS substations would occupy part of these lands.

[13] https://r2.steppowerplant.com/eiar/volume-3-figures/SLNG_PP_Figure_F1_1_Shannon_Technology_and_Energy_Park_STEP_Masterplan.pdf

There would not be any new physical effect on the landform or land cover due to the proposed GIS Substations, as the terrain would have already been modified during the construction phase of the STEP Power Plant. In this regard, the physical effect of the proposed GIS Substations would be less in this cumulative scenario than predicted due to the proposed development when assessed independently.

The STEP Power Plant would be of a much larger scale compared to the proposed GIS Substations. The addition of the proposed GIS Substations would further industrialise the site, but it will not be uncharacteristic in the receiving landscape as the landscape character in the immediate area would already be established by the presence of the STEP Power Plant; in addition the existing Moneypoint Power Station to the north of the Shannon Estuary.

It is considered that the magnitude of the landscape impact due to the STEP Power Plant in isolation would be greater than the proposed GIS Substations in isolation. The proposed GIS Substations represent a minor additional element to the STEP Power Plant. Although the proposed GIS Substations would increase the quantity and mass of structures on the southern banks of the Shannon Estuary, and add to the industrialisation both within the STEP Power Plant site, and in the receiving landscape, it would not be to the degree that would increase the significance of the effect produced by the STEP Power Plant in isolation of the proposed GIS Substations. It is anticipated that the significance of the cumulative landscape effect would be no greater than the significance determined for the proposed development in isolation; Negative, Moderate (not significant) and Permanent.

14.6.2.2 Visual

The cumulative visual effects of the proposed GIS Substations in conjunction with the STEP Power Plant during the operational phase are depicted in the photomontages in Volume 4. The proposed GIS Substations would be visible immediately adjacent to the STEP Power Plant from many of the viewshed reference points in which the STEP Power Plant and Strategic Gas Reserve Facility would be visible.

In these instances, the proposed development would represent an increase in industrial structures within views where the larger industrial development of the STEP Power Plant would be visible. The developments would appear as a single and cohesive development, whereby the proposed GIS Substations would be seen as a modest addition to a much larger industrial facility. It is not considered that the proposed GIS Substations represent a noticeably greater cumulative impact than what would occur due to the STEP Power Plant in isolation. Thus, the significance of the cumulative visual effects would not be materially greater than the significance of the STEP Power Plant when considered in isolation. Indeed, it is anticipated that the significance of the cumulative visual effect would be no greater than the significance determined for the proposed development in isolation: Negative, Moderate-slight (not significant) and Permanent.

14.7 Mitigation and Monitoring

14.7.1 Embedded Mitigation Measures

The location of the GIS Substations is at +20 m OD and adjacent to the main turbine halls of the adjacent STEP Power Plant. This low position was deliberately selected during the design phase to avail of the screening effect of the elevated terrain (+25 m OD) between the residences along Coast Road L-1010 (VP7, VP8, VP9, VP10 and VP13). This mitigates the visual impact of the GIS Substations on these residences. The benefit of this mitigation is clearly visible from (VP7, VP8, VP9, VP10 and VP13). Additionally, the proposed colour scheme of the façade of the GIS Substations has been selected to match that of the adjacent STEP Power Plant so that the two developments are visually coherent. The STEP Power Plant colour scheme was selected based on the constructed ESB substation near Kilmorna, Co. Kerry, which successfully helped the integration of the built structures into the surrounding landscape in close and distant views, including designated scenic views across the River Feale valley. The colour scheme that would be applied is as follows:

- Fencing, enclosure/ equipment container sides and tops, racks, evaporators, water tanks - RAL 6006 (Grey-Olive);
- Building and enclosure façades - RAL 6003 (Olive green);
- Building and enclosure roofs - RAL 6020 (Chrome green);
- Doors, window frames, auxiliary boiler and fuel gas stacks and cooler pipes - RAL 7043 (Traffic grey B);
- Façade for the turbine halls - RAL 6011 (Reseda Green); and
- Turbine air intakes and diesel generator/ HRSG exhaust stacks - RAL 9023 (Pearl dark grey).

14.7.2 Specific Mitigation Measures

No significant landscape or visual adverse effects have been identified in the construction phase or the operational phase, which require specific mitigation measures; however, additional mitigation planting is proposed in relation to the proposed GIS Substations anyway, to generally help reduce and/or offset non-significant adverse effects. Additional mitigation planting is indicated on the Landscape Plan in Appendix 14.2. It includes a proposed vegetation strip along the field boundary to the southeast of the proposed GIS Substations, and a proposed hedgerow to the southwest and northwest. No planting is proposed to the northeast as that would be the location of the adjoining BESS of the adjacent STEP Power Plant. The additional mitigation planting will help the proposed GIS Substations to 'bed into' the receiving landscape. The proposed vegetation strip will be visible and noticeable from locations to the south of the proposed GIS Substations and will help screen the proposed GIS Substations (VP8).

14.7.3 Construction phase

Specific mitigation measures in relation to landscape and visual are not considered necessary for the proposed development as no significant effects are anticipated during the construction phase.

14.7.4 Operational phase

Specific landscape and visual mitigation measures are not considered necessary in relation to the proposed development as no significant effects are anticipated during the operational phase.

14.8 Residual Effects

As no specific mitigation measures are proposed, residual landscape and visual impacts as a result of the proposed development will be the same as described for the operational phase, where no significant effects were identified.

No potential significant effects were identified in construction or operational phases that require specific mitigation. However, there would be benefits from the proposed additional mitigation planting at the proposed GIS Substations, which relate to non-significant landscape and visual effects, and these are detailed in Table 14.10.

The LVIA is structured to account for embedded architectural/site layout mitigation, including the colour tone of buildings, as part of the pre-mitigation assessment. This is reflected visually in the pre-mitigation photomontage set in Volume 4. The post-mitigation scenario is that which incorporates proposed additional mitigation planting after an establishment period that would allow it to perform the function intended (approximately five to seven years) while acknowledging that it would be of increasing mitigation benefit up until that point (post-mitigation photomontage set in Volume 4). It would continue to increase in screening benefits (thicker/taller vegetation) thereafter.

Table 14.10: Significance of residual effect

Aspect	Sensitivity	Quality	Magnitude of residual impact	Significance of residual effect	Duration
Underground Cable	Medium	Negative-Neutral	Low-negligible	Slight-imperceptible (Not significant)	Permanent
GIS Substations	Medium	Negative	Medium	Moderate (Not significant)	Permanent
Viewshed reference points (VP1 to VP14)	High-medium or less (VP1 to VP3)	Negative or Neutral	Medium-low or less (VP7)	Moderate-slight (Not significant) or less (VP7)	Permanent

14.9 Summary

Significant landscape and visual effects are not anticipated for the construction, operational or decommissioning phases, nor are significant cumulative or residual landscape and visual effects expected as a result of the proposed development.

14.10 References

Kerry County Council (2022) Cork County Development Plan 2022 -2028. Available from www.kerrycoco.ie [Accessed: 30 April 2024]

Environmental Protection Agency (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment – Third Addition

National Parks and Wildlife Service (2021) Map viewer. Available from: http://webgis.npws.ie/npwsviewer/ [Accessed: 30 April 2024]

The Heritage Council (2021) Map Viewer. Available from http://www.heritagemaps.ie/ [Accessed: 30 April 2024]

Coillte (2021) Map Viewer. Available from https://www.coillte.ie/our-forests/recreation-map/ [Accessed: 30 April 2024]

Fáilte Ireland (2021). Available from: https://www.discoverireland.ie/ [Accessed: 30 April 2024]

Sport Ireland (2021) Sport Ireland Trails. Available from: www.irishtrails.ie [Accessed: 30 April 2024]

Shannon LNG Ltd. (2024) Shannon Technology and Energy Park Environmental Impact Assessment Report. Available from: https://steppowerplant.com/ [Accessed 21 May 2024]

The Heritage Council (2021) Map Viewer. Available from http://www.heritagemaps.ie/ [Accessed: 30 April 2024]

Google Maps (2021) Map view and aerial view. Available from: www.google.ie/maps [Accessed: 30 April 2024]

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Shannon Technology and Energy Park (STEP) 220kV Grid Connection

Chapter 15 – Archaeology, Architectural and Cultural Heritage

July 2024

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15 Archaeology, Architectural and Cultural Heritage

15.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) has considered the potential cultural heritage effects associated with the Construction, Operational and Decommissioning Phases of the Shannon LNG STEP 220KV Grid Connection (hereafter referred to as the proposed development).

The aim of the proposed development, when in operation, is to provide grid connection services for the associated STEP Power Plant facility which includes:

- Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566).[1] The proposed development includes for two GIS substations (SLNG substation and EirGrid/ESBN substation).
- Gas Pipeline – The previously consented 26km Shannon Natural Gas Pipeline (Planning Reference: PL08.GA0003), once constructed, will facilitate transport of the natural gas between the Site and the national gas network at Foynes. Shannon LNG Limited obtained consent in February 2009 for Natural Gas Pipeline under Section 182C (1) of the Planning and Development (Strategic Infrastructure) Act 2006, as amended.

The objectives of the proposed development are outlined in Chapter 1 (Introduction). The proposed development, which is described in detail in Chapter 5 (Description of the proposed development) has been designed to meet these objectives.

The design of the proposed development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental effects, where practicable, whilst ensuring the objectives of the proposed development are attained. In addition, feedback received from the consultation programme undertaken throughout the process have been incorporated, where appropriate. In this process, Archaeological Management Solutions (AMS) were directly involved in the identification of key constraints at the early stages of design and were subsequently involved in the proposed development assessments and preparation of this EIAR Chapter once design was finalised.

The design intent is to avoid overhead lines and to route the majority of the grid connection from the proposed on-site substations underground and along the L-1010 to minimise effects on greenfield land, archaeology and reduce visual impact. Refer to Chapter 2 Alternative considered for a detailed discussion on route selection.

In summary, route the cable under the L-1010 was generally preferable as the removal of vegetation and effects on archaeology are limited, noise effects are temporary and can be mitigated, there are no landscape effects. However, it was not possible to put the full length of the cable under the L-1010 road as there was existing utility congestion, within the final 0.83km of the road carriageway.

Therefore, the cables will be routed off-road, to the north of the L-1010. The offroad section north of the L1010 to the Kilpaddoge access road runs initially in a field parallel to a private

[1] Application details accessible at: https://www.pleanala.ie/en-ie/case/319566 [Accessed 10 June 2024].

roadway. The route eventually turns east toward the Kilpaddoge access road. The alignment here has been chosen to avoid the zone of notification of Recorded Monuments in the area.

Kerry County Council has obtained Part 8 planning for the widening of the L-1010. Therefore, the road widening works, including archaeological resolution, will be undertaken by Kerry County Council, or their subcontractors, in advance of the proposed development.

In this assessment, tangible cultural heritage assets are captured under the relevant sections on archaeology and built heritage, while intangible cultural heritage associations (i.e. historical and folklore associations) are referred to, where known, in the archaeological and historical background with further information presented in the appendices.

The following Appendices are included, to be referenced with this report:

- Appendix 15.1: Cultural Heritage Dataset
- Appendix 15.2: Inventory of Previous Archaeological Investigations
- Appendix 15.3: Inventory of Archaeological Objects from the National Museum of Ireland (NMI) Topographical Files
- Appendix 15.4: Extracts from the Irish Folklore Commission Schools' Collection
- Appendix 15.5: Walkover Survey Photographic Record
- Appendix 15.6: List of Figures
- Appendix 15.7 List of Plates taken during Walkover Surveys

This chapter should be read in conjunction with Chapter 14 (The Landscape) and its appendices, which present related impacts arising from the proposed scheme and proposed mitigation measures to avoid or reduce the predicted impacts.

15.2 Policy and Guidance

The assessment has been undertaken with reference to the most appropriate guidance documents relating to cultural heritage, which are set out below. In addition to specific legislation, policy and guidance documents, the following guidelines were followed in particular in the carrying out of this assessment:

- Guidelines for Cultural Heritage Impact Assessment of TII National Roads and Greenway Projects (Transport Infrastructure Ireland [TII] 2024),[2] (hereafter referred to as the TII Guidelines); and,
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency [EPA] 2022),[3] (hereafter referred to as the EPA Guidelines);

The collation of baseline cultural heritage data and the evaluation of potential effects on cultural heritage had regard to the following legislation, policy and guidance documents:

15.2.1 Legislation:

- National Monuments Acts 1930 to 2014;
- Heritage Act 1995 (as amended);
- National Cultural Institutions Act 1997;
- European Convention for the Protection of the Archaeological Heritage (Valetta Convention, 1997);

[2] Available at: https://www.tiipublications.ie/library/PE-ARC-02009-01.pdf [Accessed 29.02.2024].

[3] Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed: 29.02.2024].

- European Convention for the Protection of the Architectural Heritage (Granada Convention, 1997);
- European Landscape Convention (Florence Convention, 2000);
- Planning and Development Act 2000 (as amended);
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (Paris Convention, 2003); and
- Directive 2011/92/EU of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU of the European Parliament and the Council (hereafter the EIA Directive).

15.2.2 Policy and Planning Documents:

- Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands [DAGHI] 1999);[4]
- Listowel/Ballybunion Functional Area Local Area Plan 2013–2019 (Kerry County Council [KCC] 2014) [5];
- Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport, Infrastructure Ireland (TII & Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs [DAHRRGA] 2017);[6]
- Built & Archaeological Heritage: Climate Change Sectoral Adaption Plan (Department of Culture, Heritage and the Gaeltacht [DCHG] 2019);[7]
- Kerry County Development Plan 2022–2028 (KCC 2021);[8]
- *National Development Plan 2021–2030* (Department of Public Expenditure and Reform [DPER] 2021);[9]
- Archaeology in the Planning Process (DHLGH & OPR 2021);[10]
- A Living Tradition: A Strategy to Enhance the Understanding, Minding and Handing On of our Built Vernacular Heritage (DHLGH 2021);[11]
- Places for People: National Policy on Architecture (DHLGH 2022a);[12]and

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[4] Available at: https://www.archaeology.ie/sites/default/files/media/publications/framework-and-principles-for-protection-of-archaeological-heritage.pdf [Accessed: 23.05.24]

[5] Available at: https://www.kerrycoco.ie/planning/planning-policy/local-area-plans/listowelballybunion-falap-2013-2019/ [Accessed: 26.05.2024]. Note KCC state that these plans are being updated at present.

[6] Available at: https://www.tii.ie/news/archaeology/code-of-practice/TII-Code-of-Practice.pdf [Accessed: 24.05.24].

[7] Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/246863/2660361a-6b77-4b58-b040-aea8fd960606.pdf#page=null [Accessed: 24.05.24].

[8] Available at: https://www.kerrycoco.ie/kerry-county-development-plan-2022-2028/ [Accessed 24.05.2024].

[9] Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/200358/a36dd274-736c-4d04-8879-b158e8b95029.pdf#page=null [Accessed: 25.05.24].

[10] Available at: https://www.archaeology.ie/sites/default/files/media/publications/archaeology-planning-process-pl13.pdf [Accessed: 24.05.2024].

[11] Available at: https://www.buildingsofireland.ie/app/uploads/2021/12/A-Living-Tradition.pdf [Accessed:24.05.2024].

[12] Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/224573/aac6d6ce-8a48-49a8-85f0-76da56be8ba4.pdf#page=null [Accessed: 23.04.24].

- Heritage Ireland 2030: A Framework for Heritage (DHLGH 2022b).[13]

15.2.3 Guidelines

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2022);
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2003);[14]
- Architectural Heritage Protection: Guidelines for Planning Authorities (Department of Arts, Heritage and the Gaeltacht [DAHG] 2011);[15]
- Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis (TII 2016);[16]
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment of Proposed National Roads – Standard (TII 2020);[17]
- Climate Assessment of Proposed National Roads – Standard (TII 2022);[18] and
- National Inventory of Architectural Heritage Handbook (DHLGH 2023).[19]

15.2.4 Legislative Mechanisms of Protection

15.2.4.1 Archaeological Heritage

At the time of preparation of this Chapter, the National Monuments Acts 1930 to 2014 are the primary legislation aimed at protecting and preserving archaeological heritage in the Republic of Ireland. At present, archaeological sites and monuments are protected under the National Monuments Acts 1930 to 2014 in one of four ways:

- Being recorded in the Record of Monuments and Places (RMP);
- Being registered in the Register of Historic Monuments (RHM);
- Being a national monument in the ownership or guardianship of the Minister for Housing, Local Government and Heritage or a Local Authority; or
- Being a national monument subject to a Preservation Order or Temporary Preservation Order.

Different levels of protection apply to a monument depending on which of the categories of designation it falls under (e.g. whether it is a national monument or Recorded Monument). The National Monuments Acts can also protect elements of architectural heritage or offer dual/parallel protection in conjunction with the Planning and Development Act 2000 (as amended).

National policy on the protection of the archaeological heritage during development is set out in Framework and Principles for the Protection of the Archaeological Heritage (DAHGI 1999). Under this policy, avoidance of impacts on archaeological heritage and preservation of archaeological sites and monuments in situ is always the preferred option. When a site, or part

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[13] Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/216633/d5e7370d-ee0e-41a8-81b5-9bc46bc75e17.pdf#page=null [Accessed: 23.04.2023].

[14] Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EPA_Advice_Notes-on_Current-Practice-on-prep-EIS_2003.pdf [Accessed: 26.05.2024].

[15] Available at: https://www.buildingsofireland.ie/app/uploads/2019/10/Architectural-Heritage-Protection-Guidelines-for-Planning-Authorities-2011.pdf [Accessed:26.05.2024].

[16] Available at: https://www.tiipublications.ie/training/ST17/2.-TII-Standards-Roadshow_PAGs-2017.pdf [Accessed: 26.05.2024].

[17] Available at: https://www.tiipublications.ie/library/PE-ENV-01102-01.pdf [Accessed: 26.05.2024].

[18] Available at: https://www.tiipublications.ie/library/PE-ENV-01105-01.pdf [Accessed: 26.05.2024].

[19] Available at: https://www.buildingsofireland.ie/app/uploads/2023/04/NIAH-Handbook-Edition-April-2023.pdf [Accessed 26.05.2024].

of a site, must be removed due to development, then preservation by record must be undertaken (i.e. through excavation, recording and publication/dissemination of the findings).

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 had not been enacted at the time of preparation of this Chapter. However, the Minister of State with Responsibility for Nature, Heritage and Electoral Reform has commenced certain provisions within the new Act with enforcement measures in effect as of 31 May 2024. The provisions now in force consider World Heritage Properties in the State[20], allow for the establishment and maintenance of inventories of relevant things of archaeological interest, architectural heritage and wrecks of archaeological interest. Provisions concerning implementation and enforcement are also commenced. When fully commenced, the Act will replace the existing National Monuments Act 1930 to 2014, and other related legislation, and introduce a range of new provisions to protect and conserve Ireland's historic heritage.

15.2.4.2 Architectural Heritage

Part IV of the Planning and Development Act 2000 (as amended) provides the legislative basis for the protection of architectural heritage.[21] Under the terms of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999, the term 'architectural heritage' means: 'all

- structures and buildings together with their settings and attendant grounds, fixtures and fittings;
- groups of such structures and buildings; and
- sites which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest'.

The Planning and Development Act 2000 (as amended) requires each Planning Authority to include in their Development Plan objectives for the protection of structures, or parts of structures, which are of special architectural, historical, archaeological, artistic, cultural, scientific, technical or social interest. These buildings and structures are compiled on the Record of Protected Structures (RPS). A Protected Structure, unless otherwise stated, includes the interior of the structure, the land lying within the curtilage of the structure, any other structures lying within that curtilage and their interior and all fixtures and features which form part of the interior or exterior of that structure. The protection also extends to any features specified as being in the attendant grounds including boundary treatments (DAHG 2011, 21).

An Architectural Conservation Area (ACA) is a place, area, group of structures or townscape, that is of special architectural, historical, archaeological, artistic, cultural, scientific, technical, social interest or value, or contributes to the appreciation of a Protected Structure and whose character it is an objective of a development plan to preserve (DAHG 2011, 41). An ACA may consist of groupings of buildings and streetscapes and associated open spaces. The legislation relating to ACAs is contained in Section 81 of the 2000 Act.

In addition, the scope of the National Monuments Acts includes monuments of architectural, historical or archaeological interest, allowing overlap with the Planning and Development Act 2000 (as amended). The importance of built heritage is outlined in Architectural Heritage Protection: Guidelines for Planning Authorities (DAHG 2011).

[20] See https://www.worldheritageireland.ie/category/heritage-property/ for the current List

[21] The Planning and Development Bill 2023 was published in October 2023. Therefore, a new Act is expected.

15.2.4.3 Kerry Development Plan 2022–2028

The Kerry County Development Plan 2022–2028 is intended to guide the sustainable future growth of County Kerry through a number of interlinked strategic objectives. These include Objectives (KCC, 2022, 154) relating to the protection of the archaeological heritage as follows:

- ***KCDP 8-24: (i)*** Secure the preservation in situ of all sites, features, protected wrecks and objects of archaeological interest within the county. In securing such preservation the Council will have regard to the advice and recommendations of the National Monuments Service, Department Gaeltacht Areas, Culture & Heritage 155 of Housing, Local Government and Heritage, the National Museum of Ireland, and the County Archaeologist.
- ***KCDP 8-24 (ii)*** Ensure that proposed development (due to location, size, or nature) which may have implications for the archaeological heritage of the county will be subject to an Archaeological Assessment (including Underwater Archaeological Impact Assessment) which may lead to further subsequent archaeological mitigation – buffer zones/exclusion zones, monitoring, pre-development archaeological testing, archaeological excavation and/or refusal of planning permission. This includes areas close to archaeological monuments, development sites which are extensive in area (half hectare or more) or length (1km or more) or include potential impacts on underwater cultural heritage and development that requires an Environmental Impact Assessment.
- ***KCDP 8-25***: Ensure the protection and preservation of archaeological monuments, wrecks and features, not yet listed in the Record of Monuments & Places (RMP), Sites & Monuments Record (SMR) or Wreck Inventory of Ireland Database and such unrecorded, through on-going review of the archaeological potential of the plan area. In securing such protection the council will have regard to the advice and recommendations of The National Monuments Service, Department of Housing, Local Government and Heritage, and the County Archaeologist.
- ***KCDP 8-26:*** Protect and preserve and promote the underwater archaeological heritage of the county. In assessing proposals for development, the Council will take account of the Archaeological Potential of rivers, lakes, intertidal and sub-tidal environments. Where flood relief schemes are being undertaken the Council will have regard to the Archaeological Guidelines for Flood Relief Schemes (DHLGH and OPW 2021).
- ***KCDP 8-27:*** Ensure that development (including forestry, renewable energy developments and extractive industries) within the vicinity of a recorded monument, zone of archaeological potential or archaeological landscape does not detract from the setting of the feature and is sited and designed appropriately and sympathetically with the character of the monument/feature/ landscape and its setting.
- ***KCDP 8-28:*** Ensure the active protection of the 19 identified, significant archaeological landscapes outlined in Volume 3 with particular emphasis on the landscape settings, views to and from the landscapes and monument/feature inter-visibility within these landscapes.
- ***KCDP 8-29:*** Protect archaeological/historical graveyards within the county and to encourage and promote their maintenance in accordance with legislation, conservation principles and best practice.
- ***KCDP 8-30***: Protect and preserve the industrial, military, maritime, riverine, lacustrine and post-medieval archaeological heritage of the county as reflected in such sites as mills, lighthouses, harbours, Valentia cable station, gun batteries, towers, and demesnes. Proposals for refurbishment, works to or redevelopment of these sites should be subject to a full architectural and archaeological assessment including, where appropriate, Underwater Archaeological Impact Assessment
- ***KCDP 8-31:*** Promote public awareness and facilitate appropriate access to archaeological monuments through public engagement and appropriate advisory guidance.

- ***KCDP 8-32:*** Promote awareness of the impact of climate change on the archaeology of the county, and promote appropriate identification, assessment, and adaption measures to reduce climate risk and develop resilience strategies for the archaeology of the county.
- ***KCDP 8-33:*** Continue to research and record the archaeological heritage of the county and to promote the timely public access to the results of archaeological research and excavation.

The key Objectives in relation to the preservation and protection of built heritage (KCC 2022, 156) include the following:

- ***KCDP 8-34:*** Prepare an Architectural Heritage Plan for the County including marine, industrial, and agricultural heritage.
- ***KCDP 8-35:*** Support and facilitate the rejuvenation of Kerry's historic built environment through the Kerry Building Conservation project.
- ***KCDP 8-36:*** Address the impact of climate change in accordance with the Built and Archaeological Heritage Climate Change Sectoral Adaptation Plan and Kerry County Council's Climate Change Adaptation Strategy 2019-2024.
- ***KCDP 8-37:*** Facilitate and support the growth and development of Architecture Kerry (Creative Ireland Kerry Programme).
- ***KCDP 8-38:*** Seek the retention and appropriate repair and upgrading of historic, buildings, structures, road bridges, railway bridges and tunnels throughout the county, subject to environmental assessment.
- ***KCDP 8-39:*** Ensure that rejuvenation and placemaking projects in the county enhance the physical, social, architectural, and historic settlement pattern of the locality.
- The key Objectives in relation to the preservation and protection of Protected Structures (KCC 2022, 157) include the following:
- ***KCDP 8-40*** Ensure that any development, modification, alteration, or extension affecting a protected structure and/or its setting including designed landscape features and views, is compatible with the special character of that structure.
- ***KCDP 8-41*** Support owners of protected structures to carry out conservation-led repair and rejuvenation of their protected structures.
- ***KCDP 8-42 P***rohibit demolition or inappropriate alterations and replacement of elements of protected structures where they would adversely affect the essential character of a protected structure.
- ***KCDP 8-43*** Review the Record of Protected Structures as needed during the lifetime of the Plan.
- ***KCDP 9-29*** It is an objective to protect sites of significant historical military importance along the Shannon Estuary, including …… the core area of Fort Shannon at Ardmore point.
-

The key Objectives in relation to the preservation and protection of Vernacular Architecture (KCC 2022, 158) include the following:

- ***KCDP 8-46*** Encourage the retention, appreciation and appropriate revitalisation of the vernacular-built heritage of Kerry by deterring the replacement of good quality older buildings with modern structures and by protecting these buildings where they contribute to the character of an area and/or where they are rare examples of a structure type.
- ***KCDP 8-47*** Promote the sympathetic maintenance, adaptation, and re-use of the county's vernacular built heritage, including thatched structures, in recognition of their role in tourism, economic revitalisation, climate change, placemaking and quality of life.

The key Objectives in relation to the preservation and protection of Historic Landscapes (KCC 2022, 159) include the following:

- ***KCDP 8-49*** Carry out further research and analysis to identify, survey and promote the conservation of historic landscapes in Kerry.
- ***KCDP 8-50*** Require that proposals for development within historic designed landscapes be sensitive to and respect the built heritage elements and green space values of the site.

15.2.4.4 Kerry County Heritage Plan

Heritage Plans are generally developed to facilitate a coordinated approach between the Local Authority, the community and other agencies to determine the general principles for the protection and development of cultural heritage for future generations. The Heritage Plan outlines broad aims and objectives for the future development, protection, and promotion of each county's heritage, which include for the conservation and enhancement of built and cultural heritage in a manner appropriate to its significance. There is currently no Heritage Plan in place for Kerry County Council.

15.2.4.5 Kerry County Development Plan: Appendix 7 - Landscape Review

The Kerry County Development Plan (KCC 2022, Appendix 7, A-190)[22] lists the Shannon Estuary as being a Landscape Character Area with overall sensitivity ratings ranging between Medium to High. The proposed landscape designation for this area includes the estuary foreshore and area within which the proposed development is located.

15.3 Assessment Methodology

15.3.1 Defining Cultural Heritage

Under Annex IV (4) of amended EIA Directive 2014/52/EU, 'cultural heritage', including architectural and archaeological aspects, is an environmental factor to be addressed in an Environmental Impact Assessment Report (EIAR). Cultural heritage comprises archaeology, architectural heritage, folklore and history (EPA 2022).

Archaeology is the study of past societies through surviving structures, artefacts and environmental data, and is concerned with known archaeological sites and monuments, areas of archaeological potential and underwater archaeology.

Architectural heritage comprises structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of architectural, historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents.

Architectural heritage and archaeology together form 'built heritage' or 'tangible heritage'. Folklore and history are aspects of 'intangible heritage', which also includes language, musical traditions, traditional crafts and skills, townland names, poetry and so on. These forms of cultural heritage are 'non-moveable, non-material and largely non-environmental although by their associations with certain sites and places, add to the character of an area' (EPA 2015).

For the purposes of the study, cultural heritage assets were categorised broadly as follows:

- Archaeological Heritage — World Heritage Properties; national monuments; archaeological sites and monuments listed on the Record of Monuments and Places (RMP), Register of Historic Monuments (RHM) and/or the Sites and Monuments Record (SMR); portable

[22] Available at: http://docstore.kerrycoco.ie/KCCWebsite/planning/devplan/voloneappendix.pdf [Accessed:26.05.2024].

heritage objects recorded in the National Museum of Ireland (NMI) Topographical Files and Finds Database; previously unrecorded (undesignated) potential archaeological sites identified through LiDAR and geophysical survey; areas where undesignated archaeological sites, material and deposits potentially occur.

- Architectural Heritage — designated Protected Structures and Architectural Conservation Areas (ACAs); buildings and historic gardens listed on the National Inventory of Architectural Heritage (NIAH) surveys; previously unrecorded (undesignated) structures of architectural heritage interest identified through desktop research, local consultations and field survey.
- Intangible Cultural Heritage — local folklore traditions documented in the Irish Folklore Commission (IFC) Schools' Collection; skills, crafts and traditions listed in the National Inventory of Intangible Cultural Heritage (NIICH); sites, areas or features of potential intangible cultural heritage value.

In this assessment, tangible cultural heritage assets (built heritage) are captured under the relevant sections on archaeology and built heritage, while intangible cultural heritage associations (i.e. historical and folklore associations) are referred to, where known, in the archaeological and historical background with further information presented in the appendices.

The assessment is based on identifying and describing the likely significant effects arising from the proposed development as described in Chapter 5 (Description of the Proposed Development) of the EIAR. The description of the proposed development is based on the design prepared to inform the planning stage of the project to allow for robust assessment as part of the EIA process.

Where it is required to make assumptions as the basis of the assessment presented in this chapter, these assumptions are based on advice from competent project designers and are clearly outlined within the chapter.

The methodology was designed to provide a full understanding of the potential effects on archaeological and cultural heritage assets and on the setting and amenity of heritage assets. In doing so, it allowed the character of the immediate and wider historic environment to be described and facilitated the identification of individual heritage assets and locations where there is the potential to reveal subsurface archaeological features.

15.3.2 Approach to Data Collection

A detailed evaluation of the cultural heritage resource took place, comprising of a desk study of published and unpublished documentary and cartographic sources, supported by field surveys. Reference numbers (e.g. abbreviated to CH001 etc.), were assigned to each identified cultural heritage receptor, as recommended in the TII Guidelines (e.g. TII 2024, Table A.3).

15.3.2.1 Desk Study

A desktop study was carried out to establish a baseline of cultural heritage receptors within the receiving environment and to understand their cultural heritage interest and importance.

The desk study availed of the following sources:

15.3.2.2 World Heritage Properties and Tentative World Heritage List

Two sites in the Republic of Ireland (Brú na Bóinne in County Meath and Sceilg Mhichíl, County Kerry) have been included on the World Heritage List in recognition of their outstanding universal value. In 2021, the following sites were included on a new Tentative List for Ireland:[23]

[23] Available at: https://www.whc.unesco.org/en/statesparties/ie [Accessed 01.03.2024].

- The Passage Tomb Landscape of County Sligo;
- The Transatlantic Cable Ensemble: Valentia-Heart's Content, County Kerry (a serial transnational nomination with Canada); and
- The Royal Sites of Ireland: Dún Ailinne, County Kildare; Hill of Uisneach, County Westmeath; Rock of Cashel, County Tipperary; Rathcroghan, County Roscommon; and Tara County Meath.

There are no UNESCO World Heritage Properties, or properties included on the Tentative List (an inventory of properties that each State intends to consider for nomination to the UNESCO World Heritage List), within the study area. The closest World Heritage Site, Scelig Mhichíl, lies c.120km to the south of the proposed development. From the Irish UNESCO World Heritage Tentative List sites, the Transatlantic Cable Ensemble site at Valentia Island is located c. 98km to the southwest of the proposed development. The Royal Sites of Ireland are included (since 2010) on the Tentative List for World Heritage Site status and were proposed again in 2021 as part of a serial nomination for same. The Rock of Cashel (County Tipperary) is the closest of the Royal Sites and is located c.105km to the east of the proposed development.

15.3.2.3 National Monuments Lists

The term 'national monument' as defined in Section 2 of the National Monuments Act 1930 means "*a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic, or archaeological interest attaching thereto..."* National Monuments in State care include those which are in the ownership or guardianship of the Minister for Housing, Local Government and Heritage. Section 5 of the National Monuments Act 1930 allows owners of other national monuments to appoint the Minister or the relevant local authority as guardian of such monuments, subject to their consent. This means in effect that while the property of such a monument remains vested in the owner, its maintenance and upkeep are the responsibility of the State.

The National Monuments Service (NMS) publishes lists of the national monuments in State Care for each county; the list for Kerry was published in 2009.[24] There are no national monuments in State Care within the study area, the closest is Lislaughtin Abbey, a Franciscan Friary (Nat. Mon. No. ; RMP L1036-067001-) and Great Hall (Nat. Mon. No. 258; RMP KE003-016-----), in Lislaughtin townland. This former Friary and associated assets are located c. 2.5km to the southwest of the proposed development.

Monuments that may be defined as national monuments are also in the ownership or guardianship of Local Authorities, which have similar responsibilities under the National Monuments Acts (1930–2014) to DEHLG. Following consultation with the NMS,[25] it was confirmed there are no national monuments in the ownership or guardianship of KCC in the study area for the proposed development.

15.3.2.4 Preservation Orders

Section 8(1) of the National Monuments Act 1930 provides for the Minister to place a Preservation Order on a monument which the Minister considers to be a national monument under threat. The current list of Preservation Orders detailing all monuments that have had a Preservation Order or a Temporary Preservation Order placed on them was published by the

[24] Available at: https://data.oireachtas.ie/ie/oireachtas/committee/dail/31/committee_of_public_accounts/submissions/2014/2014-03-06_pac-correspondence-meeting-of-06-03-2014-from-the-opw_en.pdf [Accessed: 26.05.2024].

[25] By email on 17 June 2024

NMS in June 2019.[26] There are no monuments subject to Preservation Orders within the study area.

15.3.2.5 Register of Historic Monuments

The RHM was established under Section 5 of the National Monuments (Amendment) Act 1987. It requires the responsible Minister to establish and maintain an RHM that includes 'historic monuments' known at the commencement of the Act, in addition to 'archaeological areas' entered in the Register subsequent to the Act. Historic sites and archaeological areas included on the RHM are subject to legal protection. The NMS maintains the Register of Historic Monuments on behalf of the Minister for Housing, Local Government and Heritage. No Registered Monuments are either located within the proposed development area or the wider Study Area.[27]

15.3.2.6 Record of Monuments and Places

The RMP is the statutory list of protected places and monuments established under Section 12(1) of the National Monuments (Amendment) Act 1994. The RMP for County Kerry was published in 1998, in paper form with accompanying location maps, which have been scanned and published online.[28] During the current assessment the scanned lists and accompanying location maps were used to check whether a monument or place is subject to legal protection under the National Monuments Acts through its inclusion on the RMP.

15.3.2.7 Sites and Monuments Record

The NMS of the DHLGH maintains a publicly accessible database known as the SMR, available through the Historic Environment Viewer (HEV).[29] This contains current information on known archaeological sites and monuments, including whether or not they are scheduled for inclusion in the next issue of the statutory RMP. The SMR sites dataset includes a 'Zone of Notification' (ZoN) for sites and monuments. The zones do not define the exact extent of the monuments, but rather are intended to identify them for the purposes of notification under Section 12(3) of the National Monuments Acts 1930 to 2004; each is referred to as a 'Zone of Notification'.

The SMR and ZoN datasets for County Kerry were downloaded during the current assessment and imported into the project Geographical Information System (GIS) database.

15.3.2.8 Record of Protected Structures

Under the Planning and Development Act 2000 (as amended), Local Authorities are required to maintain an RPS as part of their Development Plan.[30] These are structures recognised by the Local Authority as having special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The legal protections afforded to Protected Structures are set out in Part IV of the Planning and Development Act 2000, as amended.

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[26] Available at: https://www.archaeology.ie/sites/default/files/media/publications/po19v1-all-counties.pdf [Accessed: 26.05.2024].

[27] Confirmed by email with NMS on 17.06.2024

[28] Available at: https://www.archaeology.ie/sites/default/files/media/pdf/Archaeology-RMP-Kerry-Manual-(1998)-0018.pdf [Accessed: 06.05.2024].

[29] Available at: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8 [Accessed: 26.05.2024].

[30] Available for County Kerry at: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8. [Accessed: 26.05.2024].

The RPS provides positive recognition of a structure's importance and protection from adverse impacts. A Protected Structure, unless otherwise stated in the RPS, includes the interior of the structure, the land lying within its curtilage, any other structures and their interiors lying within that curtilage, plus all of the fixtures and features that form part of the interior or exterior of any of these structures. The National Monuments Acts 1930 to 2014 can also protect elements of the architectural heritage or offer dual/parallel protection.

The current RPS for County Kerry includes Ralappane House (RPS-KY-0888) in Ralappane townland as being of architectural and historical categories of special interest. In the wider vicinity, a lookout post (RPS-KY-0877; lying some 730m beyond the study area) of historical and social categories of special interest is also listed in the RPS.

15.3.2.9 Architectural Conservation Areas

The designated ACA aims to identify an area of special character and architectural interest, preserve that special character and promote an awareness of this significance. Buildings falling within the boundaries of an ACA can include Protected Structures and non-protected structures. There are no ACAs in proximity to the proposed development.

15.3.2.10 National Inventory of Architectural Heritage

The NIAH is a nationwide survey of post-1700 architectural heritage including buildings, structures and historic landscapes and gardens, carried out under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The NIAH comprises a Building Survey, and a Survey of Historic Gardens and Designed Landscapes.[31] These surveys are used to advise Local Authorities in relation to structures of interest within their functional areas. The purpose of the surveys is to highlight a representative sample of the architectural heritage of each county and to raise awareness of the wealth of architectural heritage in Ireland. Not all buildings and structures listed on the NIAH are legally protected through inclusion on the RPS. There are no structures or buildings listed on the NIAH within the study area.

15.3.2.11 Database of Irish Excavation Reports

The Database of Irish Excavation Reports (DIER), also commonly known as the 'Excavations Bulletin' (summary accounts of archaeological excavations in Ireland), is maintained by Wordwell publishers with the support of the DHLGH and is accessible online.[32] The Excavations Bulletin indicates that there are several previous archaeological investigations of interest in the wider vicinity of the proposed development, including important excavations which have identified Mesolithic sites, multiple Neolithic houses and extensive evidence for Bronze age and later activity (see Section 15.4.4 below for details, and Appendix 15.2). However, three previous archaeological investigations[33] within the study area for the proposed development identified significant archaeological remains. These include excavations undertaken by Headland Archaeology in 2008 in the townlands of Ralappane and Kilcolgan Lower;[34] excavations undertaken by Dermot Neilis in Kilpaddoge townland in advance of the development of the Kilpaddoge Energy plant;[35] and further monitoring and excavation undertaken by Aidan

[31] Available at: https://www.buildingsofireland.ie/buildings-search/. [Accessed: 26.05.2024].

[32] Available at: https://excavations.ie/ [Accessed: 26.05.2024].

[33] DIER Excavation Licence No. 13E0350; Excavation Licence No. 18E0723; Excavation Licence No. 08E0587

[34] See DIER 2008:631; Excavation Licence No. 08E0587. Available at: https://excavations.ie/report/2008/Kerry/0019645/ [Accessed: 08.01.2024].

[35] See DIER 2012:314; Excavation Licence No. 12E0347. Available at: https://excavations.ie/report/2012/Kerry/0023214/ [Accessed: 08.01.2024].

Harte/Munster Archaeology in Kilpaddoge townland.[36] Their locations are shown on Figure 15.6 (c-e) and on Figure 15.7(c). One further archaeological testing investigation undertaken during road-widening works on a 500m stretch of the L-1010 in 2020 did not identify any archaeological features, finds or deposits (Figure 15.6c).[37] However, the resulting report has usefully highlighted information of further investigations in the immediate vicinity for which no excavation reports have been lodged with the NMS Archives Unit, or summary detail uploaded to the Excavations Bulletin.[38]

TII also makes available reports commissioned as a result of its projects via the TII Digital Heritage Collections.[39] There are no previous reports relating to the study area housed in this Digital Heritage Collection.

15.3.2.12 Historical Maps and Satellite Imagery

Undesignated potential cultural heritage receptors were identified through analysis of aerial photography, satellite imagery, and historical mapping, which were verified during the Walkover Survey. The cartographic sources included the Down Survey maps of The County of Kerry[40] and The Barony of Iraghticonnor in the County of Kerry (1656–58); The County of Kerry by William Petty (1685),[41] and The Counties of Cork & Kerry by Hermann Moll (1728).[42] The first-edition six-inch Ordnance Survey (OS) map for County Kerry (published in 1836), and the first-edition 25-inch OS map (1892-98), were reviewed online through the Tailte Éireann (TE) Irish Townland and Historical Viewer[43] and Geohive Map Viewer,[44] as well as the NMS Historic Environment Viewer (HEV)[45] and the Heritage Maps viewer of the Heritage Council.[46]

Satellite and aerial imagery were also reviewed throughout the assessment, including Google Earth via Google Earth Pro; Digital Globe and orthophotographs via OSI's MapViewer; Bing Satellite and Google Satellite via QGIS (version 3.22) XYZ Tiles.

15.3.2.13 The Archive of the National Museum of Ireland

The Archive of the NMI is designated as a place of deposit under the National Archives Act 1986 and is responsible for preserving and providing access to its historical papers, collections records and relevant collections of private archives acquired by the Museum. The Archive Collection includes the Topographical Files and Finds Database in the Antiquities Division. The Topographical Files relate primarily to the discovery and acquisition of archaeological objects by the NMI; however, they also include references to archaeological monuments and excavations. The discovery of an archaeological object is often an indicator of the presence and nature of

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[36] See DIER 2016:531; Excavation Licence no. 13E0350. Available at: https://excavations.ie/report/2014/Kerry/0024736/ [Accessed: 08.01.2024].

[37] DIER 2020:174 – Coolnanoonagh & Farranawana, Kerry. Excavation Licence No. 20E0671. Available at: https://excavations.ie/report/2020/Kerry/0030022/ [Accessed: 26.05.2024].

[38] These include Excavation Licence Nos.: 13E0465, 14E0039, 14E0233, 14E0234, 14E0240 and 14E0241.

[39] Available at: https://dri.ie/ [Accessed: 26.05.2024]

[40] Available at: https://downsurvey.tchpc.tcd.ie/down-survey-maps.php [Accessed 08.01.2024].

[41] Available at: https://www.lbrowncollection.com/ireland-barony-maps-county-kerry/ [Accessed: 08.01.2024].

[42] Available at: https://www.lbrowncollection.com/ireland-counties-herman-moll-1728-a-10/ [Accessed: 08.01.2024].

[43] Available at: https://www.tailte.ie/en/surveying/products/professional-mapping/historical-maps-and-data/ [Accessed: 08.01.2024].

[44] Available at: https://webapps.geohive.ie/mapviewer/index.html [Accessed:08.01.2024].

[45] Available at: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=0c9eb9575b544081b0d296436d8f60f8 [Accessed: 08.01.2024].

[46] Available at: https://www.heritagemaps.ie/WebApps/HeritageMaps/index.html [Accessed:08.01.2024].

archaeological material in an area. Thus, these archives were accessed by appointment on the 25 April 2024. All of the townlands in the study area were checked; however, the relevant detail on archaeological objects recorded from the townlands in the study area are presented below (see also Appendix 15.3).

15.3.2.14 National Soil Database

The National Soil Database is a national database of soil geochemistry and accompanying mapping resource; the study generated a National Soil Archive. The data presented in the database are underpinned by underlying geology and parent material, and factors such as soil type, land use, anthropogenic effects and climatic effects are also incorporated.[47]

The database, in addition to the EPA Rivers and Streams datasets, were searched for local riverine, peatland and wetland environments. These are considered to be of high archaeological potential as they may contain features such as *fulachtaí fiadh*, ancient bridging sites, fords, mills, trackways and hurdles, as well as producing archaeological objects such as log boats, organic and palaeoenvironmental remains, in addition to prehistoric votive offerings such as axeheads and metalwork. Two Areas of Archaeological Potential (AAP) have been identified in the Study Area. The presence or absence of archaeology in these areas can generally only be established through invasive investigation (e.g. test excavation and palaeoenvironmental assessment), with other forms of investigation (e.g. geophysical surveys, metal detector surveys and underwater surveys) undertaken as appropriate.

15.3.2.15 Irish Folklore Commission Schools' Collection

The IFC Schools' Collection, which is a rich source of local information, is accessible online as part of the Dúchas Project,[48] a collaboration between University College Dublin, Dublin City University and the (then) Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media to digitise the National Folklore Collection. The Schools' Collection was searched for entries pertaining to the folklore, traditions, oral histories and intangible cultural heritage of the Study Area (Appendix 15.4).

15.3.2.16 Placenames Database of Ireland

As noted in Section 16.2.3, placenames can provide clues to a townland's historical associations (e.g. Ralappane = *Ráth Lappáin* – Lapan's Fort; Carhoonakilla = *Ceathrú na Cille* – Quarterland of the Church; Kilpaddoge = *Coill Pháideog* – Paideog's Church. A search of the Placenames Database of Ireland[49] was undertaken for the townlands that occur within the proposed development, these are listed in Table 15.1.

Given the long history of habitation within the county, it is not surprising that many of the townlands within the study area contain placename components relating to settlement. The placenames also reveal information on land holding patterns in the study area. For example the barony name, Iraghticonnor, *Oireacht Uí Chonchúir*, means the district or tribe of O'Connor and refers to an early population group who were the dominant family in the area with the Civil Parish name, Kilnaughtin, meaning "Naughtin's Church". The townland names then have similar detail, three of which refer to land holdings or subdivisions of land, Carhoona, Carhoonakilla, and Carhoonakineely. The first element of these is a derivation of the word "quarter" which was an ancient land measurement. Farranawana also refers to a land holding with Coolnanoonagh referring to a physical topographical feature, a hill. Kilcolgan Lower then refers to another church, and the first element of Ralappanne referencing a ringfort or rath (Ra = ráth).

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[47] Available at: https://data.gov.ie/dataset/national-soils-database [Accessed: 26.01.2024].

[48] Available at: https://www.duchas.ie/en [Accessed 23.01.2024].

[49] Available at: https://www.logainm.ie/en/ [Accessed 23.01.2024]

15.3.2.17 Field Surveys

The following field surveys were undertaken in support of this assessment, details of which are provided below:

- Walkover Surveys

Walkover Surveys

Walkover surveys of the area within the PAB were carried out over a period of two days (15th and 19th March 2024) to supplement the desktop research. The walkover surveys assisted in:

- Confirming the nature, location, condition and extent of cultural heritage receptors that have the potential to be impacted by the proposed development;
- Noting additional unidentified archaeological sites and monuments and architectural heritage assets as defined under the National Monuments Acts 1930 to 2014 and Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999;
- Evaluating the magnitude of impact and significance of effect of the proposed development; and
- Providing a photographic record and field notes of individual undesignated features of potential archaeological and architectural heritage interest.

Potential cultural heritage receptors that were identified during the walkover surveys have been factored into this assessment. However, the importance of the potential archaeology sites identified during survey can only be conclusively established through further geophysical survey and invasive investigation (i.e. test excavation).

15.3.2.18 Geophysical Survey

No bespoke geophysical survey for the proposed development was procured in advance of the preparation of this EIAR Chapter. However, the geophysical survey for the Shannon Gas Pipeline Scheme was undertaken in Spring of 2023 by AMS (Roche and Drummond 2023) and a portion of that survey intersects with the subject proposed development. The intersect area occurs within the study area in the townlands of Carhoonakineely to the north of the local road L-1010, and in the townlands of Carhoonahilla and Cockhill to the south of the L-1010.

The geophysical survey of suitable lands along that Scheme consisted of high-resolution magnetic gradiometry, electromagnetic induction and electrical resistivity imaging surveys, and was used to identify features of archaeological and potential archaeological interest.

The significant geophysical anomalies identified through the surveys have been factored into this assessment. However, the presence or absence of archaeology in these areas can only be conclusively established through invasive investigation (i.e. test excavation).

Details of this geophysical survey are incorporated into the Cultural Heritage Dataset for the assessments.

It is agreed, following consultation with NMS (see Consultation section below), that a targeted geophysical survey as advance works will be carried out in Kilpaddoge townland and other areas of the proposed development which are not subject to existing Consents (L-1010 road widening project) and previous archaeological testing (STEP Power Plant development area) in Ralappane and Kilcolgan Lower townlands.

15.3.2.19 Mapping

The locations of all cultural heritage assets identified in the course of this assessment have been mapped and are shown on Figure 15.2 and Figure 15.3 (a-c) of this report. The coordinates for each asset are provided in Irish Transverse Mercator (ITM) in the Cultural Heritage Inventory (Appendix 15.1).

15.3.2.20 LiDAR Data

The Open Topographic Data Viewer (OTDV)[50] was accessed to see if pre-existing data is available for the scheme area. One dataset, the OPW LiDAR DSM Hillshade NASC 2m Ireland (ROI) ITM MH TIFF dataset, covers a portion of the proposed development in Kilpaddoge townland. Although the data capture intervals are at 2m (generally resulting in poor resolution for interpretation of archaeological data) two potential new sites (comprising possible ringfort or enclosures) were identified through analysis of this data.

15.3.3 Appraisal Method for the Assessment of Effects

Cultural heritage assets are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites.

The potential impact of the proposed development on cultural heritage was carried out with reference to the EPA Guidelines (EPA 2022) and TII Guidelines (TII 2024), as well as using metrics specific to archaeological and built heritage, as detailed in *Framework and Principles for the Protection of the Archaeological Heritage* (DAHGI 1999), *Archaeology in the Planning Process* (DHLGH & OPR, 2021), *Architectural Heritage Protection: Guidelines for Planning Authorities* (DAHG 2011) and the *National Inventory of Architectural Heritage Handbook* (DHLGH 2023).

The importance rating for each cultural heritage receptor was based on evidence from the baseline studies, fieldwork, specialist surveys and consultation, using professional judgement and with reference to the factors set out in Table 15.1 (TII 2024, Table 5.6). Additional guiding factors that were considered included the status, i.e. designation and level of statutory protection of the cultural heritage receptor, the condition/preservation, special interest, group value, rarity, visibility in the landscape, fragility/vulnerability, amenity value and local significance (*ibid*., 66; DAHG 2011, 24–30).

Table 15.1: Criteria for assessing the importance of cultural heritage receptors

Importance	Criteria
Very High	Designated built heritage receptors rated as being of international importance, including associated historic gardens and designed landscapes;
High	Architectural Conservation Areas; Built heritage receptors rated as being of national importance by the NIAH, including associated buildings and designed landscapes; Historic landscapes (designated or undesignated) of outstanding interest and of demonstrable national value. These will be well-preserved historic landscapes exhibiting considerable coherence, time-depth, or other critical factors; Other designated or undesignated cultural heritage receptors of demonstrable national importance; Places or features of national intangible heritage value; Protected Structures; Recorded Monuments (or sites and monuments scheduled for inclusion on the RMP) of high quality and importance; Sites and monuments subject to a Preservation Order or Temporary Preservation Order;

[50] Available at: https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5 [Accessed 28.06.2024].

Importance	Criteria
	Undesignated receptors of high quality and importance; and, World Heritage Tentative List Properties;
Medium	Built heritage receptors rated as being of regional importance by the NIAH, including associated historic gardens and designed landscapes; Historic landscapes of regional value (designated or undesignated); Historic townscapes or built-up areas with demonstrable historic integrity in their buildings or built settings (e.g. including street furniture and other structures); Other designated or undesignated receptors of regional cultural heritage importance; Places or features of regional intangible heritage value; and, Recorded monuments (or sites and monuments scheduled for inclusion on the RMP).
Low	Built heritage receptors rated as being of local importance by the NIAH, including associated historic gardens and designed landscapes; Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations; Historic townscapes or built-up areas of limited historical integrity in their buildings, or built settings (e.g. including street furniture and other structures); Other designated or undesignated cultural heritage receptors of local importance; Places or features of local intangible heritage value; Receptors compromised by poor preservation of contextual associations with inherent, albeit limited, cultural heritage value; and, Undesignated historic buildings of modest quality in their fabric or historical associations.
Negligible	Receptors/landscapes with very little surviving cultural heritage interest.

Potential effects from the proposed development on the receiving cultural heritage environment were categorised as direct, indirect, positive and/or negative adverse in accordance with the TII Guidelines (2024, 66-67).

- Direct Effect — an effect that is directly attributable to the proposed development;
- Indirect Effect — an effect that results indirectly from the proposed development because of the direct effects, which may be away from the proposed development;
- Positive Effect – a change that enhances or improves the quality of the cultural heritage receptor. Includes increased physical separation resulting in traffic relief, reduced visual and noise intrusion, and enhancement of setting or amenity; and

Negative/Adverse Effect – a change that reduced the quality of the cultural heritage receptor. Includes total or partial loss of a site, monument, structure or its attendant grounds, visual intrusion, severance, degradation of setting and/or amenity. The predicted magnitude (level) of impact was rated as Very High, High, Medium, Low or Very Low/Negligible (TII 2024, Table 5.7), as detailed in Table 15.2. The predicted magnitude of impact was evaluated by considering the type and quality of impact/effect, extent and context, probability, duration and frequency of impact/effect (EPA 2022, 50–52).

Table 15.2: Criteria for assessment of magnitude of impacts on cultural heritage

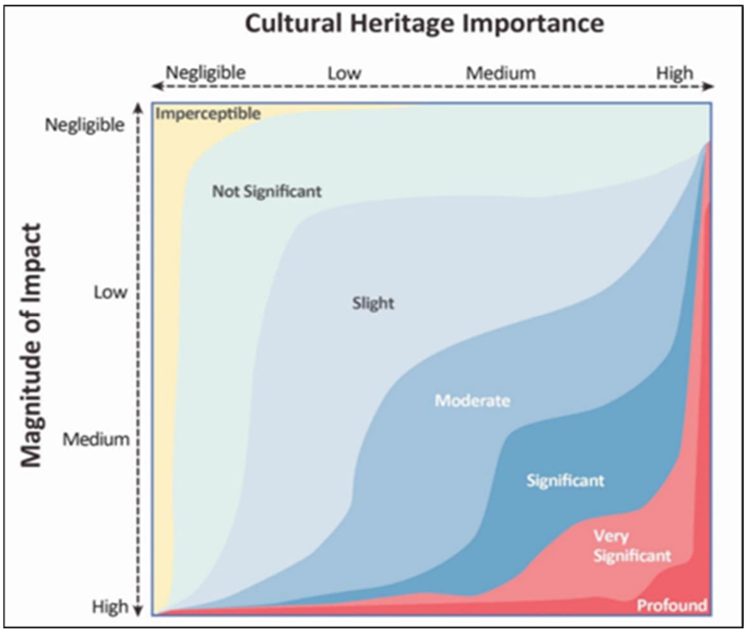
Magnitude of Impact	Descriptors of Impact/Effect
Very High	Major alteration to, or complete loss of a cultural heritage receptor. Effects likely to be experienced at a very large scale; considered permanent and irreversible.
High	Notable or long-term change to a cultural heritage receptor.
Medium	Moderate or long-term change over a restricted area, or a moderate change to a cultural heritage receptor.
Low	Minor, short- or medium-term change over a restricted area, or a minor change to a cultural heritage receptor.
Negligible	Imperceptible change to a cultural heritage receptor.

The predicted significance of effect was evaluated by comparing the predicted magnitude of impact/effect with the suggested importance of the archaeological and/or cultural heritage receptor using the schedule and definitions of significance adapted from the EPA (2022, Table 3.4) and the TII Guidelines (2024, 69-70); see also Image 15.1). Significance of Effect for cultural heritage receptors are classified and summarised in Table 15.3.

Table 15.3: Significance of effect on cultural heritage

Significance of Effect	Descriptors of Effect
Profound	An effect which obliterates a cultural heritage receptor of high or very high importance.
Very Significant	An effect which, by its character, magnitude, duration or intensity, significantly alters most of an important aspect of the cultural heritage receptor.
Significant	An effect which, by its character, magnitude, duration or intensity alters an important aspect of the cultural heritage receptor.
Moderate	An effect that the character of the cultural heritage receptor in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the cultural heritage receptor without affecting its importance.
Not Significant	An effect which causes noticeable changes in the character of the cultural heritage environment but without significant consequences.
Imperceptible	An effect capable of measurement but without significant consequences.

Figure 15.1: Chart showing typical classifications of the significance of effects for cultural heritage receptors (after EPA 2022, Figure 3.4).



15.3.4 Approach to Impact Assessment

15.3.5 Study Area

In order to inform the assessment of potential effects on archaeological and cultural heritage during the construction and operational phase of the proposed development, a study area including and extending 100m from the Planning Application Boundary (PAB) was applied. The PAB includes the full extent of the footprint of the proposed development as well as the area within its proximity that will be required to facilitate its construction. An area extending 100m from the PAB is considered a suitable distance to enable the description of baseline conditions and allow the assessment of effects to cultural heritage receptors. This was considered in relation to the various other schemes and archaeological investigations which have occurred in the vicinity of the proposed development since 2008. The study area corresponds to the guidance outlined in the TII Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects (TII 2024, Figure 5.5). Where setting/visual effects are anticipated for cultural heritage the Study Area was extended to include receptors up to a distance of 1km from the proposed development.

Where potential archaeological sites have been identified through analysis of aerial imagery, LiDAR or geophysical surveys, the Magnitude of Impact cannot be accurately ascertained. The archaeological validity of these receptors can only be qualified through further archaeological works such as archaeological testing. Using professional judgement, the Significance of Effect are assessed based on the potential importance of the asset (generally Low since assets are unverified) against the potential Magnitude of Impact to arrive at an Imperceptible to Significant assessment. Pending results of advance works (geophysical survey and archaeological testing) the Significance of Effect for each may change.

15.3.5.1 Distance Measurements

Distance measurements presented in this Chapter are taken from the edge of the PAB since it is within this area that impacts during construction will occur.

The study area for this assessment is presented in Figure 15.1 of this Chapter.

15.3.5.2 Setting Assessment

TII has published an Overarching Technical Document (PE-ENV-01101) which provides guidance on methodology, scope and processes for LVIA; a Standards Document (PE-ENV-01102) sets out the methodology for LVIA and for use of LCA in establishing the baseline.

The identification of Sensitive Visual Receptors is as set out in the TII LVIA Guidelines (Section 13) and Standard (Section 3.4.2.3). A broad assessment of the likely effects including the significance of effect based on the magnitude of the impact against the sensitivity of the receptor is made. The extent of the study area is 100m either side of the PAB (allowing an assessment of any significant impacts on the receiving environment arising from the construction of the proposed development). However, as per PE-ENV-01102 (2020; 52) professional judgement is used to decide where the study area should be extended to take into consideration other features beyond the study area where necessary. In this case, the assessment establishes potential visibility of the proposed development in relation to Ralappane House (CH72) which is included on the RPS, is as it is considered to be a sensitive receptor. Fort Shannon at Ardmore point is excluded from the assessment as it is not visible from the proposed development study area (730m to the east of the PAB).

15.3.6 Consultation

Mott MacDonald submitted the EIA Scoping Consultation letter, which was reviewed by statutory consultees, including the National Monuments Service (NMS) in early 2024. NMS returned a comprehensive response on 13th June 2024 (Ref.: Pre00173/2024) and which, in summary, advised that:

- A Cultural Heritage Impact Assessment (CHIA) was to be prepared as part of the overall development;
- That the proposed development site is located within a wider area of known archaeological settlement and activity, all subject to statutory protection;
- That the proposed development is in close proximity to Recorded Monuments;

- That, as part of the CHIA, the NMS advised targeted geophysical survey or prospection and archaeological test excavation and monitoring of all GI works associated with the project;
- That the results of advance works should inform the EIA Chapter for Cultural Heritage;
- That previous archaeological investigations and surveys have shown the proposed development site to be a significant archaeological landscape;
- That the proposed development is in the environs of underwater cultural heritage;
- That there should always be a presumption in favour of avoiding developmental impacts on archaeological heritage in the project design;
- That a project archaeologist should be part of the underwater cultural heritage aspects of the design;
- That the CHIA should incorporate all complimentary archaeological surveys and assessments;
- That an Underwater Archaeological Impact Assessment should be undertaken as advance works;
- That comprehensive buildings archaeology assessments of extant assets be undertaken as advance works;
- That screening of all advance works (including GI) be agreed in advance with NMS and that archaeological monitoring is advised; and
- That archaeological testing be carried out under Section 26 archaeological licence and that a Section 3 Dive/Survey licence be in place.

AMS subsequently undertook further consultation (phone call on 21st June 2024) with the NMS archaeologist responsible for SID project assessment to agree the scope of advance works, specifically geophysical surveys to support the EIAR and a commitment to undertake early advance works archaeological testing post-consent. Furthermore, it was verbally agreed that the NMS advised Underwater Archaeological Impact Assessment works were more appropriate to the scope of works for the proposed STEP Power Plant project. It was agreed to scope the survey and discuss the proposal further with NMS. However, in undertaking the geophysical survey scoping it became evident that because of landowner access issues and with timing issues (silage cutting) it was not feasible or practicable to undertake the proposed survey in time to support the submission of The EIAR, This determination was conveyed again to NMS (phone call on 3rd July 2024) and it was verbally agreed to postpone the geophysical survey and other advance works to post-consent stage.

Written (email) consultation with the Kerry County Council Archaeologist in relation to the 'missing' excavation reports in Kilpaddoge townland was undertaken on 14th June 2024, and to enquire about a potential site (CH82; Figure 15.7b) which overlapped with previous archaeological testing undertaken by Kerry County Council in 2020 (Connelly 2020). The County Archaeologist confirmed he did not have copies of the relevant reports but had visited the excavations in progress. He confirmed also that no evidence for CH82 was identified during his testing works on the L-1010 road in 2020.

The author contacted (by email) the licenced archaeologist responsible for the six 'missing' excavation reports by email on 14th June 2024 and again on 3rd July 2024. Summary detail was provided to the author by email on 4th July 2024, and the relevant detail is incorporated into this EIAR Chapter.

15.3.6.1 Limitations of this EIAR

The following general limitations apply to the archaeological and cultural heritage assessment presented in this chapter:

- The assessment is based on the information available at the time of writing (as of July 2024). There is potential for additional information to become available at a later date that may alter the assessment presented here;
- Early cartographers were often subjective or selective regarding the nature and detail they recorded in the landscape. Similarly, it is possible that in the interval between survey for map editions some short-lived structures or land-use practices may not have been mapped. Georeferencing of historic mapping on GIS is problematic, and pin-pointing the location of specific assets in this study is therefore often indicative of a general rather than actual location where assets are no longer extant.
- The absence of LiDAR covering the entire area of the proposed development. LiDAR DTM Hillshade OPW NASC 2m Ireland (ROP) ITM TIFF data is available for the areas to the east (Kilpaddoge) and the west of the proposed development.[51] Even at 2m interval data capture the potential to identify possible archaeology has been demonstrated (see 15.3.2.20 above);
- Assessments are primarily desk-based with results of walkover surveys; and
- The findings conveyed in the assessment are based on information obtained from a variety of sources including regulatory data, baseline studies and field surveys, as detailed in the chapter and which are understood to be reliable. Nevertheless, the authenticity and reliability of the information cannot be guaranteed.

15.4 Receiving Environment

15.4.1 Context

Parish, baronial and county boundaries are typically of the greatest antiquity owing to their frequent use of topographical features followed by older Gaelic boundaries. Civil parishes largely date to the twelfth century, being coterminous with existing Gaelic political and territorial units (Nugent 2007, 119; Ní Ghabhláin 1996). Similarly, baronies, although being institutions introduced by colonial administrations from the high medieval to the early modern period, have their origins in older Gaelic territorial units (Nugent 2007, 63; Ó Muraíle 1984).

Townlands constitute the smallest territorial unit in Ireland with approximately 62,000 being delineated on the first-edition OS maps (Duffy 2004, 24). While first surveyed in their modern incarnation in the mid-nineteenth century, townlands have a long pedigree stretching back to the pre-Norman period (McErlean 1983). As territorial units, they ultimately derive from the Gaelic system of landholding, serving to allocate land and usage rights and to impose taxation. The existing framework of townlands was utilised during both high medieval and early modern colonial periods, serving as an expedient framework for controlling confiscated land. Many Irish townlands were mapped for the first time in the Down Survey undertaken by William Petty in the 1650s in preparation for the Cromwellian land settlement.

15.4.2 Character

The northeast Kerry foreshore along the River Shannon exhibits a low density of designated archaeological constraints. However, it should be noted that the number of Recorded Monuments does not constitute the sum total of archaeological remains in this area. It is likely that concealed archaeological deposits occur throughout the area, the nature and extent of which can only be determined through synthesis of previous investigations, and future investigation. The previous archaeological works, including geophysical surveys and archaeological testing and excavation, have shown the potential for previously unrecorded and

[51] Available at: https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5 [Accessed 28.06.2024].

undocumented cultural heritage sites to occur within the study area, and the results of that analysis are incorporated throughout this Chapter.

15.4.3 Archaeological and Historical Background

15.4.3.1 Prehistoric Period (8000 BC-AD 400)

The Irish Mesolithic is subdivided into two phases on the basis of stone tool technologies and cultural traditions – the Early Mesolithic (8000–7000/6500 BC) and Late Mesolithic (7000/6500–4000 BC) (Chapple *et al*. 2022; Woodman 2011; Bayliss & Woodman 2009). Evidence for the Irish Mesolithic tends to be concentrated around or in close proximity to coastal areas, along river and lake shores, and elevated river valley positions. Mesolithic society was characterised by small kin groups of nomadic hunter-fisher-gatherers that exploited seasonally available food resources such as fruit, nuts, berries, fish and wild fowl. The archaeological record of this period presents as the remains of temporary settlements, fishing technology, chipped stone implements and production waste (debitage). At Hermitage, County Limerick, *c*.59km to the northeast of the proposed development, evidence for some of the earliest known burials (7530–7320 cal. BC) in Ireland were discovered adjacent to the River Shannon (Collins & Coyne 2003, 25; Collins 2009). It is possible that similarly dated burials could exist in morphologically similar locations adjacent to rivers and water sources throughout the county.

In an all-island context, evidence for Late Mesolithic activity was recorded from Ferriter's Cove, County Kerry. The site, which was located on the Dingle Peninsula, produced evidence for small middens that were seasonally visited over a thousand years, with the main period of activity dating to 4500 cal. BC (Woodman *et al*. 1999, 114). Possible roasting pits were uncovered, as well as burnt stone platforms and assemblages of faunal remains and typologically diagnostic butt-trimmed flakes and stone axes (*ibid*.). While Ferriter's Cove contained no formal burials, several pieces of disarticulated human bone and teeth were found, one dating to 4225–3950 cal. BC, and the other to 4250–3980 cal. BC (Schulting 1999). Some of the earliest domesticated cattle bone from Ireland was also recovered from the midden deposits, which was dated to approximately 4300 cal. BC (*ibid*.) and suggests Ferriter's Cove may represent a key site for our understanding of the Neolithic transition in an Irish context.

In a local context, Connolly (2020, 8) has suggested that significant evidence for prehistoric activity survives within the general proposed development area; material excavated under excavation licence 13E0465 represents probable late Mesolithic settlement or occupation evidence on the Shannon estuary shoreline in Kilpaddoge townland.[52] A butt-trimmed flake, of late Mesolithic (Bann-flake type) type, was found at Site 3 and was confirmed as such by PC Woodman (Harte 2024, 2).

The Neolithic period (4000–2500 BC) witnessed the introduction of agriculture to Ireland and the change from a highly mobile hunter-gatherer lifestyle to one of a more sedentary nature based on livestock husbandry and cereal cultivation. This brought corresponding changes in settlement form, food production, burial practices and material culture (e.g. Cooney 2000). The time between 3750 and 3600 BC saw a period of rapid expansion across the country, which included the construction of timber-built rectangular houses and monumental hilltop enclosures, as well as monumental court tombs and portal tombs (e.g. Lynch 2014; Schulting *et al*. 2012; Whittle *et al*. 2011). Evidence for these changes have been excavated at the important Neolithic site of Lough Gur, County Limerick which lies *c*.60km to the east of the study area. Both rectangular and circular post-built houses were excavated at Lough Gur, as well as possible animal pens and a megalithic tomb (Waddell 2000, 32–35). Burials from cave sites, such as

[52] No summary excavations detail is uploaded to the www.excavations.ie website, and no report for this excavation has been submitted to the NMS; there is no report available for this excavation licence in the NMS Virtual Reading Room [Accessed 24.04.2024].

Killuragh Cave, County Limerick, *c*.68km to the northeast, are also known from this time (Woodman *et al*. 2018).

In the immediate vicinity of the proposed development, Connolly (2020, 8) has suggested that up to six Neolithic houses were excavated[53] near the foreshore of the Shannon in Kilpaddoge townland, highlighting the potential for similar significant archaeology to survive as yet undetected in this area. Both NMI Topographic Files and the Irish Stone Axe Project (ISAP) record a Neolithic stone axe found In Tarmonhill townland c.3.5km to the southeast of the L-1010 in Kilpaddoge.[54] Hourihan (2016, 4) suggests that local tradition holds that a stone axe was found in the townland of Coolnanoonagh. Lane (2007) notes the presence of three submerged forests dating to the Neolithic period on the northern Shannon estuary shoreline.

The Copper Age falls within the end of the Neolithic and beginning of the Bronze Age, and in Kilpaddoge townland radiocarbon dates (2457-2203 cal BC and 2434-2142 cal BC)[55] from two fulacht fia troughs produced clear evidence for prolonged activity in the area during this time.

The Bronze Age (2500-800 BC) is typically associated with the introduction and development of metal technology, the production of a diverse range of copper, bronze and gold objects, as well as the emergence of a distinct warrior elite class defined by high-status weaponry towards the end of the period (Waddell 2000). The material culture included not only weapons and tools, but also high-status items of personal adornment. This technological innovation went hand-in-hand with an intensification of agriculture that was largely facilitated by the availability of more efficient tools. A copper mine at Ross Island, County Kerry, is thought to have been the source of most of the copper used in Ireland during this time. Excavations at the site uncovered smelting operations and a smelting camp where copper ore was processed (O'Brien 2004).

Historic finds of artefacts greatly add to our archaeological understanding of this period; for example, a bronze spearhead (NMI Reg. P.1951:1) was recovered to the north of the study area in the townland of Ballynamuddagh during land reclamation works.

Fulachtaí fia (burnt mounds) are amongst the most common site types in Ireland (e.g. Hawkes 2015). The sites are characterised by a low horseshoe- or kidney-shaped mound of heat-shattered stone discarded from the process of heating water in a subsoil-cut trough. Generally found in low-lying ground where the water table is close to the surface, the often wood-lined troughs filled naturally with water. The functions of fulachtaí fia were many and varied, from cooking to bathing places to brewing sites and sweat houses. Excavations in Kilpaddoge townland have produced a radiocarbon date (1401-1230 cal BC) from the trough of a fulacht fia which places it in the Middle Bronze Age.[56] Given the multiple examples identified both within and in the vicinity of the proposed development study area, it is apparent that this landscape was intensively used during this period and that there is high potential for more *fulachtaí fia* burnt mounds to be encountered.

15.4.3.2 Early Medieval Period (AD 400-1100)

The early medieval period saw significant social, cultural, political and technological changes in Ireland. The beginning of the period saw the arrival of Christianity, the gradual conversion of the population, the flourishing of Irish monasteries, the development of church sites and the spread of literacy. The period, which spanned 700 years, was also a time of economic and

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[53] Excavation Licence number 14E0039. No summary excavations detail is uploaded to the www.excavations.ie website, and no report for this excavation has been submitted to the NMS; there is no report available for this excavation licence in the NMS Virtual Reading Room [Accessed 24.04.2024].

[54] NMI Reg. no. 1947:171; ISAP Ref. 03765. Available at: https://repository.dri.ie/catalog/pg15r853x [Accessed: 02.06.2024].

[55] Hourihan 2016b, 12. Excavation Licence No. 16E0362.

[56] *Ibid.*

environmental change (Byrne et al. 2008, 5). Surviving law tracts provide valuable insights into the nature of Irish society at the time, which suggest Ireland was roughly divided into overkingdoms, regional kingdoms and local kingdoms (*tuatha*) that largely operated as pastoral communities bounded by ties of kinship (Edwards 1996, 8).

Early medieval archaeological monuments are numerous in Kerry. For example, approximately one third of all the Ogham Stones in Ireland can be found in Kerry (Bennett, 1987, pp 48–51) with the site of one Ogham Stone recorded in Carhoona (KE003-070---; CH112). Ogham stones are standing stones marked with a writing system referred to as Ogham. Ogham is a series of lines with up to five marks representing individual letters, either above, below, or across a central line which can be the corner of the stone. These writings are generally commemorative and are in a form of early Irish (Ó Ríordáin, 1974 pp 82–83). The example from Carhoona is no longer in its original location, being now in the Pitt-Rivers Museum (see Appendix 15.1).

Ringforts/raths and related monuments, such as cashels and raised/platform raths, all comprise forms of early medieval enclosed settlement (e.g. Stout 1997). Excavation and topographical studies have demonstrated that a wide variety of morphologies and dates occur within the ringfort classification (O'Sullivan *et al.* 2013, 51–72). They can be univallate, bivallate, or trivallate, can vary greatly in size, can occur singly or in dense concentrations and may or may not contain settlement evidence. Stout (2015, 73) suggested that of the approximately 60,000 recorded Irish ringforts, most were occupied between the early seventh and ninth centuries AD. Although the vast majority appear to have been built during the second half of the first millennium AD, in areas of Gaelic-Irish rule they were sometimes inhabited into the medieval period (e.g. O'Conor 1998). This is particularly true west of the Shannon, where there are examples of continued occupation in cashels as late as the seventeenth century (Fitzpatrick, 2009). There are 2,022 ringfort-raths in Kerry recorded on the HEV further showing the extent of early medieval archaeology within the county.

Three ringfort sites occur within the study area (CH105, CH106 and CH109), all in Kilpaddoge townland. Souterrains, field systems, trackways and other outlying subsurface archaeological remains are often associated with ringforts. Souterrains are sub-surface stone features built for storage and/or defence. Two of the above ringforts are associated with souterrains (CH107 and CH109), and local tradition holds that these 'tunnels' are linked (Appendix 15.4, Extract no. 04).

There are two placenames in the study area that likely refer to early medieval churches, Kilnaughtin and Kilcolgan Lower. The archaeological record then shows the ruins of Kilnaughtin Church in Carhoona (KE003-008---; CH110) indicating the spread and development of Christianity in the study area. Local folklore for this area recounts stories relating to Lislaughtin, Kilnaughtin, Glencloosagh (provided in Appendix 15.4).

In the wider vicinity it is recognised that there is potential for fortified Viking coastal settlement may have occurred at Ballylongford (Beal Átha Longphuirt – possibly meaning the ford of the mouth of the longport/fortress according to Joyce, 1913).

15.4.3.3 Medieval Period (AD 1100-1540)

The influx of the Anglo-Norman manorial system of territorial organisation resulted in considerable change to the settlement pattern of west Limerick and Kerry in the thirteenth century. A landscape previously characterised by displaced rural settlement now witnessed the founding of urban centres, with a borough established at Tarbert. These boroughs became the focus of economic, political and ecclesiastical activity in the region and served to consolidate and centralise the power of the Anglo-Norman magnates.

Archaeological evidence for the medieval period is partly characterised by castles or castle sites, among others. The beginning of this period in Ireland is marked by the arrival and settlement by the Anglo-Normans and subsequent interaction with the native Gaelic population.

New settlement forms (including many of our surviving towns), systems of landscape divisions based on the manorial systems, and changes in economic/agricultural practices are typically associated with this period. The Anglo-Normans also had an influence in Kerry with six recorded cantreds, two boroughs, Ardfert and Ratoo, and two towns, Dingle and Tralee (Cotter, 2004, pp 39–85). A characteristic monument from this period associated with the Normans is the motte and bailey and there is only one recorded in the county (KE048-190----) south of Farranfore. The closest located castle sites to the study area occur at Castlequarter (KE002-001001-) and Faha (KE001-035----) both to the west, with both beyond the study area.

15.4.3.4 Post Medieval Period (AD 1540–1700)

The Civil Survey of 1654–56 does not survive for the barony of Iraghticonnor, but the corresponding Down Survey map does. There is an accompanying terrier to this map which has the following description of the barony:

> *The Barony of Fraght I Connor in the County of Kerry The soyle in generall is cold Boggy and Wiidy is the arable land yeing in little places invironed wth Bog and wood, corne it will yield by standing and other Manure but the Knight of Kerryes Land all along by the Feale side to Listehill and the Land of Listowell they are Rich land for Corne and also ye Mannor of Harbert is rich and dry both for corne and pastureing and lyeth very convenient bordering with the River of Shannon where the Slate, fireing, corne and all other profits may be sent by Boat to Limerick or else where there is noe River in this Barony other than is already sett forth onely the River of Galey that runs from ye County of Limerick This barony is in breadth from Listowhill the most southward part to Carrigenfoyle the Northeast part five Miles Irish and in length from the Castle of Ballysmone in the west in the Spring called Glassincarrinirily on the East tenn Irish Miles*.[57]

The Down Survey map also shows the study area and several of the townlands in the proposed development area on this map. Farranawana is shown as “Farrenanuanagh”, Carhoona is also shown, as are Coolnanoonagh, Carhoonakilly, and Ralappane all with alternate spellings. A symbol denoting church lands is presented on the map in the area of Carhoona, probably relating to the Glebe lands of Kilnaughtin. The lands in Ralappane are denoted with an annotation for bog.

Pender’s Census *c*.1659 gives some rudimentary population statistics for some of the townlands in the study area. “Cahurhuny” is likely Carhoona and it has a recorded population of five, which probably just refers to heads of household rather than being an accurate number of people living in the townland. There are twelve people noted as residents in Kilpadoge.

In relation to demesnes and designed landscapes, in the seventeenth century, William Sandes arrived in Ireland as a Cromwellian supporter and his grandson Thomas, set about building Sallowglen in the nearby townland of Glansallagh to the south of the proposed development. The Sandes family were also the proprietors of Ralappane House (CH76). The designed landscape associated with Sandes’ Sallowglen house extended almost to the boundary with Cockhill and Carhoonakilla townlands at its northern extent, however it does not extend into the study area.

A second designed landscape associated with Pyrmont House is depicted on the first-edition six-inch OS mapping, its northern limit extends along the local L-1010 road. By the time of survey of the 25-Inch OS mapping, the landscaping and trees associated with the demesne have for the main part disappeared.

[57] Available at: https://downsurvey.tchpc.tcd.ie/down-survey-maps.php#bm=Iraghticonner&c=Kerry [Accessed 26.04.24].

15.4.3.5 Early Modern and Modern Period (Post AD 1700)

While the sources for the eighteenth century are still relatively scarce, there are multiple sources from the nineteenth century that reveal significant detail on the individual townlands in the study area. With agriculture being the dominant livelihood in the study area, Tarbert begins to emerge as an important market centre for the small farm holdings along the line of the scheme. Detail begins to emerge about the quality of the land, the types of crops grown, the value of the land and holdings, and the population of the area.

The earliest eighteenth-century references to the townlands in the study area relate to Cockhill in 1717 and are contained in references in the Registry of Deeds. The Registry of Deeds contains records of land sales, deeds, and conveyances, since 1708 and there are numerous further references in these archives to land sales and transfers in the early to mid-eighteenth century within the study area.[3] There are also further eighteenth-century references in the form of entries in the Index of Wills, for example for Arthur Wade of Ralappane in 1742.[4]

Road building programmes of the seventeenth and eighteenth centuries delivered critical infrastructure and provided much-needed employment for locals, especially in the period before harvest time. Parliamentary Acts paved the way for the development of local gentry led ‘Turnpike Trusts’ and tolled turnpike roads in the 1730s. Taxes were levied by the Barony Grand Juries in the 1760s, and in the late 1780s the Irish Post Office pushed for the development of road networks between towns. Landlords sitting on Grand Juries could influence the location and nature of new roads, and in some cases their country estates became convergence points for these routes. New roads ran through some estates that were not extensively cultivated or populated. The new mail coach roads of the late eighteenth century were in many cases more suited to local topography, with the emphasis being on the most convenient link between urban Post Offices. Many of these roads lost out with the coming of the railway in the nineteenth century (Coughlan & O’Reilly 1995, 22–35).

One of the earliest cartographic representations of the study area post 1700 comes from the Taylor and Skinner maps, *c*.1777. This map has a paucity of detail of individual townlands, focussed as it is on main roads, towns and the principal landowners’ houses. Tarbert is shown with the main road to Ballylongford to the west, along which the scheme passes, but there is no further detail of the individual townlands other than a representation of a large hill near Tarbert and a wooded area near Kilfergus church to the west.

The early to mid-nineteenth century saw the Ordnance Survey began the task of producing the first-edition six-inch OS maps for the whole country. As part of this process a separate branch of the OS were tasked with gathering information on the spelling of placenames, on local customs, and on antiquities in each parish, with a view to aid in the production of the maps. The result of this process were documentary sources such as the OS name books and letters. They offer a valuable insight into pre-Famine Ireland and show what life was like at the time. The townlands in the study area are all in the Civil Parish of Kilnaughtin which is noted *c*.1840 in the OS Name Books as having a population of 544 protestants and 3600 Catholics. There were fairs held at Tarbert on 1 January, Easter Monday, 22 June, 12 August and 11 December. Crops grown in the area included were potatoes, oats and some flax. The soil was described as ‘generally spongy and not good’[5]. The general information available for the parish is then expanded on in the same source with more detail available for each townland. For example, the proprietor of Coolnanoonagh was noted as being Lord Duglas [*sic*.] Hallyburton in Scotland, while the local agent was Benjamin Hinde of Tarbert. There were no formal leases, and rents were from 18*s*. to 28*s*. per acre and the size of the farms varied from 1 to 20 acres. The soil was described as ‘not good’ while the crops grown were oats and potatoes.[6] There is similar detail for the other townlands in the OS Name Books.

The OS letters then describe several local customs, antiquities, and traditions. For example, there is a holy well noted in Cockhill (O'Donovan, *OS Letters*, pp5–6), while there is considerable detail given of the church which gives the parish its name with the town of Tarbert described as "contains no remains of antiquity" (Ibid.). Lewis then published his *Topographical Dictionary* in 1837 and he notes the population of the parish as being 4,371 while he describes the land as "general good and mostly under tillage" (Lewis, 1837, pp 194–5). The first-edition six-inch maps (Surveyed 1840, published 1846) then follow on from the OS letters and name books and for the first time provide a detailed cartographic representation of the study area. There are numerous small houses and buildings shown facing the road along the line of the route as well as a gate lodge while the field systems vary in size. The *Parliamentary Gazetteer* shows that the population of the rural areas in 1841, including the study area, was 4,078 with this source describing the soil as "generally poor and still more poorly cultivated" (*Parliamentary Gazetteer*, 1846, vol ii, pp 524–525). Griffiths Valuations then refer to the proprietors of some of the buildings and dwellings along the route.

The development of the rail network in Ireland realised the potential for mass movement of people, many of whom used the railway to access port towns from where they emigrated for a life in the New World. Employment opportunities outside farming developed and the railways opened up previously isolated parts of the country to new trade and industry and served as a means by which new goods and services could be readily transported. Horse-drawn coach services, which had previously relied on transporting mail and passengers, enjoyed a new lease of life in their ferrying of passengers from stations to their onward destinations. This was the case with the Great Southern and Western Railway which terminated at Foynes, and with the monorail system linking Listowel to Ballybunnion to the southwest. Visiting historic sites and beauty spots like Killarney became popular and a burgeoning tourism industry developed. The railways were also critical for the British Army who garrisoned and provisioned troops throughout the country. The relative speed and affordability of rail fares ensured that increased mobility and travel became accessible to all. The rail network ensured lower costs for transportation of produce and faster access to markets – for example, a return journey for a dairy farmer delivering produce from Macroom to Cork markets was reduced from three days to one (Donnelly 1975, 137). Ironically, however, although the expanded railway network allowed for improved access to markets from an agricultural perspective, the British Government failed to utilise this network for the transport of food relief to the starving population in a province ravaged by famine (O'Connor 1999, 68).

There are few sources for the remainder of the nineteenth century with the 25-inch OS maps (Surveyed 1897, published 1898) showing few changes from the earlier six-inch map with some additional detail such as benchmarks and disused lime kilns.

The events of the War of Independence and the subsequent Civil War also had an impact on the study area. William Walsh of "Kalipadogue" (Kilpaddoge) was a member of the Irish Volunteers and laterally became a second lieutenant of the company formed in 1917. In 1919 they collected shotguns in the area and having previously bought eleven rifles prior to the volunteer split in 1914 gave all of these away by January 1921, which possibly suggests that they saw little action during either conflict while no one from the Tarbert Company was selected for the flying column in 1920. Walsh comments that "The only thing the Company did up to the Truce was to cut and trench roads" (Bureau of Military History WS 974, pp 1–5).

Fort Shannon was built in 1942 as part of the defences to protect Ireland against the threat of invasion during World War Two (known in the 26-counties as 'the Emergency') and was the first major fortress built since Independence in 1922. All other fortifications (e.g. Martello towers) were built by the British.

The Shannon Estuary is navigable for 50 miles upriver and so was strategically very important to defend. During Napoleonic times, forts were placed either side (e.g., at Tarbert). As well as the estuary, there are places and installations of particular military and infrastructural value in the region. Foynes was the location of a transatlantic seaplane base, while the new airfield at Rineanna (now Shannon Airport) on the other side of the estuary could have been used by the enemy to land troop-carrying planes. Another installation of importance was the hydroelectric power station at Ardnacrusha to the north of Limerick City which provided 80% of the state's electricity, and then there were the major population centres of Limerick itself and Ennis in Co. Clare.

Due to its strategic importance, around 70 blockhouses (pillboxes) were built around the mouth of the Shannon by the Irish Army in 1940–41, in a triangle formed by Ennis in the north, Limerick in the east and Askeaton in the south. Clusters were focussed around Askeaton, Shannon Airport, Ardnacrusha, Limerick and Ennis. In addition, mines were laid across the mouth of the Shannon extending north from Ardmore Point and by 1942 a new fortress, called Fort Shannon, had been built by the Army at Ardmore Point in Carhoonakineely townland and equipped with powerful six-inch guns provided by the British and installed underground along with a network of bunkers. Kilrush was seen as a particular danger point for a seaborne invasion and plans were made to blow up the pier there if necessary (Military Archives EDP 45/4; Military Archives EDP S/3/2).

In May 1942, work began on the first major seaward defence planned and executed by Irishmen in their own country. This was a "unique and historic undertaking". It included: Gun emplacements; Magazines; Connecting tunnels; Fire control station; Searchlight installations; Engine rooms; Electricity generators; Water supply; Approach roads and Living accommodation.

The work required a major rock-blasting programme and involved two full companies and a section of field engineers; an infantry company; and a company from the Construction Corps.[58] When the guns (weighing over 16 tons each) were being put in place, it was realised that the bolts set into the concrete base were too short. There was a frantic task in rectifying this before the 'top brass' arrived the next morning to inspect the works. The guns are now on display at the museum at Fort Dunree, Co. Donegal[59] (MacCarron 1999, pp.126–31).

The most important new work by the Corps of Engineers of the Irish Army was Fort Shannon at Ardmore Point, on the south side of the Shannon Estuary west of Tarbert (Kerrigan 1995, p.269). The Military Archives Coastal Defence Files (EDP S/3/2) contain a progress report by the Corps of Engineers on the construction of Fort Shannon dated 17 July 1942. It provides a detailed account of progress on the camp, E.S.S. [electricity supply station], gun emplacements, tunnels, search light emplacements and other features. A detailed account of Fort Shannon, including basic layout drawings is published by de Cogan and Swords 2001.

Fort Shannon was evacuated on 31 May 1946 (Dargan 2017–18, p.22); in spite of its cultural heritage significance Fort Shannon is not listed on the National Inventory of Architectural Heritage (it is, however, included on the Record of Protected Structures for Kerry). An account of a site visit by the Artillery Club in May 2023 is available online[60] and concludes with:

> *"… Fort Shannon remains an important feature of Irish military history and today the dilapidated and neglected state of the site reflects poorly on the authorities responsible for its upkeep. This is particularly so, when contrasted with other similar fortifications around the Irish coastline, such*

[58] The Construction Corps was made up of unemployed young men, many from underprivileged urban backgrounds, who were too young or not yet considered suitable for the army (though many did eventually join the regular army).

[59] This does not seem to be supported by Dargan 2017–18, p.22.

[60] See http://artilleryclub.ie/field-trip-fort-shannon-18-19-may-2023/ [accessed 10.07.2024]

> *as the museums at Fort Dundee, Fort Mitchell and Gray Point Fort, where restored and heavy and light weaponry are clearly and attractively presented to visitors"* (Dargan 2017–18, p.22).

Local newspapers contain other references to the townlands in the study area throughout the twentieth century, for example C. Fitzell of Carhoonkilla attended a bull calf sale in Limerick in 1950 (*Irish Independent*, 4 Nov. 1950), while the Department of Defence sold land in Carhoonakineely in 1988 (*Kerryman*, 8 July 1988).

15.4.3.6 Folklore

The Irish Folklore Commission's School's Collection (IFC), hosted by Dúchas.ie, frequently contains relevant information collected by schoolchildren in the 1930s. Several stories relating to the nine townlands in the study area are recorded (Appendix 15.4) that indicates the conditions in the area at the time. These stories reveal detail of the placenames in the study area, for example Carhoona, Carhoonakilla, Carhoonakineely, Ralappane and Kilpaddoge. There is also some detail about the origins of the townland names with stories for example, from Kilcolgan being named after a saint by the name of Colgan, recording that "*He built a church there and beside it was supposed to be a graveyard. There is not a trace of the church or grave-yard to be seen for several years*" (Appendix 15.4; Extract no. 01). There are further references to archaeological monuments in the study area (see for example Extract no. 09), and other accounts (see for example Extract no. 04) possibly identifying the souterrains (CH109 and CH107) as a tunnel linking two ringforts. Alternatives to the meanings of the placenames are provided: for example, a local tradition survived that recorded the meaning of Kilpaddoge as *church of the rush light* while further elaborating that this church (for which there are no visible remains) was situated on a height and that a rush light was placed in the window of the church looking over the Shannon and that it was "*kept burning every night to serve as a beacon for mariners*" (Appendix 15.4; Extract no. 02). Local folklore holds the tradition of candles being made in Ralappane in the nineteenth century when sheep were more abundant in the area than in the 1930s (Appendix 15.4; Extract No. 08). There are several references to Glencloosagh (or Glouncloosagh) in the School's Collection with reference to a settlement for Cromwellian soldiers (Extract no. 07), but also referring to these soldiers cutting off the ears of monks of Lislaughtin (or possibly Kilnaughtin) in this area (see Appendix 15.4 Extract no. 02 and Extract no. 03).

15.4.4 Previous Cultural Heritage Investigations and Surveys

The study area and environs have been subject to numerous previous investigations and studies, which cumulatively, point to the existence of previously unrecorded archaeological and built heritage sites, and the high archaeological potential of the area within which the proposed development is located. These works are summarised below in chronological order.

15.4.4.1 Geophysical Survey Licence 06R0167

A geophysical Survey was undertaken by Target Archaeological Geophysics in Carhoonakineely, Kilcolgan Lower and Ralappane townlands in 2006. This work was in support of the Cultural Heritage Chapter of an EIS for the proposed Shannon LNG (Lane & Associates, 2007). Lane & Associates had identified 8 areas of archaeological potential in their analysis of aerial imagery and cartographic research, through field inspection and geological surveys on the site of the proposed Shannon LNG terminal. Two areas provided evidence for potential fulachta fiadh/burnt mounds. Around the known archaeological monument KE003-001---- the responses achieved were interpreted as being enclosing ditch and internal remains; recent buildings/structures, intensive cultivation and boundary removal were also identified (Nicholls 2006, 2-3).

15.4.4.2 Marine Geo-archaeological Survey 07R0048

Donal Boland undertook a marine geoarchaeological survey (marine and intertidal geophysical surveys) of a proposed gas terminal (marine structures) in the Shannon Estuary around Ballylongford in 2006 (Boland 2007). This work was undertaken in support of the production of the EIS for the proposed Shannon LNG terminal which was subsequently approved by An Board Plenála in 2008 (Ref. 08.PA0002). Other than the identification of the remains of a van and a small boat/cleared foreshore, no features of archaeological significance were identified in the intertidal zone within the subject site area. Nothing of archaeological significance was identified in the marine geophysical surveys, although eleven anomalies were noted; these were interpreted as being non-archaeological and related to recent human activity in the busy Shannon estuary. One anomaly was regarded as having limited archaeological potential, and it was recommended that this be avoided through a 50m exclusion zone being put in place around it. Potential archaeological monitoring during construction was also recommended.

15.4.4.3 Wade and Detection Survey 07D63, 07R196

CRDS Ltd were engaged by Headland Archaeology Ltd to undertake a wade and detection survey to comply with a condition of planning associated with the consented Shannon LNG terminal in Ralappane and Kilcolgan Lower townlands in 2007. Because of dense vegetation and shrubby growth around the banks of the stream, much of the survey area was inaccessible for this survey.

15.4.4.4 Excavation Licence no. 08E587

In 2008 Headland Archaeology Ltd undertook a programme of test trenching in compliance with planning permission granted (Ref. 08.PA0002) for the development of a 257-acre site for the Shannon Liquified Natural Gas (LNG) terminal in Ralappane and Kilcolgan Lower townlands (Long and O'Malley, 2009). A total of 48,860 linear metres of archaeological test trenches were excavated across the site and a total of 60 areas of archaeology and potential archaeology were identified. An architectural heritage survey of built heritage elements in both townlands was also undertaken as part of this work.

The 60 identified areas of archaeology included sites ranging in date from at least the Bronze Age to the post-medieval period. Within the subject proposed development area the following Archaeological Areas identified in that work occur within the study area:

Table 15.4: Archaeology identified in 2008 Testing (after Long & O'Malley 2009 and Kilner, 2024).

2008 Testing Area Reference	Description	AMS CH Ref.
Area 10	Two points of focus: one cereal - drying kiln and one charcoal rich feature.	CH117
Area 12	A concentration of linear and curvilinear features in the west of the field.	CH86
Area 13	Two points of focus - A number of charcoal rich features, linears and a possible figure - of - eight shaped corn - drying kiln	CH87
Area 14	Two points of focus - A number of charcoal rich pits and stone filled features in the north of the field	CH36/CH88
Area 15	Two points of focus - A number of linear features, postholes, a large sub - rectangular pit and several burnt mound deposits	CH116
Area 16	Two deposits of burnt mound material in a dip in the local topography.	CH115

2008 Testing Area Reference	Description	AMS CH Ref.
Area 17	A pit full of burnt stone and charcoal and some possible postholes in the west of the field.	CH89
Area 18	Two points of focus - A number of stone filled pits and linear features.	CH90
Area 20	A large charcoal production pit, a possible hearth and a number of possible postholes in the east of the field.	CH113
Area 23	Two stripped areas around several deposits of burnt mound material and associated features.	CH35
Area 24	Two points of focus - possible habitation area (structure) and associated pits and postholes	CH91
Area 25	A kiln / furnace running up to the stream edge.	CH73
Area 26/27	Burnt mound deposits and associated features on either side of the stream. A series of post holes and burnt material found in the east side of the field.	CH33/CH37
Area 28	A deposit of burnt mound material.	CH93
Area 31	A linear feature and a burnt deposit.	CH94
Area 32	A possible hearth and several sub - oval charcoal - rich features.	CH95
Area 33	Three points of focus - Two small features in the south of the field A curvilinear feature further by the stream.	CH96
Area 34	Three points of focus - Around the isolated features identified in the south and southeast of the Field.	CH97
Area 35	Two points of focus - Two small burnt mound deposits	CH98
Area 36	Two points of focus - Around a post - hole, a charcoal - rich pit and a charcoal - rich linear scattered throughout the field.	CH99
Area 45	A deposit of burnt mound material and a linear feature.	CH120
Area 50	A possible posthole in the southwest of the field.	CH102
Area 60	A dense concentration of features in the southeast of Field 56 and the northeast of Field 55 within a possible ditched enclosure.	CH122

15.4.4.5 Excavation Licence no. 12E347

Dermot Neilis Archaeology prepared an impact assessment for the proposed development of an electricity generating plant in Kilpaddoge townland in 2012. The proposed development comprised an electricity generating plant measuring 140.8m north west/south east x 94m north east/south west, to contain 52 dual fuelled high speed diesel reciprocating engines with an export capacity of 102 megawatts electricity (MWe). The proposed development also included a control building, fuel storage area, a site access road and an electrical substation. Ancillary works included the installation of 60m of a 110 kV underground transmission line to connect the proposed development to the national grid.

Consultation with the Kerry County Council Archaeologist identified the need for pre-planning archaeological test trenching to be undertaken; a total of 18 test trenches were excavated and a fulacht fia, two small spreads of burnt stone were identified. It was determined that the fulacht could be preserved in situ through mitigation by design measures, and the two small stone spreads were archaeologically resolved. Two wells identified on historic mapping failed to be located in the field, however, it was proposed that these areas be fenced off during construction to ensure preservation in situ of both and any potential associated archaeology (Neilis 2013, 29).

15.4.4.6 Excavation Licence no. 13E0465

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024). This licence number relates to the excavation of Site 3 as follows: '*along the banks of the Shannon, west of the ESB Substation. This is at a point where a spring rises from the field and flows north-northwest to the river bank. On the eastern side of this spring the ground appeared as a low bank. Where the trench intersected this bank, two large burnt spreads were identified. The spread along the northern side had eroded down into the stream to east. The remnants of this mound were very disturbed having been cut by a 1950s stone-lined field drain and possible lead trading token was found on the surface. Where the mound sloped down at east, three pieces of stuck flint were found. Two oval troughs were found beneath the mound material, neither lined. However, an elongated hearth was uncovered. This was over 4m in length and 0.4m – 0.5m in width, lined with angular stone, in which burning had taken place. Similar 'hearths' were found on Site 4. The southern spread was thicker but not as expansive. It extended beyond the limit of excavation to the south. While no troughs were identified, a second linear cut, lined with stone, was found beneath it – but no evidence that burning had taken place. Finally, as the site reached an end, a butt-trimmed flake, of late Mesolithic type, was found at the base of the stream. Out of context, this flake was made of an unusual stone-type, similar to chert'.* The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.7 Excavation Licence no. 13E0350

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

15.4.4.8 Excavation Licence no. 14E0039

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024). This licence number relates to the excavation of Site 4: *'initially recorded as probable waste from the nearby lime-kiln along the shoreline. The site is also adjacent to the remains of a dwelling along the bank. The initial test-pits were monitored by Tobar (Tobar Archaeological Services 2013. Kilpaddoge 220kV Substation, Tarbert, Co.Kerry: Archaeological monitoring of site investigations). After monitoring, a 13m x 7m spread of burnt material was identified and licensed as 14E0039. This burnt spread was actually the disuse/occupation layer associated with the latest structure in the sequence at this point (Light blue Structure in figure attached). The structures were all small and formed of rectangular slot trenches. The earliest structure that has a stratigraphical relationship is also the largest (Navy highlight in fig). The structures move from large structures to smaller in size it seems. The smaller structures are roughly 2m x 6m, just about 25% the size of usual early Neolithic rectangular buildings. The large example at south (in Red) is also the only structure that was ritually burnt and then sealed with clay. The western end of many of these houses was missing, primarily because this is the downslope end, towards to the marsh.*

Other features were a multitude of pits, some forming enclosures (such as at the southern side of the westernmost structure (in purple)). Two elongated hearths were found. These are comparable to those seen beneath the fulacht material at Site 3, but here they were later than the two structures which they cut (Green and Purple structures) and both were orientated east-west. A third rectangular hearth was also stone-lined and found at the western limit. This again seems to be later than the structures and includes burnt animal bone (pig, cattle and water-fowl according to Mags McCarthy). Lots of potential features were found to the southeast but all appeared to be attempts at filling soft ground where palaeo-channels once ran down into the marsh at west.

Find were numerous, 347 in all, mostly lithics. These are being looked at the moment. Notable were a hollow-scraper and polished stone axe from the southeast area but also a very small polished axe from the floor of the latest house (Light Blue structure). The majority of lithics were unusual in that they were largely made of shales and sandstones with very few chert/flints. Bone was only preserved where burnt.

The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.9 Excavation Licence no. 14E0233

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024). This excavation relates *to 'the location of a pylon-tower and the excavation was directed by Linda Lynch. Multiple pits and post-holes were found. One large rectangular pit was found in the centre of the area and a short section of shallow ditch extended into the area for about 16m. At the west was a rectangular pit with multiple phases of burning. Very few artefacts were found, although a large spindle-whorl was retrieved from topsoil.*

The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.10 Excavation Licence no. 14E0234

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024*).*This excavation was *'at the location of a pylon-tower and the excavation was directed by Linda Lynch. The pits and post-holes that were identified here, initially seemed to form the outline of a structure. However, during excavation it became clear that while structural elements were present, no complete outline of a structure had survived. This is owing to the steepening slope at this point. Charcoal from these pits/posts has been retained for dating but very few artefacts were found (and nothing indicative of period etc.*

The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.11 Excavation Licence no. 14E0240

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS

Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024). *Site 8 (14E0240) was at the location of a pylon-tower and only 15m from Site 1. A series of shallow pits were found and these produced almost nothing of archaeological interest. One pit was almost 2 in depth and seems to have been a tree-bowl within an earlier pit. A north-south linear at the eastern side of the trench was a 'bóthairín'/road marked on the 1st edition O.S. map. A rectangular charcoal pit was also found and was comparable to that at Site 1. Only a possible hammer-stone was found in terms of artefacts.*

The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.12 Excavation Licence no. 14E0241

No Excavations Bulletin summary has been uploaded to the Directory of Irish Excavation Reports for this project. No excavation report for this licence number was available in the NMS Virtual Reading Room. Connolly (2020) refers to archaeology in this area having been identified/excavated under this licence number.

In response to a direct request, Munster Archaeology provided summary details of this excavation in July 2024 (Harte 2024). This excavation relates to Site 9: *at the location of a pylon-tower where three linear features were excavated. There were several very shallow pits associated. It is currently unclear whether the linear features form a structure or perhaps a boundary, and the dates for these features is currently unknown.*

The georeferenced location of this excavation is shown in Figure 15.7c in point data format.

15.4.4.13 Excavation Licence no. 16E0152

Tobar Archaeological Services were engaged to undertake archaeological monitoring of all groundworks at the site of a proposed sub-station associated with the Tullyhennel Windfarm. Three areas of archaeological potential represented by burnt mound or *fulacht fia*-type material were identified, and full archaeological resolution of these areas was subsequently undertaken by Rubicon Heritage Services Ltd (see 15.4.4.14 below).

15.4.4.14 Excavation Licence no. 16E0362

James Hession for Rubicon Heritage Services Ltd undertook an archaeological excavation at Kilpaddoge at the site of a proposed sub-station associated with the Tullahennel Windfarm (Planning Ref. 13/138) (Hourihan, 2016). Three areas of archaeological potential represented by fulacht fia-type material were preserved by record, and radiocarbon dates returned results dating to the Copper Age (2457-2203 cal BC and 2434-2142 cal BC)[61] and Middle Bronze Age (1401-1230 cal BC),[62] although a clear function for each of the three areas excavated was not determined.

15.4.4.15 Dive and Detection Licence nos. 17D0070 and 17R0164; Marine Geophysical Survey Licence no. 17R0168

ADCO were commissioned to undertake Impact Assessments for potential cable landfall intertidal foreshore sites, and a marine geophysical survey data interpretation assessment for the Cross Shannon 400kV Project (Bangeter & Brady, 2018). The results for area S1 presented in the report relate to Kilpaddoge and Coolnanoonagh townlands. Three potential options for crossing the Shannon were assessed, drawing on previous archaeological works. Eight features

[61] Hourihan 2016, 13.

[62] *Ibid*.

of archaeological and potential archaeological significance were identified, including a probable prehistoric submerged woodland and peat-saltmarsh, and a possible portion of a souterrain of Early Medieval date. The remaining features were interpreted as being of likely nineteenth-century date, comprising quays, slipway, limekiln, a curvilinear structure and a dwelling or boat house. The Marine Geophysical Survey data highlighted two areas of potential archaeological significance comprising a stone alignment in Glencloosagh Bay, close to the site of a former fishtrap; a second feature of potential comprising an area of archaeological potential associated with former busy sea area around Moneypoint Power Station (Co. Clare). The report authors highlighted the archaeological potential of the Shannon estuary area and the need for continued archaeological input into projects proposed and in development.

15.4.4.16 Excavation Licence no. 18E0723

John Cronin and Associates produced an Archaeological Impact Assessment for a proposed battery storage project (Planning Ref. no. 18/878) in Kilpaddoge townland in January 2019 (Chambers, 2019). Test trenching was undertaken by Colm Chambers to comply with an FI request by Kerry Co. Council, who stated that *'Given the scale of the proposed development and the features recorded and excavated in this area in recent years during ESB works, pre-development archaeological testing is required to be carried out across the site and a report submitted'.* A total of four test trenches were excavated across the footprint of the proposed development, and other than evidence for modern disturbance and modern finds, nothing of archaeological significance was identified. No further archaeological works were recommended.

15.4.4.17 Excavation Licence no. 19E0684

A planning application (Ref. No. 19/115) for the proposed Glencloosagh Phase 1 grid stabilisation facility in Kilpaddoge townland (comprising four rotating stabilisers, five battery storage containers, a control room, two transformers and ancillary equipment) was subject to a request for Further Information, including archaeological works. A total of 687m of archaeological testing by Laurence Dunne identified burnt mound material in one of the five excavated test trenches (Trench 3). The features were subsequently excavated under an extension to this licence (see below). The excavation strategy was agreed in advance with the Kerry Co. Council Archaeologist and included for topsoil stripping of the full proposed development area and archaeological resolution (preservation by record) of all identified features.

15.4.4.18 Excavation Licence no. 19E0684(Ext)

In March 2021, Laurence Dunne Archaeology undertook archaeological excavation of the features identified in archaeological testing in 2019, and additional features identified during wider topsoil stripping of the subject area. A spread of burnt mound or *fulacht fia*-type material, and two adjacent similar but more discrete features were excavated. The excavator proposed that all of the material was introduced/redeposited levelling material, and it was subsequently truncated by an agricultural drain running N-S across the excavation area. It was proposed that the *fulacht* material was derived from an adjacent *fulacht* fia located c. 80m to the southwest of the excavation area.

15.4.4.19 Excavation Licence no. 20E0270

An archaeological impact assessment report (AIA) (Dunne, 2020a) was submitted in support of a planning application proposed subsurface 38kva grid connection cable between the (planning consented) Ballylongford Windfarm and the existing Eir-Grid Substation in Kilpaddoge townlands. A total of 10.6km of the proposed grid connection was online, with the remaining 1.4km being in greenfield in Carhoona and Kilpaddoge townlands. In the Kilpaddoge section, the first-edition six-inch OS mapping suggested the presence of a former limekiln within the proposed development area. Subsequently, Laurence Dunne undertook archaeological testing of the greenfield sections (Dunne, 2020b; Figure 15.7c), a total of thirty test trenches – each being 20m long, were excavated and nothing of archaeological significance was found. In the Kilpaddoge section, one field within the proposed development area was excluded from the testing programme since it was utilised as an extensive storage area for large plastic-wrapped round bales of sileage. No evidence for the former limekiln was identified. No further archaeological works were recommended.

15.4.4.20 Excavation Licence no. 20E0671

In advance of proposed 570m-long road widening scheme along the northern side of the L-1010 local road in Coolnanoonagh and Farrawana townlands, Co. Kerry, four archaeological test trenches (total excavated area of 920m²) were excavated by the local authority Archaeologist, Dr. Michael Connolly (see Figure 15.6c). No archaeological or potential archaeological features were identified by the excavator, and no further archaeological mitigation was proposed.

15.4.4.21 Geophysical Survey 23R0062

An archaeological Geophysical Survey of an area comprising 88.10ha over 26km from Ralappane to Foynes, Co. Limerick was carried out by AMS along the route of the proposed Shannon Gas Pipelineject in March – June 2023. The Project is the subject of an *An Bord Pleanála* approval (ABP Ref. No. 08.GA0003). Eight clear and coherent responses for archaeological sites were identified, including parts of a known site included on the RMP (ringfort KE003-004----), a previously unrecorded large (52m by 38m) oval enclosure in Cockhill townland immediately to the south of the subject proposed development; field systems (including CH121 in the subject proposed development). Twelve further possible archaeological sites were identified, including a possible pentagonal-shaped enclosure in Ralappane townland (see CH119), two possible circular enclosures, a possible rectilinear enclosure, four possible ring-ditches (including one within CH121 in the subject proposed development).

15.4.4.22 Intertidal Survey 24D0008

A recent walkover and detection survey was undertaken by Dr Conn Herriott of AMS in February 2024 along the foreshore in the townlands of Ralappane and Carhoonakineely (Herriott 2024); nothing of archaeological significance was identified.

15.4.4.23 Marine Geophysical Survey 24R0012

A multibeam sonar, magnetometry, side-scan sonar and sub-bottom profiling survey was conducted at the same time as the 2024 Intertidal Survey by Dr Conn Herriott and Dr Dan Atkinson of AMS. This survey was undertaken as part of the Shannon Technology and Energy Park (STEP) Power Plant (see Kilner, 2024). Eight anomalies were identified in the survey, of which 4 were determined to be non-archaeological. Three features were identified as signals denoting metallic objects. One anomaly was interpreted as representing a potential prehistoric archaeology feature/site.

15.4.4.24 Walkover Surveys

As part of the preparatory works for the EIS, Lane and Associates (2007) undertook extensive walkover surveys of the proposed development area in Ralappane, Kilcolgan Lower, Carhoonakineely townlands. This work identified a total of three Cultural Heritage Sites (CHS) within or immediately adjacent to the subject proposed development area. They included

- CHS 4 Farm complex: re-surveyed as Complex C in Laban, 2009; subsequently tested by Headland Archaeology in 2008 and assigned Areas 14, 15 and 16; noted in this report as CH36 and CH88.

- CHS 12 Site of old Forge: Possibly identified in 2008 testing in Area 45; noted in this report as CH67.
- CHS 13 Tubberagleana well: not identified in 2008 testing but occurs in proximity to Area 58; occurs beyond the subject proposed development study area and not assigned a CH reference number. Kilner (2024, 28) notes that it occurs as an overgrown spring and is not apparent on the ground.

As part of the 2021 STEP EIAR Lane's catalogue of cultural heritage sites including details from walkover survey was reproduced (Lane, 2021).

The author, accompanied by an AMS survey partner, undertook a walkover survey of the proposed development area, on 15th and 19th March 2024. The walkover surveys took place on sunny, fine days, and were specifically limited to those lands where access was permitted within the planning boundary. Therefore, it was not possible to access sites or assets within the study area which were not already publicly accessible (such as Kilnaughtin Church and Graveyard). The walkover survey specifically targeted the sites of former vernacular buildings depicted on historic mapping, benchmarks, gates and gate piers, townland boundaries and stone-faced boundary features, which had not generally been targeted for inspection in previous archaeological works. The walkover survey also considered setting and visual impact on known archaeological receptors (RMP sites). Slight limitations to the survey occurred in the fact that CH36 [63] buildings depicted on historic mapping and identified in testing, were inaccessible due to obstructive vegetation growth. The same factor applied at Glencloosagh townland boundary (CH48) in Coolnanoonagh/Kilpaddoge townlands. However, this was offset by the fact that these areas had been previously recorded (Laban, 2009) and inspected in earlier walkover surveys.

This walkover survey found, contrary to some reports on more recent walkover surveys, that in Ralappane and Kilcolgan Lower, clear evidence for the extensive archaeological testing was evident on the ground in what initially appeared to be the remnants of wide lazy beds. When cross-referenced with the previous archaeological works undertaken by Headland Archaeology it was immediately clear that the footprint of the test trenches was evidenced. The same was true of areas tested in the easternmost portions of the Scheme in Kilpaddoge townland (Dunne 2016), although in the interim some fields have been top-dressed and re-seeded, making the visible traces of those test trenches very ephemeral.

It was also found that in the majority of cases, traces of buildings depicted on historic mapping and pre-dating the first-edition six-inch OS map survey (1837) did not survive as earthworks in the pasture fields along the L-1010 road edge. However, in some cases clear 'platforms' indicating the likely presence of sub-surface archaeological features such as wall foundations were clearly identified (CH08). Similarly, the roadside boundary walls in some instances were of a construction type that could indicate the remnants of house facades, where visible. In general, the roadside boundaries included dense shrubby vegetation that rendered identification of the potential presence of benchmarks impossible – these could still remain *in situ*.

15.4.4.25 Overview of Receptors

Table 15.5 lists the identified cultural heritage receptors within the study area for the proposed development, with suggested importance ratings for each. Full descriptions of the receptors are provided in Appendix 15.1. The receptors can be broadly categorised into the following groups and impact assessments are arranged in this manner as set out in Section 17 below:

- Designated archaeological heritage (SMR/RMP assets)
- Designated built heritage assets (RPS)

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[63] Long & O'Malley's Architectural Heritage Complex C; Archaeological Area 14.

- Undesignated Archaeological Heritage:
  - Townland, roadside and field boundaries
  - Vernacular heritage
  - Industrial heritage features
  - Archaeological features identified in previous investigations
  - Areas of archaeological potential identified through geophysical surveys
  - Natural heritage features of archaeological potential
- Undesignated Built Heritage
  - Extant built heritage
  - bench marks of scientific interest identified on historic mapping

15.4.4.26 Note on Consideration of Assessment and Proposed Mitigations

The EIAR for a proposed STEP Power Plant was published in April 2024 and Chapter 12 of the EIAR concerns Cultural Heritage (Kilner 2024).[64] There is considerable overlap in the development areas for the subject STEP 220 kV Grid Connection project and the proposed STEP Power Plant in the townlands of Ralappane and Kilcolgan Lower, where a shared access and Project Application Boundary (PAB) for access etc. are proposed. The proposed Power Plant extends immediately to the north and northeast of the substation and temporary laydown areas at the northern limit of the proposed STEP Grid Connection development. Both proposed developments occur in the areas where comprehensive archaeological testing was undertaken in 2008 (Long & O'Malley 2009). The STEP Power Plant EIAR includes a comprehensive mitigation strategy based on the recommendations of the 2009 testing report for these works (Long & O'Malley 2009). This EIAR Chapter therefore defers to the Mitigation Strategy already proposed for the STEP Power Plant which has been agreed in principle through consultation with NMS and statutory authorities.

Kerry County Council have achieved Part 8 planning (2010) the proposed widening of the local L-1010 road in the townlands of Coolnanoonagh, Carhoona, Cockhill, Carhoonakilla, Carhoonakineely, Ralappane, Kilcolgan Lower and Kilcolgan Upper. It is anticipated that these works will occur in advance of the construction phase for the STEP Grid Connection project. As part of the proposed road widening works it is intended to lay the ducting which will carry the STEP 220 kV Grid Connection cables. The PAB for the subject STEP Grid Connection project and the L-1010 works are corresponding along the online section of the STEP Grid Connection project. The road widening works are anticipated to precede the Grid Connection construction and a Part 8 approval was granted for these works in 2010.

[64] Available at: https://r2.steppowerplant.com/eiar/volume-2-main-report/STEP_PP_EIAR_12_Cultural_Heritage.pdf [Accessed April 2024].

Table 15.5: Summary of all cultural heritage assets within the study area

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH01	Built Heritage	2 Buildings - including 1 ruin	Undesignated	N/A	Low	Kilpaddoge	505035	647716	0m	1st Edition 6-inch OS map (1837);
CH02	Built Heritage	Building	Undesignated	N/A	Low	Farranawana	504915	647689	0m	1st Edition 6-inch OS map (1837);
CH03	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	504807	647711	0m	1st Edition 6-inch OS map (1837);
CH04	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	504667	647713	0m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH05	Archaeology	Townland Boundaries	Undesignated	N/A	Low	Coolnanoonagh	504691	647699	0m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH06	Built Heritage	3 Buildings	Undesignated	N/A	Low	Coolnanoonagh	504344	647761	0m	1st Edition 6-inch OS map (1837);
CH07	Built Heritage	4 Buildings, one annotated 'gate lodge' (site of)	Undesignated	N/A	Low	Carhoona	504265	647742	25m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH08	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	504219	647780	5m	1st Edition 6-inch OS map (1837);

[65] Distances indicated as ‘0m’ refer to those assets that fall within the design footprint and it is considered that direct impacts could occur anywhere within this area.

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH09	Built Heritage	2 buildings	Undesignated	N/A	Low	Coolnanoonagh	504056	647785	0m	1st Edition 6-inch OS map (1837);
CH10	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	504034	647763	0m	1st Edition 6-inch OS map (1837);
CH11	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	503963	647786	14m	1st Edition 6-inch OS map (1837);
CH12	Built Heritage	2 buildings, one L-shaped	Undesignated	N/A	Low	Coolnanoonagh	503884	647795	5m	1st Edition 6-inch OS map (1837);
CH13	Built Heritage	Building	Undesignated	N/A	Low	Coolnanoonagh	503858	647820	22m	1st Edition 6-inch OS map (1837);
CH14	Archaeology	Ruined building	Undesignated	N/A	Low	Coolnanoonagh	503667	647763	0m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH15	Built Heritage	2 buildings	Undesignated	N/A	Low	Coolnanoonagh	503619	647775	4m	1st Edition 6-inch OS map (1837);
CH16	Archaeology	Stream	Undesignated	N/A	Low	Coolnanoonagh	503609	647740	0m	1st Edition 6-inch OS map (1837);
CH17	Archaeology	Townland boundary	Undesignated	N/A	Low	Coolnanoonagh	503559	647742	0m	1st Edition 6-inch OS map (1837);
CH18	Archaeology	Townland boundary	Undesignated	N/A	Low	Coolnanoonagh	503550	647733	0m	1st Edition 6-inch OS map (1837);
CH19	Built Heritage	1 building	Undesignated	N/A	Low	Kilpaddoge	505220	647749	0m	1st Edition 6-inch OS map

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
										(1837); 25-Inch OS map (1892-8)
CH20	Built Heritage	2 buildings	Undesignated	N/A	Low	Cockhill	503355	647758	0m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH21	Built Heritage	Group of 3 buildings	Undesignated	N/A	Low	Carhoonakineely	503313	647793	0m	1st Edition 6-inch OS map (1837);
CH22	Built Heritage	Building	Undesignated	N/A	Low	Carhoonakilla	503272	647790	0m	1st Edition 6-inch OS map (1837);
CH23	Built Heritage	Farm complex	Undesignated	N/A	Low	Carhoonakilla	502662	647756	130m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8) and Last Edition 6-inch OS map.
CH24	Built Heritage	Plantation	Undesignated	N/A	Very Low	Carhoonakilla	503155	647837	0m	1st Edition 6-inch OS map (1837);
CH25	Built Heritage	Building	Undesignated	N/A	Low	Carhoonakilla	503087	647876	2m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1892-8)
CH26	Built Heritage	Building	Undesignated	N/A	Low	Carhoonakineely	503051	647898	0m	1st Edition 6-inch OS map (1837);
CH27	Built Heritage	2 buildings	Undesignated	N/A	Low	Carhoonakineely	502989	647909	5m	1st Edition 6-inch OS map (1837);

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH28	Built Heritage	2 buildings	Undesignated	N/A	Low	Carhoonakineely	502815	647927	0m	1st Edition 6-inch OS map (1837);
CH29	Built Heritage	Building	Undesignated	N/A	Low	Carhoonakineely	502718	647927	0m	1st Edition 6-inch OS map (1837);
CH30	Built Heritage	Building	Undesignated	N/A	Low	Carhoonakineely	502689	647926	0m	1st Edition 6-inch OS map (1837) ;
CH31	Built Heritage	Building	Undesignated	N/A	Low	Ralappane	502696	647921	0m	1st Edition 6-inch OS map (1837) ;
CH32	Built Heritage	Possible building	Undesignated	N/A	Low	Kilcolgan Lower	502384	647935	0m	1st Edition 6-inch OS map (1837) .
CH33	Archaeology	Pond, burnt mound complex and associated features. Area 26/27 from 2008 testing	Undesignated	N/A	Medium	Kilcolgan Lower	502347	648013	0m	1st Edition 6-inch OS map (1837) ; 25-Inch OS map (1892-8) . Archaeological testing 2008 (08E0587). Walkover Survey 2024.
CH34	Archaeology	Townland boundaries	Undesignated	N/A	Low	Ralappane	502392	647926	0m	1st Edition 6-inch OS map (1837) ;
CH35	Archaeology	Area shaded on 1st edition mapping; Area 23 burnt mounds and associated features (2008 testing).	Undesignated	N/A	Low	Ralappane	502117	648318	0m	1st Edition 6-inch OS map (1837) ; Archaeological testing 2008 (08E0587). Walkover Survey 2024.

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH36	Built Heritage	Buildings	Undesignated	N/A	Low	Ralappane	501975	648537	0m	1st Edition 6-inch OS map (1837) ;
CH37	Archaeology	Townland boundary; complex of burnt mound deposits and associated features. Area 26/27 from 2008 testing.	Undesignated	N/A		Ralappane	502364	648001	0m	1st Edition 6-inch OS map (1837) ; Archaeological testing 2008 (08E0587). Walkover Survey 2024.
CH38	Archaeology	Townland boundary	Undesignated	N/A	Low	Ralappane	502430	647911	0m	1st Edition 6-inch OS map (1837) ;
CH39	Archaeological	Laneway	Undesignated	N/A	Low	Kilcolgan Upper	502785	647888	0m	25-Inch OS map (1892-8)
CH40	Archaeology	Townland boundary	Undesignated	N/A	Low	Carhoonakilla	503259	647796	0m	1st Edition 6-inch OS map (1837) ;
CH41	Built Heritage	Road	Undesignated	N/A	Medium	Carhoonakineely or Carhoona check double numbering	503570	647715	0m	1st Edition 6-inch OS map (1837) ;
CH42	Archaeology	Townland boundaries	Undesignated	N/A	Low	Coolnanoonagh	503790	647807	0m	1st Edition 6-inch OS map (1837) ;
CH43	Archaeology	Laneway (site of)	Undesignated	N/A	Low	Carhoona	504287	647737	0m	1st Edition 6-inch OS map (1837) ;
CH44	Archaeology	Road	Undesignated	N/A	Low	Carhoona	504536	647697	0m	1st Edition 6-inch OS map (1837) ;

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH45	Archaeology	Laneway	Undesignated	N/A	Low	Coolnanoonagh	504308	647760	0m	1st Edition 6-inch OS map (1837) ;
CH46	Archaeology	Laneway	Undesignated	N/A	Low	Coolnanoonagh	504793	647715	0m	1st Edition 6-inch OS map (1837) ;
CH47	Archaeology	Townland boundary	Undesignated	N/A	Low	Coolnanoonagh	504964	647686	0m	1st Edition 6-inch OS map (1837) ;
CH48	Archaeology	Townland boundary	Undesignated	N/A	Low	Kilpaddoge	504970	647726	0m	1st Edition 6-inch OS map (1837) ;
CH49	Archaeology	Townland boundary	Undesignated	N/A	Low	Kilpaddoge	505176	647731	0m	1st Edition 6-inch OS map (1837) ;
CH50	Built Heritage	Modern access track	Undesignated	N/A	Very Low	Kilpaddoge	505254	648025	0m	Walkover Survey, aerial and satellite imagery
CH51	Archaeology	Parallel field boundaries	Undesignated	N/A	Low	Kilpaddoge	505205	648045	0m	1st Edition 6-inch OS map (1837) ;
CH52	Archaeology & Built Heritage	Limekiln disused	Undesignated	N/A	Low	Kilpaddoge	505206	648043	0m	25-Inch OS map (1892-8)
CH53	Archaeology	Laneway entrance to limekiln	Undesignated	N/A	Low	Kilpaddoge	505640	648093	0m	25-Inch OS map (1892-8)
CH54	Archaeology & Built Heritage	Lime kiln disused	Undesignated	N/A	Low	Kilpaddoge	505685	648103	0m	25-Inch OS map (1892-8)
CH55	Archaeology	Quarry	Undesignated	N/A	Low	Kilpaddoge	504978	647737	0m	25-Inch OS map (1892-8)
CH56	Built Heritage	Benchmark	Undesignated	N/A	Low	Farranawana	504979	647657	68m	25-Inch OS map (1892-8)

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH57	Built Heritage	Benchmark	Undesignated	N/A	Low	Coolnanoonagh	504628	647706	N/A	25-Inch OS map (1892-8)
CH58	Archaeology	Glebe Boundary	Undesignated	N/A	Medium	Coolnanoonagh	504263	647718	0m	25-Inch OS map (1892-8)
CH59	Built Heritage	Benchmark	Undesignated	N/A	Low	Coolnanoonagh	504080	647763	0m	25-Inch OS map (1892-8)
CH60	Built Heritage	Benchmark	Undesignated	N/A	Low	Coolnanoonagh	503479	647732	0m	25-Inch OS map (1892-8)
CH61	Archaeology	Wooded area and junction of townland boundaries	Undesignated	N/A	Low	Carhoonakineely	503562	647788	0m	25-Inch OS map (1892-8)
CH62	Archaeology	Buildings - site of	Undesignated	N/A	Low	Kilpaddoge	505176	648127	20m	25-Inch OS map (1892-8)
CH63	Built Heritage	Pump	Undesignated	N/A	Low	Carhoonakineely	503304	647835	35m	25-Inch OS map (1892-8)
CH64	Built Heritage	Buildings and shed to the rear	Undesignated	N/A	Low	Carhoonakilla	503113	647849	3m	25-Inch OS map (1892-8)
CH65	Built Heritage	Benchmark	Undesignated	N/A	Low	Carhoonakineely	502894	647914	0m	25-Inch OS map (1892-8)
CH66	Built Heritage	Benchmark	Undesignated	N/A	Low	Kilcolgan Lower	502302	647899	0m	25-Inch OS map (1892-8)
CH67	Built Heritage	Smithy	Undesignated	N/A	Low	Kilcolgan Lower	502239	647883	65m	25-Inch OS map (1892-8)
CH68	Archaeology	Spring	Undesignated	N/A	Low	Ralappane	502142	648316	0m	25-Inch OS map (1892-8)
CH69	Archaeology	Well	Undesignated	N/A	Low	Carhoonakilla	503144	647794	44m	25-Inch OS map (1892-8)
CH70	Archaeology	Well	Undesignated	N/A	Low	Farranawana	505166	647692	33m	25-Inch OS map (1892-8)

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH71	Archaeology	Quarry disused	Undesignated	N/A	Low	Kilpaddoge/ Coolnanoonag h	504942	647995	86m	25-Inch OS map (1892-8)
CH72	Archaeology	Laneway	Undesignated	N/A	Low	Kilpaddoge	505067	648059	0m	25-Inch OS map (1892-8)
CH73	Archaeology	Well	Undesignated	N/A	Low	Ralappane	502192	648042	34m	25-Inch OS map (1892-8)
CH74	Archaeology	River	Undesignated	N/A	Medium	Ralappane				1st Edition 6-inch OS map (1837) ; 25-Inch OS map (1892-8)
CH75	Built Heritage	Gate Pier	Undesignated	N/A	Low	Kilcolgan Upper	502414	647906	0m	Not depicted on any historic mapping
CH76	Built Heritage	House	Designated – RPS Ralappane House	KY003-001	High	Ralappane	502655	648293	333m	1st Edition 6-inch OS map (1837) ; 25-Inch OS map (1892-8)
CH77	Built Heritage	Gate Piers	Undesignated	N/A	Low	Carhoonakilla	502769	647909	111m	1st Edition 6-inch OS map (1837) ; 25-Inch OS map (1892-8) .
CH78	Built Heritage	House	Undesignated	N/A	Low	Carhoonakilla	502437	647911	0m	25-Inch OS map (1892-8)
CH79	Built Heritage	Demesne (Pyrmont)_	Undesignated	N/A	Low	Carhoona	504239	647639	423m	1st Edition 6-inch OS map (1837)
CH80	Archaeology	Trigonometrical Station (Site of)	Undesignated	N/A	Low	Kilpaddoge	505596	648221	33m	1st Edition OS Mpa
CH81	Built Heritage	Gate Piers	Undesignated	N/A	Low	Coolnanoonag h	504261	647754	0m	6-Inch Last Edition OS

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
										mapping (c.1914)
CH82	Archaeology	Earthwork/crop mark	Undesignated	N/A	Unknown	Coolnanoonag h	504874	647726	0m	1995 MapGenie b&w image available on the HEV
CH83	Archaeology	Features and deposits+C85 (deposit) C89 (burnt mound material) C84 (fill of possible ring ditch); C92 (fill of cut feature)	Undesignated	N/A	High	Ralappane	502673	648959	537m	Long & O'Malley 2009
CH84	Archaeology	Burnt mound/fulacht fia	Undesignated	N/A	Medium	Ralappane	502682	648762	423m	Long & O'Malley 2009
CH85	Archaeology	Settlement, pits, midden, built heritage	Undesignated	N/A	Medium	Ralappane	502543	648714	253m	Long & O'Malley 2009
CH86	Archaeology	Furrows, linear features	Undesignated	N/A	Medium	Ralappane	502144	648504	0m	Long & O'Malley 2009
CH87	Archaeology	Corn-drying Kiln, linear features, hearth.	Undesignated	N/A	Medium	Ralappane	502245	648456	0m	Long & O'Malley 2009
CH88	Archaeology	Charcoal-rich pits, stone filled features	Undesignated	N/A	Medium	Ralappane	501994	648531	0m	Long & O'Malley 2009
CH89	Archaeology	stone-filled pits, pits	Undesignated	N/A	Medium	Ralappane	502002	648478	16m	Long & O'Malley 2009
CH90	Archaeology	pits, linear features, field boundaries	Undesignated	N/A	Medium	Ralappane	502133	648436	0m	Long & O'Malley 2009

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH91	Archaeology and built heritage	habitation site, postholes, burnt features	Undesignated	N/A	Medium	Ralappane	502265	648071	0m	Long & O'Malley 2009
CH92	Archaeology	Gate Lodge (site of)	Undesignated	N/A	Low	Carhoonakilla	502770	647898	1m	1st Edition 6-inch OS map (1837) and subsequent historic mapping
CH93	Archaeology	Burnt mound/fulacht fia	Undesignated	N/A	Medium	Ralappane	502208	648150	0m	Long & O'Malley 2009
CH94	Archaeology	Stone setting and burnt deposit	Undesignated	N/A	Medium	Ralappane	502171	648584	13m	Long & O'Malley 2009
CH95	Archaeology	Two hearths and a charcoal-rich feature	Undesignated	N/A	Medium	Ralappane	502266	648553	85m	Long & O'Malley 2009
CH96	Archaeology	Curvilinear ditch feature, charcoal rich features.	Undesignated	N/A	Medium	Ralappane	502144	648179	0m	Long & O'Malley 2009
CH97	Archaeology	Post holes, charcoal rich pits.	Undesignated.	N/A	Medium	Ralappane	502020	648212	41m	Long & O'Malley 2009
CH98	Archaeology	Two burnt deposits, likely burnt mounds.	Undesignated	N/A	Medium	Ralappane	502100	648647	40m	Long & O'Malley 2009
CH99	Archaeology	Postholes, charcoal rich pit.	Undesignated	N/A	Medium	Ralappane	502088	648555	0m	Long & O'Malley 2009
CH100	Archaeology	Charcoal production pit	Undesignated	N/A	Medium	Ralappane	502698	648885	530m	25-Inch OS map (1892-8)

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH101	Archaeology	Charcoal rich linear feature and a deposit of heat shattered stone and charcoal.	Undesignated	N/A	Medium	Ralappane	502474	648829	356m	1st Edition 6-inch OS map (1837) ; 25-Inch OS
CH102	Archaeology	Posthole	Undesignated	N/A	Medium	Ralappane	502072	648356	10m	Not depicted on any historic mapping
CH103	Built Heritage	Headland Archaeology Complex D/ Lane EIS CHS 7	Undesignated	N/A	Medium	Ralappane	502683	648931	553m	1st Edition OS
CH104	Archaeology	Laneway	Undesignated	N/A	Low	Ralappane	504000	647782	0m	1st Edition OS
CH105	Archaeology	Ringfort - rath	Recorded Monument	KE003-011----	High	Kilpaddoge	505851	647975	71m	Not depicted on any historic mapping
CH106	Archaeology	Souterrain	Recorded Monument	KE003-010001-	High	Kilpaddoge	505371	647993	71m	1st Edition and later mapping; HEV.
CH107	Archaeology	Ringfort - rath	Recorded Monument	KE003-010----	High	Kilpaddoge	505375	647996	33m	1st Edition and later mapping; HEV.
CH108	Archaeology	Ringfort - rath	Recorded Monument	KE003-009----	High	Kilpaddoge	504988	647857	68m	HEV; 1st Edition and later mapping
CH108	Archaeology	Ringfort - rath	Recorded Monument	KE003-009----	High	Kilpaddoge	504988	647857	68m	HEV; 1st Edition and later mapping
CH109	Archaeology	Souterrain	Recorded Monument	KE003-009001-	High	Kilpaddoge	504988	647857	Minumum 68m	HEV; 1st Edition and later mapping

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH110	Archaeology	Church	Recorded Monument	KE003-008----	High	Carhoona	503618	647620	81.5m	HEV; 1st Edition and later mapping
CH111	Archaeology	Graveyard	Recorded Monument	KE003-008001-	High	Carhoona	503625	647610	81.5m	HEV; 1st Edition and later mapping
CH112	Archaeology	Ogham stone (site of)	Recorded Monument	KE003-070----	High	Carhoona	503916	647589	81.5m	HEV; 1st Edition and later mapping
CH113	Archaeology	Charcoal production pit, possible hearth and possible postholes	Undesignated	N/A	Medium	Ralappane	501979	648460	46m	Long & O'Malley 2009
CH114	Archaeology	Two stony features	Undesignated	N/A	Medium	Ralappane	501928	648476	79m	Long & O'Malley 2009
CH115	Archaeology	Two deposits of burnt mound material in a natural dip in local topography	Undesignated	N/A	Medium	Ralappane	501923	648525	61m	Long & O'Malley 2009
CH116	Archaeology	Linear features, postholes, a large sub-rectangular pit and several burnt mound deposits	Undesignated	N/A	Medium	Ralappane	501919	648575	78m	Long & O'Malley 2009
CH117	Archaeology	Cereal drying kiln and a charcoal rich feature	Undesignated	N/A	Medium	Ralappane	502196	648703	103m	Long & O'Malley 2009
CH118	Archaeology	Brunt mound	Undesignated	N/A	Medium	Ralappane	502405	648660	254m	Long & O'Malley 2009

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
CH119	Archaeology	Charcoal-rich features, stakeholes and linear features	Undesignated	N/A	Medium	Ralappane	502688	648654	395m	Long & O'Malley 2009
CH120	Archaeology	Burnt mound material and a linear feature	Undesignated	N/A	Medium	Ralappane	502198	647931	110m	Long & O'Malley 2009
CH121	Archaeology?	Area of Archaeological Potential	Undesignated	N/A	Medium	Carhoonakineely/ Carhoonakilla	502795 to 503170	648005 to 647855	0m	Roche & Drummond 2023
CH122	Archaeology	Site of building	Undesignated	N/A	Low	Kilpaddoge	505483	648420	7m	25-inch OS map
CH123	Archaeology	Site of 4 buildings	Undesignated	N/A	Low	Kilpaddoge	505586	648452	57m	1st Edition 6-inch OS map (1837); 25-Inch OS map (1838-8)
CH124	Built Heritage	Group of 3 buildings	Undesignated	N/A	Low; local	Kilpaddoge	505819	648365	11m	1st Edition 6-inch OS map; 25-inch OS map
CH125	Built Heritage	Benchmark	Undesignated	N/A	Low; local	Kilpaddoge	505881	648144	23m	25-inch OS map
CH126	Built Heritage	Benchmark	Undesignated	N/A	Low; local	Kilpaddoge	505756	648006	16m	25-inch OS map
CH127	Built Heritage	Buildings, extant	Undesignated	N/A	Low; local	Kilpaddoge	505869	647858	70m	1st Edition 6-inch OS map
CH128	Built Heritage	Benchmark	Undesignated	N/A	Low; local	Carhoona	505879	647848	80m	
CH129	Archaeology	Group of 3 buildings	Undesignated	N/A	Low	Carhoona	503570	647647	58m	1st Edition 6-inch OS map;

CH Receptor No.	Category	Site Type	Designation	RMP/SMR No.	Importance	Townland	ITM_ Easting	ITM_ Northing	Distance[65]	Information Source
										25-Inch OS map
CH130	Archaeology	Well	Undesignated	N/A	Low	Carhoona	503143	647759	78m	25-inch OS map
CH131	Built Heritage	Building	Undesignated	N/A	Low; local	Cockhill/ Carhoona	503551	647696	21m	1st Edition 6-inch OS; Last Edition 6-inch OS map
CH132	Archaeology	Field boundary and path	Undesignated	N/A	Low	Coolnanoonagh	504554	647744	0m	1st Edition OS map, 25-Inch OS map
CH133	Area of Archaeological Potential	Glencloosagh	Undesignated	N/A	High	Coolnanoonagh/ Kilpaddoge	504930	647773	0m	1st Edition 6-inch OS and all subsequent mapping
CH134	Archaeology	Group of 4 buildings	Undesignated	N/A	Low	Kilpaddoge	505910	648115	20m	1st Edition 6-inch OS
CH135	Archaeology	Site of isolated building	Undesignated	N/A	Low	Carhoonakineely	503147	647917	48m	1st Edition 6-inch OS
CH136	Archaeology	Site of isolated building	Undesignated	N/A	Low	Carhoonakineely	503334	647887	93m	1st Edition 6-inch OS
CH137	Archaeology	Site of 2 buildings	Undesignated	N/A	Low	Kilpaddoge	505085	648092	10m	1st Edition 6-inch OS
CH138	Archaeology?	Possible ringfort	Undesignated	N/A	Low	Kilpaddoge	505789	648178	0m	OPW NASC LiDAR; 1996 MapGenie aerial imagery on the HEV
CH139	Archaeology?	Possible ringfort/ enclosure	Undesignated	N/A	Low	Kilpaddoge	505888	648219	0m	OPW NASC LiDAR; 1996 MapGenie aerial imagery on the HEV

15.5 Likely Significant Effects

The Likely Significant Effects arising from the proposed development are considered in this study and are set out below. It is important to note that certain assets and receptors included in the baseline Cultural Heritage Dataset for this study which overlap with other already consented projects, or projects in planning, have been de-scoped from this assessment. This is in consideration of the likely future receiving environment, current and emerging trends, as well as the fact that mitigation for these assets/receptors are likely to have occurred in advance of construction of the subject development. Certain other assets included in the baseline Cultural Heritage Dataset were de-scoped from the assessment because although they occur within the study area, it is considered that there will be no direct or indirect impacts arising through the construction of the proposed development. These assets are listed in Table 15.6 below.

Embedded mitigation measures designed to avoid, prevent, reduce or offset negative effects are incorporated into the project design. These mitigations include avoidance of known and designated cultural heritage assets and offsetting negative effects through preservation by record and dissemination of information on the cultural heritage of the proposed development post-construction.

Table 15.6 Assets Scoped Out of Assessment

CH Asset No.	Site Type	Townland	Rationale
CH03	Building	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH04	Building	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH05	Townland boundary	Kilpaddoge	This asset overlaps with the consented L-1010 Road Widening project
CH06	3 Buildings	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH07	4 Buildings, (site of)	Carhoona	This asset lies beyond the PAB for the proposed development
CH08	Building	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH09	2 buildings	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH010	Building	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH011	Building	Coolnanoonagh	This asset lies beyond the PAB for the proposed development
CH012	2 buildings, one L-shaped	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH013	Building	Coolnanoonagh	This asset lies beyond the PAB for the proposed development
CH014	Ruined building	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH015	2 buildings	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH016	Stream	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH017	Townland boundary	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project

CH Asset No.	Site Type	Townland	Rationale
CH018	Townland boundary	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH019	1 building	Kilpaddoge	This asset overlaps with the consented L-1010 Road Widening project
CH020	2 buildings	Cockhill	This asset overlaps with the consented L-1010 Road Widening project
CH021	Group of 3 buildings	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH022	Building	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH023	Farm complex	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH024	Plantation	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH025	Building	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH026	Building	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH027	2 buildings	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH028	2 buildings	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH029	Building	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH030	Building	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH031	Building	Ralappane	This asset overlaps with the consented L-1010 Road Widening project
CH032	Possible building	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH033	Pond, burnt mound complex Area 26/27 from 2008 testing	Kilcolgan Lower	This asset overlaps with the proposed STEP Power Plant site
CH034	Townland boundaries	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH035	Area 23 burnt mounds and associated features Area 23	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH036/CH88	Buildings Area 14	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH037	Townland boundary; complex of burnt mound deposits and associated features (2008 testing) Area 26/27	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH038	Townland boundary	Ralappane	This asset overlaps with the consented L-1010 Road Widening project
CH039	Laneway	Kilcolgan Upper	This asset overlaps with the consented L-1010 Road Widening project
CH040	Townland boundary	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH041	Road	Carhoonakineely or Carhoona	This asset overlaps with the consented L-1010 Road Widening project
CH042	Townland boundaries	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project

CH Asset No.	Site Type	Townland	Rationale
CH043	Laneway (site of)	Carhoona	This asset overlaps with the consented L-1010 Road Widening project
CH044	Road	Carhoona	This asset overlaps with the consented L-1010 Road Widening project
CH045	Laneway	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH046	Laneway	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH047	Townland boundary	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH050	Modern access track	Kilpaddoge	This is not an archaeological feature
CH056	Benchmark	Farranawana	This asset lies beyond the PAB for the proposed development
CH057	Benchmark	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH058	Glebe Boundary	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH059	Benchmark	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH060	Benchmark	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH061	Wooded area and junction of townland boundaries	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH062	Buildings - site of	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH063	Pump	Carhoonakineely	This asset lies beyond the PAB for the proposed development
CH064	Buildings and shed to the rear	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH065	Benchmark	Carhoonakineely	This asset overlaps with the consented L-1010 Road Widening project
CH066	Benchmark	Kilcolgan Lower	This asset overlaps with the consented L-1010 Road Widening project
CH067	Smithy	Kilcolgan Lower	This asset overlaps with the consented L-1010 Road Widening project
CH068	Spring Area 50	Ralappane	This asset overlaps with the proposed STEP Power Plant
CH069	Well	Carhoonakilla	This asset lies beyond the PAB for the proposed development
CH070	Well	Farranawana	This asset lies beyond the PAB for the proposed development
CH071	Quarry disused	Kilpaddoge/ Coolnanoonagh	This asset lies beyond the PAB for the proposed development
CH073	Well	Ralappane	This asset lies beyond the PAB for the proposed development
CH074	Stream	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH075	Gate Pier	Kilcolgan Upper	This asset overlaps with the consented L-1010 Road Widening project

CH Asset No.	Site Type	Townland	Rationale
CH077	Gate Piers	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH078	House	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH079	Demesne (Pyrmont)_	Carhoona	This asset overlaps with the consented L-1010 Road Widening project
CH080	Trigonometrical Station (site of)	Kilpaddoge	This asset is no longer in situ following field clearance
CH081	Gate Piers	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH083	Features and deposits, burnt mound material; possible ring ditch Area 1	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH084	Burnt mound/fulacht fia Area 2	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH085	Settlement, pits, midden, built heritage Area 6	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH086	Furrows, linear features Area 12	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH087	Corn-drying Kiln, linear features, hearth. Area 13	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH089	Stone-filled pits, pits Area 17	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH090	Pits, linear features, field boundaries Area 18	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH091	Habitation site, postholes, burnt features Area 21	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH092	Gate Lodge (site of)	Carhoonakilla	This asset overlaps with the consented L-1010 Road Widening project
CH093	Burnt mound/fulacht fia Area 28	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH094	Stone setting and burnt deposit Area 31	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH095	Two hearths and a charcoal-rich feature Area 32	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH096	Curvilinear ditch feature, charcoal rich features. Area 33	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH097	Post holes, charcoal rich pits. Area 34	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH098	Two burnt deposits likely burnt mounds. Area 35	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH099	Postholes, charcoal rich pit. Area 36	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH100	Charcoal production pit Area 38	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH101	Charcoal rich linear feature and a deposit of heat shattered stone and charcoal. Area 39	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH102	Posthole Area 50	Ralappane	This asset overlaps with the proposed STEP Power Plant site

CH Asset No.	Site Type	Townland	Rationale
CH103	Lane & O'Malley 2009: Complex D/ Lane EIS CHS 7 Area 38	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH104	Laneway	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project
CH112	Ogham stone (site of)	Carhoona	This is a ‘site of’ an ogham stone, it is no longer in situ
CH114	Two stony features Area 49	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH115	Two deposits of burnt mound material in a natural dip in local topography Area 16	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH116	Linear features, postholes, a large sub-rectangular pit and several burnt mound deposits Area 15	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH117	Cereal drying kiln and a charcoal rich feature Area 10	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH118	Burnt mound Area 8	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH119	Charcoal-rich features, stake holes and linear features Area 5	Ralappane	This asset overlaps with the proposed STEP Power Plant site
CH120	Burnt mound material and a linear feature Area 45	Ralappane	This asset lies beyond the PAB for the proposed development
CH121	Area of Archaeological Potential	Carhoonakineely, Carhoonakilla townlands	This asset overlaps with the consented L-1010 Road Widening project
CH122	Building (site of)	Kilpaddoge	This asset overlaps with the consented L-1010 Road Widening project
CH123	Site of 4 buildings	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH124	3 buildings (site of)	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH125	Benchmark	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH126	Benchmark	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH127	Building - extant	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH128	Benchmark	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH129	Group of 3 buildings (site of)	Carhoona	This asset lies beyond the PAB for the proposed development
CH130	Well	Carhoona	This asset lies beyond the PAB for the proposed development
CH131	Building - extant	Cockhill/Carhoona	This asset lies beyond the PAB for the proposed development
CH132	laneway (site of)	Coolnanoonagh	This asset overlaps with the consented L-1010 Road Widening project

CH Asset No.	Site Type	Townland	Rationale
CH134	Group of 4 buildings (site of)	Kilpaddoge	This asset lies beyond the PAB for the proposed development
CH135	Building (site of)	Carhoonakineely	This asset lies beyond the PAB for the proposed development
CH136	Building (site of)	Carhoonakineely	This asset lies beyond the PAB for the proposed development
CH137	2 buildings (site of)	Kilpaddoge	This asset lies beyond the PAB for the proposed development

15.5.1 Construction Phase

During the Construction Phase of the proposed development works will occur within the PAB that will necessitate some or all of the following:

- Total or partial impact on identified cultural heritage assets
- Impacts on setting or visual amenity of cultural heritage assets
- Impacts on group value of heritage assets
- Changes in hydrology which may indirectly affect cultural heritage assets in the wider landscape
- Noise and vibration impacts which may indirectly affect cultural heritage assets
- Landscaping, spoil bunding/embankments

The impacts on receptors identified through the previous archaeological investigations are described according to general categorisation of assets set out in Section 15.4 above.

This assessment considers that arising from the proposed development relating to direct impacts there will be:

- five direct impacts resulting in a Moderate Significance of Effect on undesignated archaeological receptors;
- eight direct impacts resulting in Not Significant Significance of Effects on undesignated cultural heritage receptors;

In relation to indirect impacts, this assessment considers that there will be:

- two indirect impacts on Recorded Monuments resulting in Significant Significance of Effects;
- two indirect impacts on Recorded Monuments resulting in Slight Significance of Effects;
- two indirect impacts on cultural heritage receptors resulting in Slight Significance of Effects
- three indirect impacts on Recorded Monuments resulting in Not Significant Significance of Effects
- one indirect impact on a RPS structure resulting in Not Significant Significance of Effects.

These are summarized with the receptor detail and CH Reference in Table 15.7 below.

Table 15.7: Summary impact assessment for the proposed development

Significance of Effect	Recorded Monument	RPS	Undesignated Archaeology	Undesignated Built Heritage
Significant (Indirect)	Souterrains CH106, CH109	None	None	None

Moderate (Direct)	None	None	CH82 curvilinear feature CH138, CH139 possible enclosure/ringfort CH52, CH54 lime kilns	None
Slight (Indirect)	Church CH110, Graveyard CH111	None	CH132 boundary/path	CH23 farm complex
Not Significant (Direct)	None	None	CH48, CH49 townland boundary; CH72 laneway CH51 field boundaries. CH01, CH02 buildings (site of); CH53 laneway. CH55 quarry.	None
Not Significant Indirect	Ringforts CH105, CH107, CH108	Ralappane House CH76	None	None

15.5.1.1 Designated Archaeological Heritage

A total of seven Recorded Monuments occur within the study area for the proposed development (Table 15.6; Figure 15.2). Of these, two comprise souterrains (CH106 and CH109) which are sub-surface and not visible and their extents and morphology are not known (see Figure 15.3c). They are not in close proximity to the cable route and are separated from the main area of construction works by existing hedgerows which are not proposed to be removed during construction. Therefore, there will be no permanent impact on the setting of these monuments arising from the proposed development. Indirect negative impacts may occur through vibration and machinery movements during construction. Because of the potential worst-case scenario (collapse of the souterrains through construction-related vibration) there is a potentially Significant and permanent Significance of Effect assessed for both prior to mitigation (see mitigation below).

Three ringfort-rath sites (CH105 (Plate 15.99), CH107 and CH108) in Kilpaddoge townland (see Figure 15.3c) are located within the study area; two of these (CH107 and CH108) are associated with the above souterrain sites. The permanent wayleave and PAB has been specifically designed to avoid any impact on the ZoN for ringfort CH107; the ZoN for CH108 is over 30m from the PAB, and over 50m from the ZoN of CH105. Because the sites will not be directly impacted by works during construction, the predicted impact will be indirect on setting, and temporary in duration arising from machinery movements and groundworks in the fields to the north, the Significance of Effect of the proposed development on these assets is therefore assessed as Not Significant.

Regarding indirect impacts (setting) on CH110 (Kilnaughtin Church (Plate 15.48; Figure 15.3b)) and CH111 (Kilnaughtin graveyard), the setting and siting of these monuments is clearly designed to take advantage of local topography, and this contributes to the importance of the assets. They are effectively at the head of a localised narrow and shallow valley between two roughly east-west orientated ridges stretching between Ralappane-Coolnanoonagh townlands on the north and Cockhill-Carhoona on the south (Plate15.98). The local L-1010 road extends through this valley, and the Glebe lands (CH58) associated with Kilnaughtin Parish are in full view from the church. The Significance of Effect of these works will have been previously assessed as part of the Archaeological Impact Assessment for that project in Part 8 planning and there is no further predicted impact arising through the construction of the proposed development. Given the distance of the PAB from the Zone of Notification for these monuments (just over 50m) there is some potential for dust and vibration to temporarily impact on these monuments, however, the magnitude of impact is low and Significance of Effect is therefore Slight.

The site of discovery of an ogham stone (CH112), which is no longer in its original location is recorded in association with CH110 and CH111. This stone was found in 1836, c. 6 feet from the southeastern angle of the church (CH110) by an Antiquarian; it is now housed in the Pitt-Rivers Museum in Oxford. There is no predicted impact on this asset.

Table 15.8: Summary Impact Assessment on Designated Archaeological Heritage

CH Ref.	RMP Ref	Type	Townland	Importance	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH105	KE003-011----	Ringfort - rath	Kilpaddoge	High	Indirect Negative	Very Low	Not Significant	Temporary
CH106	KE003-010001-	Souterrain	Kilpaddoge	High	Indirect Negative	Very High	Significant	Permanent
CH107	KE003-010----	Ringfort - rath	Kilpaddoge	High	Indirect Negative	Very Low	Not Significant	Temporary
CH108	KE003-009----	Ringfort - rath	Kilpaddoge	High	Indirect Negative	Very Low	Not Significant	Temporary
CH109	KE003-009001-	Souterrain	Kilpaddoge	High	Indirect Negative	Very High	Significant	Permanent
CH110	KE003-008----	Church	Carhoona	High	Indirect Negative	Low	Slight	Temporary
CH111	KE003-008001-	Graveyard	Carhoona	High	Indirect Negative	Low	Slight	Temporary
CH112	KE003-070----	Ogham Stone (site of)	Carhoona	High	N/A	N/A	N/A	N/A

15.5.2 Designated Built Heritage Impact Assessment

There are no designated built heritage sites included on the Record of Protected Structures (RPS) for County Kerry within the study area. However, one site – the eighteenth-century Ralappane House (CH76), is located c. 290m from the eastern limit of the study area around the proposed laydown areas and construction compound in the same townland. CH76 has direct views some 340m southwards to the L-1010 road (Plate 15.39; Plate 15.40), and views westwards and northwest-wards towards the Shannon Estuary (see Plate 15.41). The views from Ralappane House itself are somewhat occluded by mature and semi-mature trees and shrubs, as well as existing walls forming part of the curtilage around the main house. There will not be any direct physical impact, however noise and dust as well as machinery movements in the area during construction may temporarily and indirectly impact the setting of this asset, resulting in a significance of effect which is Not Significant. More significant impact on views and setting from Ralappane House will occur in the event of existing trees and shrubbery around the buildings being removed. Planting of trees and screening vegetation around the proposed sub-station site may offset any potential visual impact relating to the sub-station site.

Table 15.9: Impact assessment on Designated Built Heritage

CH Ref.	RPS Ref	Type	Townland	Importance	Type & Quality of Impact	Magintude of Impact	Significance of Effect	Duration of Effect
CH76	RPS-KY-087	Ralappane House	Ralappane	Regional	Indirect Negative	Low	Not Significant	Temporary

15.5.3 Undesignated Archaeological Heritage Impact Assessment

The potential impact for the majority of the assets identified in this study relate to the assessment of cumulative impacts, and the assessment for each is included in Section 15.6 below.

The impact assessment of undesignated cultural heritage features relating to the subject project only is subdivided into the following categories and presented below:

- Industrial heritage features
- Archaeological features identified in previous investigations
- Areas of archaeological potential identified through geophysical surveys, aerial/satellite imagery and LiDAR analysis
- Natural heritage/topographic features of archaeological potential

15.5.3.1 Undesignated townland boundaries, roadside boundaries, field boundaries, topographic features

Regarding boundaries or at the junction of townland boundaries, Direct Negative impacts will occur at four locations within the proposed development.

The Significance of Effect of the proposed development on four townland boundaries is predicted to be Slight or Not Significant, including on CH49, the boundary between Farranawana and Kilpaddoge. The total length of the boundary to be removed is c. 30m, representing a fraction of the overall length of the boundary which will otherwise be retained in situ. Similarly, approximately 60m of the junction of three townland boundaries (CH48) at Kilpaddoge, Farranawana and Coolnanoonagh will be directly impacted at the offline section of works at the southern entrance to Glencloosagh Glen (CH133). Although acknowledged that the junction of such boundaries can be places of archaeological importance, the assessment here is Not Significant since previous works (historic quarrying and road works) are likely to have disturbed any potential archaeology here.

In Coolnanoonagh townland a field boundary (CH132), –no longer extant, is depicted on the first-edition six-inch OS mapping, and which is flanked by a laneway or path on the 25-inch map edition. There is no evidence for this asset in the field, however the proposed development will potentially impact 51m of the original 172m length of the boundary/path. It is unclear what, – if anything of this asset survives sub-surface, and the Significance of Effect is predicted as being Slight.

Two parallel field boundaries (CH51; Plate 15.71) in Kilpaddoge townland are not extant and were not identified during the walkover survey. The spacing (15m apart) of these boundaries in relation to the adjacent large open fields depicted on the first-edition six-inch mapping (Figure 15.4d) makes them an unusual feature. It may be that these boundaries represent pre-famine sub-division of tenant small-holdings. However, the potential also remains for these to represent earlier organization of the landscape. For this reason they are considered to be of low archaeological importance, but the Significance of Effect of the potential direct impact is Not Significant

Table 15.10: Impact Assessment on Undesignated Townland, Roadside and Field Boundaries

CH Ref.	Type	Townland	Importance	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH48	Towland boundary	Farranawana/Kilpaddoge/Coolnanoonagh	Low	Direct, Negative	Low	Not Significant	Permanent
CH49	Townland boundary	Farranawana and Kilpaddoge	Low	Direct, Negative	Low	Not Significant	Permanent
CH51	Parallel field boundaries (site of)	Kilpaddoge	Low	Direct, Negative	Low	Not Significant	Permanent
CH132	Boundary/path	Coolnanoonagh	Low	Direct Negative	Medium	Slight	Permanent

15.5.3.2 Undesignated Vernacular Heritage (Archaeological)

Almost 60 structures including buildings, groups of buildings, gates and gate piers and a pump were identified on historic mapping or through walkover surveys within the study area. These were determined to be archaeology, where no surface expression surveyed, and to be built heritage where elements were extant. The majority of these assets were noted on the first-edition six-inch OS map of 1837, and no topographic expression in the form of earthworks or cropmarks was identified for in the field. For this reason, and in the absence of advance works geophysical survey or archaeological testing at these locations, it is not possible to determine accurately what (if anything) of these structures survives as sub-surface archaeology. The majority of these structures originally fronted onto the L-1010 road and are scoped out of the assessment for that reason as they overlap with the L-1010 Road Widening project. Others overlap with the proposed STEP Power Plant and are scoped out of the assessment. Similarly, other assets in this group lie beyond the PAB and will not be impacted by the proposed development.

The site of a former building CH01 is likely to have been destroyed through previous development works (Plate 15.74) and the impact is assessed as potential Not Significant for that reason. Similarly, CH02, which may previously have been previously impacted during development works via installation of a pylon in Farranawana townland (see Plate 15.77 for context). The magnitude of impact is considered potentially low for that reason and the significance of effect is potentially Not Significant.

15.5.3.3 Undesignated Vernacular Heritage (Built Heritage)

During the walkover survey in March 2024, a number of assets mapped on historic cartographic sources were targeted for inspection, and in a number of instances elements of these structures or features were found to be extant. For that reason they were categorised as built heritage elements although it is likely that additional sub-surface archaeological elements of the original structures survive as yet undetected in the relevant areas.

Indirect impacts are predicted on one receptor, namely at a working farm complex (CH23) in Carhoona townland lies beyond the study area, however, since it is recorded on the first-edition six-inch OS mapping it is drawn into the assessment as a potentially sensitive receptor. Predicted impacts will arise through dust and noise during construction, but these are considered to be temporary. Since this asset is for the main part shielded from view of the local L-1010 road by an east-west ridge running roughly parallel to the road there is no setting or predicted visual impact. The Significance of Effect is therefore considered to be Slight.

Table 15.11: Impact Assessment of Undesignated Vernacular Heritage Depicted on Historic Mapping

CH Ref.	Description Type	Source	Townland	Importance/ Rating	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH01	2 buildings including 1 ruin	1st Ed. OS (1837)	Kilpaddoge	Low	Direct, Negative	Low	Not Significant	Permanent
CH02	Building	1st Ed. OS (1837)	Farranawana	Low	Direct, Negative	Low	Not Significant	Permanent
CH23	Farm complex	1st Ed OS (1837)	Carhoonakilla	Medium/local	Indirect Negative	Low	Slight	Temporary

15.5.3.4 Undesignated Industrial Heritage and features of Scientific Interest

There are two former lime kiln sites (CH52 and CH54; Plate 15.62; Plate 15.66) within the study area in Kilpaddoge townland, both of which are indicated as being disused on the 25-Inch OS mapping. Of these, the area around CH52 was subject to archaeological investigations by Dunne (2016), and no trace of this feature was identified. This does not preclude the potential for sub-surface traces of this feature to exist in the vicinity of the test trenches, and because of potential cartographic errors in historic mapping. A slight depression in the field at the location of CH54 may indicate the presence of the former kiln, but this can only be verified through further investigation. There is a Direct Negative impact predicted for both, and the Significance of Effect (considering worst case scenario that they are intact sub-surface) is Moderate.

Table 15.12: Undesignated Industrial Heritage and features of Scientific Interest

CH Ref.	Type	Townland	Importance	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH52	Limekiln (Disused)	Kilpaddoge	Low	Direct Negative	High	Moderate	Permanent
CH54	Limekiln (Disused)	Kilpaddoge	Low	Direct Negative	High	Moderate	Permanent

15.5.3.5 Archaeological features identified in 2008 testing

A total of 23 archaeological Areas identified as part of the 2008 programme of archaeological testing in Ralappane and Kilcolgan Lower townlands occur within or immediately adjacent to the proposed development and study area. These features have been scoped out of the assessment here since they overlap with the proposed STEP Power Plant development (see Table 15.12 above).

15.5.4 Impacts on potential archaeological assets identified in aerial/satellite imagery, previous geophysical survey and LiDAR analysis

A very distinct curvilinear feature (CH82) measuring 41.2m in maximum diameter was identified in the 1995 black and white MapGenie imagery available on the HEV (see Figure 15.7b; Plate 15.77 for general location). It occurs on the western side of Glencloosagh glen at its southern limit and corresponds broadly with the siting of ringfort-rath CH108 on the eastern side of the same glen. This feature was not identified in Trench 4 of Connelly's 2020 archaeological testing for widening of the L-1010 road[66] in this area, and its archaeological potential is considered therefore, to be low. However, it should be borne in mind that this curvilinear feature could have been impacted through the construction of the original L-1010 road, and it is possible that previously unrecorded archaeology could survive immediately to the north within the PAB. Because the road is already widened here as part of the previous L-1010 works (Phase 1) the proposed cable route directly impacts on this feature here, and the Significance of Effect is Moderate considering the worst-case scenario that this feature is a previously unrecorded ringfort or enclosure.

Two potential ringforts or possible enclosures (CH138 and CH139; Figure 15.7a; Plate 15.62 for general directional view) in Kilpaddoge townland were identified post-walkover survey; nothing to suggest their presence was noted during inspection. The location offers commanding views

[66] These road works were undertaken as part of the Listowel Municipal Discrict 2022 Restoration Improvement Programme which included 835m of works along the L-1010 at Kilpaddoge Power Station – N-69. Information available at: http://docstore.kerrycoco.ie/KCCWebsite/mdreports/listowel/roads.pdf According to this report the Specific Improvement Grants *'Construction works have been substantially completed on phase 1 of the scheme having regard to available funding'*. [Accessed 14 July 2024].

across the landscape in all directions. Both features were identified in analysis of OPW NASC LiDAR data on the Open Topographic Viewer. The data-capture for this survey is at 2m; 0.5m capture is preferred for identification of archaeology. In spite of this limitation, the first of these features (CH138) appears as a distinct ditched anomaly which is clearly discernible in the centre of the rushy field. Its dimensions (29m north-south and 38m east-west) correspond with the general trend for ringforts in Ireland, and other recorded ringforts occur in the immediate vicinity (CH105, CH106 and CH108). This feature is also clearly discernible as a circular cropmark in both the 1996 to 2000 and 2006 to 2012 MapGenie aerial imagery on the HEV. The latest (2013 to 2018) HEV imagery shows that the construction of a pylon immediately to the east of CH138 may have impacted on the eastern limit of this feature. It is possible that archaeological testing and/or monitoring was undertaken as part of those construction works for which no full report is available This potential site lies entirely within the PAB, and within a Temporary Laydown Area for the proposed development. Considering the worst-case scenario of a High magnitude of impact the Significance of Effect on this receptor is Moderate.

The second potential ringfort (CH139) occurs 71m to the east of CH138 and almost half of it lies within the PAB. This feature appears to be more sub-oval in shape, measuring 31m north-south and 30m east-west. Some ephemeral traces of a possible internal bank on its western side are noted in the LiDAR data, with possible evidence for a ditch on the southeastern side. No clear evidence for this feature was noted in the aerial/satellite imagery on the HEV. The proposed permanent wayleave will directly impact on the western limit of this potential asset, but the Significance of Effect is Moderate in the absence of advance works survey and testing.

Table 15.13: Impacts on potential archaeological assets identified in aerial/satellite imagery, previous geophysical survey and LiDAR analysis

CH Ref.	Description Type	Importance	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH82	Archaeology – possible enclosure?	Low	Direct, Negative	High	Moderate	Permanent
CH138	Archaeology – possible ringfort?	Potential High	Direct Negative	High	Moderate	Permanent
CH139	Archaeology – possible enclosure?	Potential High	Direct Negative	High	Moderate	Permanent

15.5.5 Impacts on Other Cultural Heritage Receptors

A total of three no. laneways and roads included on historic mapping will be impacted by the proposed development via construction traffic within the permanent wayleave traversing each. In the majority of cases, these are included on the first-edition OS mapping and therefore pre-date the survey for that mapping but can be directly linked to the site of buildings.

A potential direct negative impact (construction traffic, site clearance works) will occur on the site of a laneway (CH53) depicted on the last-edition six-inch OS map (1914-5) and the 25-inch OS map. This asset does not have any surviving topographic expression in the field. The historic mapping shows this lane connecting to the site of a lime kiln (CH52), flanked by a field boundary. This feature was subject to archaeological testing in 2019; Test Trench 21 of that work transected the line of this former lane; no archaeological evidence for it was noted by the excavator (Dunne 2020, 6). The Significance of Effect arising from the proposed development is therefore considered to be Not Significant.

An extant laneway (CH72) in Kilpaddoge with high stone-lined field banks resembling in part a hollow-way will be directly impacted. This lane is shown on the first-edition OS map which allows access from the local L-1010 road in the south almost to the Shannon Estuary in the north. The laneway narrows slightly where it is in proximity to ringfort-rath CH106. A total of 358m of the laneway lies within the PAB and will be directly impacted by the cable route. The archaeological potential of this laneway is considered to be low, however, given the extent of the laneway which will be impacted (Medium) the overall Significance of Effect is assessed as Not Significant.

Two areas of quarrying (CH55 and CH71) are depicted on the historic mapping (first-edition six-inch OS) in Kilpaddoge townland and it is possible that former building CH01 was related to the quarrying activity. The quarries occur at either side of Glencloosagh glen; there is no predicted impact on CH71. By the time of the survey for the 1982 25-inch OS map the quarries were disused. There is potential for quarrying activity in this glen to date to the medieval (or earlier) period, and the fact that intangible cultural heritage sources link the monks of Lisnaughtin to the glen may indicate this was an extraction point for building materials for the churches etc in the wider area. However, the overall Significance of Effect arising through the direct impact on receptor CH55 is Not Significant.

Table 15.14: Impacts on Other Cultural Heritage Receptors

CH Ref.	Description Type	Importance	Type & Quality of Impact	Magnitude of Impact	Significance of Effect	Duration of Effect
CH53	Laneway	Low	Direct Negative	Low	Not Significant	Permanent
CH55	Quarry (site of)	Low	I Direct Negative	Low	Not Significant	Permanent
CH72	Laneway	Low	Direct, Negative	Low-Medium	Not Significant	Permanent

15.5.6 Cross Factor Climate Change Effects to Cultural Heritage

Primary climate change impacts have the potential to affect Cultural Heritage in a number of ways (DCHG 2017). The priority negative impacts of the proposed scheme are likely to be soil movement (landslip/erosion) caused by intense rainfall, long dry periods, storms, and changing burial-preservation conditions (e.g. desiccation, acidification) caused by long dry periods and temperature rise, and inland flooding, caused by rainfall.

The proposed location for the proposed development partly includes some areas of alluvium and wetland where previous investigations have demonstrated the archaeological potential in Ralappane and Kilcolgan Lower townlands. In addition to being ecologically important landscapes, such areas are archaeologically rich, and can be particularly susceptible to the effects of climate change. Actions involving the construction, operation and decommissioning are likely to exacerbate these impacts. These include dewatering in wetland areas (such as the low-lying environment in Ralappane townland where ponds and streams occur and where previous archaeological testing works identified a multitude of archaeological features typical of wetland environments), which may result in a reduction in water table and changes to groundwater distribution and flow. This action can accelerate bogslides and landslips in upland areas, which can in turn impact known archaeological sites. The predicted impact for the proposed development in this regard is considered to be Not Significant for recorded archaeological sites in the vicinity.

Diverting rivers and streams or in-stream works is another action which may cause damage to archaeological sites due to flooding. The impacts of this flooding can be long lasting and may exacerbate natural fluvial, pluvial and groundwater flooding, which has the potential to damage Cultural Heritage sites. It can cause structural damage, partial loss or complete loss of built and archaeological heritage owing to velocity of streams and dynamic impact of floating objects, inaccessibility of flood-affected areas owing to damage to public roads and infrastructure, potential contamination of built and archaeological heritage and collections by flood water and deterioration in the drying-out phase (e.g. salts, microbiological activity), potential loss of historic fabric during flood prevention works, emergency response and post flood recovery and rebuilding. The predicted impact on Cultural Heritage arising from the proposed development in this regard is assessed as not applicable since no proposal to divert any river or stream is proposed in the project design.

Changing groundwater patterns may also exacerbate decay of organic remains, which can be assessed to have a slight impact. The proposed mitigation strategy for archaeological sites identified in previous investigations is preservation by record. This means that all archaeology within the proposed development areas will be resolved and not subject to effects arising from changing groundwater patterns. The predicted impact on Cultural Heritage in this regard is assessed as not applicable since no change in groundwater patterns is proposed in the project design. Operation and Maintenance Phase

The predicted impacts arising from the proposed development are predicted to relate to the construction phase and there are no further impacts predicted during the operation and maintenance phase. There is no requirement for additional mitigation measures during the operational and maintenance phase for that reason.

15.5.7 Decommissioning Phase

Subject to the granting of statutory approval, the EirGrid/ESBN substation~~s~~ and grid connections will form part of the national electrical grid infrastructure. The design life of the substation is approximately 40 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned. It is not intended to decommission the proposed electricity cabling. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

The SLNG substation is expected to have a design life of 25 years. Where decommissioning takes place, all above-ground components associated with the substation will be disassembled and removed from the site and effects are likely to be similar or of a lesser magnitude than the construction effects.

During the Decommissioning Phase there is very low potential for changes to hydrology to occur which could result in dewatering of wetland areas, a reduction in water table and changes to groundwater distribution and flow. This action can accelerate bogslides and landslips in upland areas, which can in turn impact known archaeological sites. The predicted impact for the proposed development in this regard is considered to be not applicable for recorded archaeological sites in the vicinity and there is no requirement for additional mitigation measures during this Phase.

15.6 Cumulative Effects

Cumulative effects are described as 'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects' (EPA 2022, 52). In this instance, the baseline includes the subject proposed development, and additional schemes considered to be of a context, nature and scale to be relative to the cumulative assessment for likely significant effects in the impact assessment. Those projects include the following projects and associated tables showing cumulative impact assessments for Cultural Heritage receptors that overlap between projects

15.6.1 SLNG Strategic Gas Reserve Facility

This Project is the subject of a SID pre-application (ABP-319245-24) comprising a floating storage and regasification unit, jetty and access trestle, onshore receiving facilities and ancillary works. The Project is likely to impact on the landscape character of the surrounding area, which is predominantly rural, pastoral and agricultural. The setting of cultural heritage assets is likely to be indirectly impacted by the construction of this facility, such as indirect impacts that will occur on adjacent ringforts (SMR KE003-004 and KE003-005) as well as on Ralappane House (CH76), which is a Protected Structure. These impacts will occur during construction via noise, dust, vibration and visual amenity; the views from the House to the shore to the northeast will be interrupted.

This project is likely to Directly Impact on archaeological heritage and will be subject to archaeological investigations in agreement with the Kerry County Council Archaeologist and the NMS.

The cumulative impact assessment for receptors common to both the subject proposed project and the STEP Power Plant proposed development are set out in Table 15.14 below.

15.6.2 Combined Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS)

A planning application was lodged with An Bord Pleanála on 19th April 2024 (ABP-PA08.319566). Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works.

The Project is likely to impact on the landscape character of the surrounding area, which is predominantly rural, pastoral and agricultural. The setting of cultural heritage assets is likely to be indirectly impacted by the construction of this facility, and indirect impacts will occur.

In the event of planning for this facility being consented, all previously identified archaeology common to both the proposed development and the STEP Power Plant as identified in this EIAR will have been archaeologically resolved. This would reduce the overall Significance of Effect of the subject proposed development for Cultural Heritage. The assets that overlap with the proposed STEP Power Plant presented in Table 15.15 below:

Table 15.15: Assets Overlapping with STEP Power Plant

CH Ref.	Type	STEP Power Plant Mitigation Area
CH032	Possible building	Entrance off L-1010
CH033	Pond, burnt mound complex Area 26/27 from 2008 testing	Area 26/27
CH034	Townland boundaries	Entrance off L-1010
CH035	Area 23 burnt mounds and associated features	Area 23
CH036/CH88	Buildings	Area 14

CH037	Townland boundary: complex of burnt mound deposits and associated features (2008 testing)	Area 26/27
CH068	Spring	Area 50
CH083	Features and deposits, burnt mound material; possible ring ditch	Area 1
CH084	Burnt mound/fulacht fia	Area 2
CH085	Settlement, pits, midden, built heritage	Area 6
CH086	Furrows, linear features	Area 12
CH087	Corn-drying Kiln, linear features, hearth.	Area 13
CH089	stone-filled pits, pits	Area 17
CH090	pits, linear features, field boundaries	Area 18
CH091	habitation site, postholes, burnt features	Area 21
CH093	Burnt mound/fulacht fia	Area 28
CH094	Stone setting and burnt deposit	Area 31
CH095	Two hearths and a charcoal-rich feature	Area 32
CH096	Curvilinear ditch feature, charcoal rich features.	Area 33
CH097	Post holes, charcoal rich pits.	Area 34
CH098	Two burnt deposits, likely burnt mounds.	Area 35
CH099	Postholes, charcoal rich pit.	Area 36
CH100	Charcoal production pit	Area 38
CH101	Charcoal rich linear feature and a deposit of heat shattered stone and charcoal.	Area 39
CH102	Posthole	Area 50
CH103	Lane & O'Malley 2009: Complex D/ Lane EIS CHS 7	Area 38
CH113	Charcoal production pit, possible hearth and possible postholes	Area 20
CH114	Two stony features	Area 49
CH115	Two deposits of burnt mound material in a natural dip in local topography	Area 16
CH116	Linear features, postholes, a large sub-rectangular pit and several burnt mound deposits	Area 15
CH118	Burnt mound	Area 8
CH119	Charcoal-rich features, stake holes and linear features	Area 5
CH120	A deposit of burnt mound material and a linear feature.	Area 45

15.6.3 Shannon Gas Pipeline

Planning permission exists for the development of a 26km natural gas pipeline which will facilitate connection from the STEP facility to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.

The Project is likely to impact on the landscape character of the surrounding area, which is predominantly rural, pastoral and agricultural. The setting of cultural heritage assets is likely to be indirectly impacted by the construction of this facility, and indirect impacts will occur.

Where geophysical survey (Roche and Drummond 2023) was undertaken in overlapping project areas, identified anomalies could represent the remains of structures or buildings (CH26, CH27, CH28, CH29 and CH30) as well as garden plots, field boundaries, pits, and a potential prehistoric ring-ditch (geophysical survey anomaly 0.5-47) in Carhoona townland. The proposed development has the potential to negatively impact on these features as shown in the historic mapping. The geophysical survey anomalies 0.5-03 to 0.5-46 (included within an Area of Archaeological Potential (CH121) in the subject report) have not been archaeologically tested to verify their authenticity as archaeological features. These features have been de-scoped from the assessment as they overlap with the Kerry Co. Council L-1010 road widening project.

15.6.4 Data Centre Campus

A Data Centre Campus – as part of the STEP Masterplan, a data centre campus is proposed to the west of the STEP site and will be subject to a separate planning application

The Project is likely to impact on the landscape character of the surrounding area, which is predominantly rural, pastoral and agricultural. The setting of cultural heritage assets is likely to be indirectly impacted by the construction of this facility, and indirect impacts will occur.

15.6.5 Kerry County Council L-1010 Proposed Road Upgrade

In 2020, Kerry County Council undertook road widening works along a c. 835m stretch of the L-1010 (see Connolly, 2020), and have Part 8 Consent (since 2010 and 2013) to extend these works westwards to Ralappane and Kilcolgan Lower townlands. The road widening must occur to facilitate the construction of both the STEP Power Plant and Grid Connection projects if they are also consented. It is anticipated that the L-1010 works will be completed in advance of construction of the subject proposed development and therefore the majority of on-line features or features immediately fronting onto the L-1010 road as identified in this EIAR will have been archaeologically resolved and will reduce the overall Significance of Effect of the proposed development on cultural heritage. Notwithstanding this, there will be cumulative impacts on the setting and visual amenity of the Recorded Monuments within and immediately adjacent to the study area, including on CH110, and CH111 (Kilnaughtin Church, Graveyard). There will also be cumulative impacts on undesignated heritage features including Glebe boundary (CH58), several townland boundaries (CH37, CH38, CH40, CH42 CH49 and CH49). The Project is likely to impact on the landscape character of the surrounding area through the removal of these boundaries, which may be of considerable antiquity.

The assets and receptors subject to the road widening works are presented in Table 15.16 below.

Table 15.16: Assets overlapping with Kerry Co. Council L-1010 Road Widening Project

CH Ref.	Description / Type	Townland
CH03	Building	Coolnanoonagh
CH04	Building	Coolnanoonagh
CH006	3 Buildings	Coolnanoonagh
CH007	4 Buildings, (site of)	Carhoona
CH008	Building	Coolnanoonagh
CH009	2 buildings	Coolnanoonagh
CH010	Building	Coolnanoonagh
CH011	Building	Coolnanoonagh
CH012	2 buildings, one L-shaped	Coolnanoonagh
CH013	Building	Coolnanoonagh
CH014	Ruined building	Coolnanoonagh
CH015	2 buildings	Coolnanoonagh
CH016	Stream	Coolnanoonagh
CH017	Townland boundary	Coolnanoonagh
CH018	Townland boundary	Coolnanoonagh
CH019	1 building	Kilpaddoge
CH020	2 buildings	Cockhill

CH021	Group of 3 buildings	Carhoonakineely
CH022	Building	Carhoonakilla
CH023	Farm complex	Carhoonakilla
CH024	Plantation	Carhoonakilla
CH025	Building	Carhoonakilla
CH026	Building	Carhoonakineely
CH027	2 buildings	Carhoonakineely
CH028	2 buildings	Carhoonakineely
CH029	Building	Carhoonakineely
CH030	Building	Carhoonakineely
CH031	Building	Ralappane
CH038	Townland boundary	Ralappane
CH039	Laneway	Kilcolgan Upper
CH040	Townland boundary	Carhoonakilla
CH041	Road	Carhoonakineely or Carhoona
CH042	Townland boundaries	Coolnanoonagh
CH043	Laneway (site of)	Carhoona
CH044	Road	Carhoona
CH045	Laneway	Coolnanoonagh
CH046	Laneway	Coolnanoonagh
CH047	Townland boundary	Coolnanoonagh
CH057	Benchmark	Coolnanoonagh
CH058	Glebe Boundary	Coolnanoonagh
CH059	Benchmark	Coolnanoonagh
CH060	Benchmark	Coolnanoonagh
CH061	Wooded area and junction of townland boundaries	Carhoonakineely
CH062	Buildings - site of	Kilpaddoge
CH063	Pump	Carhoonakineely
CH064	Buildings and shed to the rear	Carhoonakilla
CH065	Benchmark	Carhoonakineely
CH066	Benchmark	Kilcolgan Lower
CH067	Smithy	Kilcolgan Lower
CH070	Well	Farranawana
CH071	Quarry disused	Kilpaddoge/ Coolnanoonagh
CH075	Gate Pier	Kilcolgan Upper
CH077	Gate Piers	Carhoonakilla
CH078	House	Carhoonakilla
CH079	Demesne (Pyrmont)_	Carhoona
CH081	Gate Piers	Coolnanoonagh
CH092	Gate Lodge (site of)	Carhoonakilla
CH104	Laneway	Coolnanoonagh
CH121	Area of Archaeological Potential	Carhoonakineely, Carhoonakilla townlands
CH122	Building (site of)	Kilpaddoge
CH129	Group of 3 buildings (site of)	Carhoona
CH130	Well	Carhoona
CH131	Building - extant	Cockhill/Carhoona
CH132	laneway (site of)	Coolnanoonagh
CH134	Group of 4 buildings	Kilpaddoge
CH135	Building (site of)	Carhoonakineely
CH136	Building (site of)	Carhoonakineely

15.7 Mitigation and Monitoring

15.7.1 Construction Phase

As previously referred to, there is overlap between the STEP Power Plant, and the L-1010 road widening project. SLNG will be responsible for the mitigation and monitoring of the proposed development, and all other mitigation relating to the overlapping cultural heritage assets (see Appendix 15.1 for full details) will fall to the various agencies involved in the project design for each of these projects. It is beyond the scope of this study to propose mitigation for schemes where mitigation is already consented or included in 'live' planning application.

The mitigation proposed is in accordance with the Department's (1999) Framework and Principles for the Protection of the Archaeological Heritage, from which the Kerry County Council policies and objectives for the protection of archaeological heritage are derived (see Section 15.2.4.3 above).

In terms of mitigation, general principles are proposed which include the following:

- A full archaeological mitigation strategy to be agreed in consultation with both the Kerry County Council Archaeologist and the NMS post-consent and in advance of any on-site works taking place. Sufficient time will be allowed in programme to undertake early advance works already agreed through consultation with NMS, and the results of any advance works will further inform archaeological mitigation required for the proposed development.
- All/any greenfield portions of the proposed development where previously unidentified sites or potential archaeological sites have been noted will be subject to advance works geophysical survey (where suitable, and not precluded by the presence of overhead power lines, etc).
- All/any greenfield/offline portions of the proposed development that have not been previously subject to archaeological testing will be tested by a suitably qualified archaeologist in consultation with the Kerry Co. Council Archaeologist and under licence from the NMS in compliance with the relevant legislation, policy and guidelines. The results of this work will inform further archaeological mitigation where/if required, the scope of which will be agreed in advance with the Kerry County Council Archaeologist and in consultation with the NMS.
- Townland boundaries within the proposed development area to be subject to townland boundary surveys, including archaeological testing of same, under licence by a suitably qualified archaeologist, in consultation with the Kerry Co. Council Archaeologist and NMS. The results of this work will inform the requirement for further archaeological mitigation where necessary.
- Architectural heritage surveys of all extant vernacular buildings/structures to be directly or potential directly impacted by the proposed development to be subject to Built Heritage Surveys in accordance with relevant guidance, and in consultation with the Kerry Co. Council Archaeologist.
- That archaeological monitoring confined to areas where advance archaeological works were not feasible will be undertaken by a suitably qualified archaeologist during construction.
- That the results of all archaeological works associated with the proposed development be disseminated both locally (through local lectures) and to the wider public through publications. These measures will be used to offset the overall Significance of Effect of the proposed development on cultural heritage.

Detailed site-specific mitigation for receptors where impacts occur are set out in Table 15.17 below:

Table 15.17: Site specific mitigation measures

CH Receptor No.	Site Type	Townland	Mitigation Type	Mitigation Details
CH001	2 Buildings - including 1 ruin (site of)	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing, depending on the nature of results of survey.
CH002	Building	Farranawana	Preservation by record	Geophysical Survey followed by archaeological testing, depending on the nature of results of survey.
CH048	Townland boundary	Kilpaddoge	Preservation by record	Once the construction area is cleared of vegetation in this area a full topographic survey and townland boundary survey will be undertaken to see if anything of a physical boundary survives, with advance works testing to ascertain same. Further mitigation may be required thereafter, depending on the results of surveys and inspection.
CH049	Townland boundary	Kilpaddoge	Preservation by record	Advance works townland boundary survey and archaeological testing to ascertain the nature and potential age of the boundary feature within the CPO extents. Further archaeological works such as resolution and/or monitoring may also be required.
CH051	Parallel field boundaries	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of these boundaries survive in situ. Further archaeological works may be required pending the results of testing.
CH052	Limekiln disused	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything of the sub-surface remains of the kiln survive below present ground level. Depending on the results of that work, further archaeological mitigation may be required either to resolve, monitor during construction or preserve in situ.

CH Receptor No.	Site Type	Townland	Mitigation Type	Mitigation Details
CH053	Laneway entrance to limekiln	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of this laneway and early field boundary survive within the PAB boundary. Depending on the results of that work, further archaeological mitigation may be required to either resolve, monitor during construction or preserve in situ.
CH054	Lime kiln disused	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of this kiln survive. Further archaeological works may be required pending the results of testing.
CH055	Quarry	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what, if any evidence of archaeological activity associated with the quarry or earlier prehistoric features in this area survive sub-surface below present ground level. Further mitigation may be required pending the outcome of testing.
CH072	Laneway	Kilpaddoge	Preservation by record	Given the potential for this feature to be earlier than 19th century in date, or possibly earlier, a full written and photographic description will be made, followed by advance works archaeological testing to ascertain the nature and date of the feature and its flanking banks at the northern limit of the scheme. Further mitigation may be required pending the results of the advance works testing.
CH82	Curvilinear feature from aerial imagery	Kilpaddoge	Avoidance	Advance works geophysical survey of the field within which the anomaly occurs, followed by advance works archaeological testing to ascertain what, if any evidence of archaeological activity associated with the quarry or earlier prehistoric features in this area survive sub-surface below present ground level. Further mitigation may be required pending the outcome of testing
CH105	Ringfort - rath	Kilpaddoge	Avoidance and offsetting	As a precaution, the location of CH105 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact occurs during construction. The temporary impact on setting during construction may be offset by screening which should be reversible post-construction.

CH Receptor No.	Site Type	Townland	Mitigation Type	Mitigation Details
CH106	Souterrain	Kilpaddoge	Avoidance	As a precaution, the location of CH106 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact occurs during construction. Consultation with NMS to discuss the engineering requirements for vibration monitoring at this Recorded Monument as management for indirect effects.
CH107	Ringfort - rath	Kilpaddoge	Avoidance and Offsetting	As a precaution, the location of CH107 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. The temporary impact on setting during construction can be offset via public presentations, lectures and dissemination of information on the cultural heritage aspects of this project post-construction.
CH108	Ringfort - rath	Kilpaddoge	Avoidance and Offsetting	As a precaution the location of CH108 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. Any potential temporary impact on setting during construction can be offset via public presentations, lectures and dissemination of information on the cultural heritage aspects of this project post-construction.
CH109	Souterrain	Kilpaddoge	Avoidance	As a precaution the location of CH109 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. Consultation with NMS to discuss the conservation engineering requirements for vibration monitoring at this Recorded Monument as management for indirect effects.
CH133	Area of Archaeological Potential	Coolnanoonagh/Kilpaddoge	Preservation by record	Archaeological testing, depending on the nature of results of advance works further archaeological mitigation may be required in consultation and agreement with the NMS and Local Authority Archaeologist.

CH Receptor No.	Site Type	Townland	Mitigation Type	Mitigation Details
CH138	LiDAR anomaly	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing and/or excavation, depending on the nature of results of survey.
CH139	LiDAR anomaly	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing and/or excavation, depending on the nature of results of survey.

15.7.2 Operational Phase

As no operational effects have been identified, no additional operational mitigation is required.

15.8 Residual Effects

Appendix 15.1 includes the specific details for each of the assets included in the Cultural Heritage Dataset for the proposed development, and details on the potential residual effects arising. In the interest of clarity, Table 15.18 below presents summary details outlining the assessed residual effects for those assets where the responsibility for mitigation will fall to the proposed development. All physical archaeological, architectural and cultural heritage effect issues will be resolved at the pre-construction and construction stage of the development. There are no potential residual effects envisioned at the operational stage and maintenance stage of the proposed development.

Table 15.18: Residual Impacts

CH Receptor No.	Site Type	Mitigation Type	Significance of Effect pre-mitigation	Potential Residual Impact post-mitigation
CH01	2 Buildings - including 1 ruin (site of)	Preservation by record	Not Significant	Imperceptible
CH02	Building	Preservation by record	Not Significant	Imperceptible
CH048	Townland boundary	Preservation by record	Not Significant	Imperceptible
CH049	Townland boundary	Preservation by record	Not Significant	Imperceptible
CH051	Parallel field boundaries	Preservation by record	Not Significant	Imperceptible
CH052	Limekiln disused	Preservation by record	Moderate	Slight
CH053	Laneway entrance to limekiln	Preservation by record	Not Significant	Imperceptible
CH054	Lime kiln disused	Preservation by record	Moderate	Slight
CH055	Quarry	Preservation by record	Not Significant	Imperceptible
CH072	Laneway	Preservation by record	Not Significant	Imperceptible
CH076	House	Offsetting	Not Significant	Not Significant
CH105	Ringfort - rath	Avoidance and offsetting	Not Significant	Not Significant
CH106	Souterrain	Avoidance	Significant	Imperceptible

CH Receptor No.	Site Type	Mitigation Type	Significance of Effect pre-mitigation	Potential Residual Impact post-mitigation
CH107	Ringfort - rath	Avoidance and Offsetting	Not Significant	Not Significant
CH108	Ringfort - rath	Avoidance and Offsetting	Not Significant	Not Significant
CH109	Souterrain	Avoidance	Significant	Imperceptible
CH138	LiDAR anomaly	Preservation by record	Significant	Moderate
CH139	LiDAR anomaly	Preservation by record	Significant	Moderate

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Chapter 16 - Material Assets including Waste

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16 Material Assets

16.1 Introduction

This chapter considers the likely significant effects on built services and infrastructure and is based on the information contained in Chapter 5 (Description of the Proposed Development). This chapter considers utility use and waste management. Likely significant impacts on roads and traffic are discussed in Chapter 18 Roads and Traffic. A Construction Resource Waste Management Plan (CRWMP) is provided as part of the Construction Environmental Management Plan (CEMP) included within the application documentation.

Appendix 1.1 details the authors and experience in conducting assessments.

16.2 Legislation and Policy

The following legislation is relevant to this waste assessment.

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Waste Framework Directive (WFD)
- Directive 2011/92/EU of the European Parliament and the Council on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU (the 'EIA Directive')
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)
- Kerry County Council (2022) Kerry County Development Plan 2022-2028
- European Communities (Waste Directive) Regulations S.I. No. 126 of 2011 (as amended) (GOI, 2011) Environmental Protection Agency Act 1992 (as amended)
- Protection of the Environment Act 2003 (as amended)
- Environmental (Miscellaneous Provisions) Acts 2011 and 2015
- Waste Management Act 1996, as amended
- Waste Management (Facility Permit and Registration) Regulations 2007 (as amended)
- Waste Management (Collection) Regulations 2007 (as amended)
- European Communities (Waste Directive) Regulations 2011
- A Waste Action Plan for a Circular Economy 2020-2025 (DECC 2020)
- National Hazardous Waste Management Plan 2021-2027, Environment Protection Agency (EPA), 2021
- The Southern Region Waste Management Plan 2015-2021 (Southern Waste Region, 2015)
- Construction and demolition waste – Soil and stone recovery/disposal capacity (Update Report 2020) Eastern Midlands region, Connacht Ulster region and Southern region (Government of Ireland, 2020)

16.3 Guidance

The following guidance and plans have been used in preparing this chapter of the EIAR:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects (EPA, 2021).

- Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-hazardous (EPA, 2019).
- A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025.
- Institute of Environmental Management and Assessment (IEMA, 2020) Best practices for material and waste environmental impact assessments.
- Design Out Waste: A Design Team Guide to Waste Reduction in Construction and Demolition Projects (EPA, 2015).
- Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA, 2020).
- IEMA (2020) IEMA Guide to Materials and Waste in Environmental Impact Assessment.

16.4 Methodology

16.4.1 Approach to Data Collection

Data was sourced from the Mott MacDonald design team in terms of volumes of excavated material and reuse/recovery and disposal percentages. The design team also provided information on utilities in the area based on a GPR survey.

16.4.2 Approach to Impact Assessment

The impact assessment has been carried out in accordance with the methodology set out in Chapter 4 Methodology and the EPA 2022 Guidelines on the Information to be Contained in an Environmental Impact Assessment Reports. The description of effects are evaluated based on the EPA 2022 Guidelines, as described in Table 16.1.

Table 16.1: Description of Effects

Quality of Effects	Positive Effects - A change which improves the quality of the environment, by increasing species diversity; or the improving reproductive capacity of an ecosystem; or be 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)
Significance of Effects	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 – an effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate – an effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant – 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 – an effect which obliterates sensitive characteristics
Extent and Context of Effects	Extent – describe the size of the area, the number of sites and the proportion of a population affected by an effect

Table 16.1: Description of Effects

	Context – Describe whether the extend, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	Likely effects – the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely effects – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency of Effects	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)

The assessment for material assets and waste considers the following:

- Types and quantities of materials required to be consumed within the proposed development, where known.
- Cut and fill balance.
- Forecast of non-hazardous, hazardous and inert waste arisings.
- Surplus materials and waste falling under regulatory controls.
- Wastes requiring treatment or disposal off-site.
- The impacts that will arise from the issues identified in relation to materials and waste.
- Identification of mitigation measures based on identified impacts.
- Conclusion based on nature and magnitude of impacts.
- This assessment was carried out by a desktop study from publicly available information and from information provided by the Applicant to determine the baseline environment existing utility arrangements within the study area which could be impacted as a result of the proposed development.
- The design team were consulted with regards to cut and fill quantities, the types of materials to be used during construction and the types of wastes likely to be produced.
- The Kerry County Development Plan (CDP) 2022-2028, Aerial imagery (Google / Bing) and Ordnance Survey Ireland, EPA online map viewer, 1:50,000 Discovery Mapping, Google search and previous planning applications on and adjacent to the Site were among the sources of reference material used for this desk study.
- The location and description of existing utilities network was sourced from the design team.

Professional judgement is used to provide an assessment of effects based on several factors:

- The availability of material assets
- The type of materials required and depletion of non-renewable resources
- The type of waste generated eg. inert, non-hazardous or hazardous

16.4.3 Study Area

The study area for this chapter includes the area within the planning boundary as defined within Chapter 5 Description of the Proposed Development and the accompanying planning drawing, 229100682-MMD-04-XX-DR-E-0010.

16.4.4 Limitations of this EIAR

It is possible that some utility services located in proximity to some of the works may not be identified in this EIAR, however the mitigation detailed and proposed as part of this EIAR will be implemented when dealing with any such features to ensure that the proposed development will not result in impacts beyond the parameters assessed in this EIAR.

16.5 Receiving environment

Tarbert and Moneypoint power stations have been considered, however it was concluded that there is no potential for significant effects as a result of the proposed development as there is significant distance between these developments and the proposed development such that utilities and waste management will not affect these projects and therefore, they are not considered further in this assessment.

16.5.1 Built Services

The following utilities infrastructure is located within the study area, principally under the L1010 road, close to the entrance of the proposed STEP Power Plant Site:

- Existing 220kV Cable Circuits (3 cables: located in the vicinity of Kilapddoge substation)
- An existing EirGrid 220kV GIS substation, called the Kilpaddoge substation
- An overhead telecom line is present along the L-1010 road between the entrance to Shannon Technology Park and the entrance to Kilpaddoge 220kV substation
- A 33kV underground cable circuit located within the L-1010 between the entrance to Shannon Technology Park and the entrance to Kilpaddoge 220kV substation
- A 220kV underground cable circuit located within the L-1010 between the junction of the L6020 and L-1010 to the entrance of Kilpaddoge 220kV substation
- A 20kV underground cable circuit located within the L-1010 between the junction of the L6020 and L-1010 to the entrance of Kilpaddoge 220kV substation
- A 110kV underground cable circuit located within the L-1010 between Gilroy Motors on the L-1010 to the entrance of Kilpaddoge 220kV substation
- Several overhead transmission lines are present in the area including:
  – Kilpaddoge-Tralee 2 110kV
  – Clashavoon-Kilpaddoge 220kV
  – Killonan-Kilpaddoge 220kV
  – Kilpaddoge-Rathkeale 110kV
- Multiple 16mm water mains are also known to be present in the study area, including a 100mm distribution watermain (on L-1010)
- Foul sewers in the Tarbert area (there are no existing stormwater or foul water drainage systems within the footprint of the proposed development or along the L-1010)
- No existing Gas Networks Ireland (GNI) infrastructure has been identified in the area. A GNI owned and operated gas transmission pipeline is located approximately 21km east of the site. The pipeline runs from its landfall on the south side of the estuary to the west and south of Foynes along its route to Craggs Above Ground Installation (AGI).

From the junction with the L6020, the STEP 220kV cable circuits will be located within agricultural lands, passing under the Kilpaddoge-Tralee No2 110kV, the Leanamore-Kilpaddoge 20kV and the Kilpaddoge – Knockanure 220kV Overhead Lines (OHL).

The proposed underground cable route will pass by Horizontal directional Drilling (HDD) under the Kilpaddoge – Knockanure 220kV, the Kilpaddoge – Tralee No.1 110kV, the Kilpaddoge – Aughinish – Knockanure (110kV) underground cables and under the Kilpaddoge – Rathkeale 110kV OHL.

The proposed development works will also cross existing services including overhead telecommunication and power lines, underground watermains and house and farmland connections and sewer connections. All services crossings and diversions will be designed in consultation with the service provider to ensure continuity of supply throughout the construction and operation stages of the scheme.

Where existing utilities / services are found, the works will be diverted around the service / utility or below them depending on the degree of complexity found.

Where existing utilities or other obstacles (e.g. culverts) need to be crossed the depth to the top of the power ducts can be reduced or, alternatively, the cable can be buried below the service.

In the case of shallow burial, steel plates will be installed above the ducts and the ducts will be encased in concrete.

In some cases, an existing utility service may be relocated to facilitate the installation of the cable. The works required to do so will be coordinated with the service / utility provider and a complete coordinated methodology will be mutually agreed between all parties prior to commencement of any diversions taking place. All proposed work methodologies will aim to prevent any outages or loss of service. If the risk cannot be avoided, prearranged agreements on outages will be set in place prior to works commencement. This will be considered during the detailed design phase of the project.

Within the two proposed substations, built services such as telecommunications, water supply, and surface water drainage will be via new connections associated with the proposed STEP Power Plant.

16.5.2 Infrastructure

Existing infrastructure is present along the main carriageway of the L-1010. The road will be upgraded and widened by Kerry County Council prior to the proposed development, with cable ducting installation undertaken at the same time as the road widening/upgrade works.

To the east of the proposed development site, the access road to Kilpaddoge substation will be crossed using HDD.

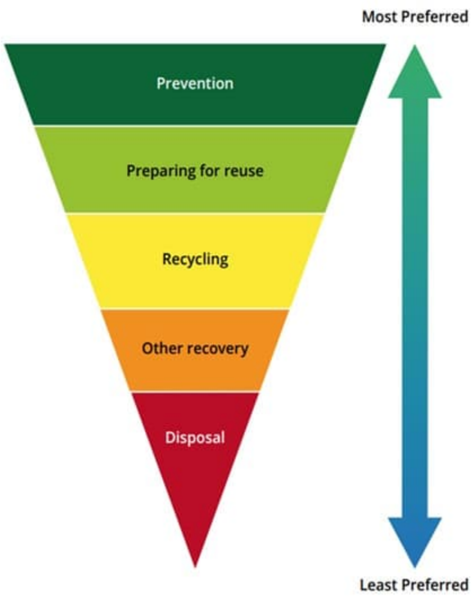
Access to the proposed EirGrid/ESBN operated 220kV substation and the customer operated 220kV GIS substation will be via the proposed STEP Power Plant access road.

16.5.3 Waste Management

The EU Waste Framework Directive (Directive 2008/98/EC) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling and recovery. It also includes definitions for when waste ceases to be waste and becomes a secondary raw material (end-of-waste criteria) and how to distinguish between waste and by-products. The Directive was transposed into Irish law by the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) (GOI, 2011).

The foundation of EU waste management is the five-step “waste hierarchy”, established in the Waste Framework Directive. It establishes an order of preference for managing and disposing of waste. The Waste Hierarchy described in the framework prioritises prevention over reuse, recycling, recovery and disposal. The approach has been adopted in the EPA 2021 guidelines, as illustrated in Figure 16.1.

Figure 16.1: Waste Framework Directive



Source: EPA Guidelines (2021)

The framework also provides a target of 70% of non-hazardous, non-soil and stone construction and demolition (C&D) waste to be recovered, reused or recycled. According to the EPA press release in August 2023 [1](reference year 2021), Ireland achieved 85% material recovery in 2021 96% of C&D waste underwent final treatment in Ireland in 2021; only 4% was exported abroad for final treatment. Most of the C&D waste finally treated in Ireland (85%) was backfilled in 2021, while 8% of all C&D waste was recycled and 7% sent for disposal. Recycling was the main treatment operation for the smaller fractions of metal, plastic, glass and wood.

16.6 Likely Significant Effects

16.6.1 Do Nothing

In the event that the proposed development does not proceed, there would be no potential effects on existing infrastructure, built services and waste. The positive benefits of expanding and strengthening of the national electricity grid and connecting the proposed STEP Power Plant to the national grid would not be realised if the development did not proceed.

16.6.2 Construction Phase

16.6.2.1 Built Services

The proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation will require new services including a water supply and energy supply. New drainage will also be constructed. During construction of the cable route, disruption to existing services will be

[1] Construction & Demolition | Environmental Protection Agency (epa.ie)

avoided where possible. Any impacts are considered to be localised and temporary in duration and the effects will be imperceptible.

16.6.2.2 Utility Use

During the construction phase a temporary construction compound will be required, adjacent to the proposed development. Welfare facilities will be provided, and any foul waste will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required.

Consequently, adverse effects on utility services during the construction phase are considered not significant.

16.6.2.3 Waste Management

Waste will be managed in accordance with the Waste Management Hierarchy (EPA, 2021) and Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA, 2020) and the Waste Management Act 1996, as amended, and associated Regulations.

In total, the approximate volume of excavated material which will not be reinstated for the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation is ca. 4,600m^3. For the off-road sections of the cable route being installed, the existing soil will be reinstated with the exception of the volume required for the duct banks which will be filled with Cement Bound Granular Mixture (CBGM) encasing High-density polyethylene (HDPE) ducting and the volumes required for the joint bays, link boxes and communications chambers. In total, the approximate volume of excavated material which will not be reinstated for the cable route is ca. 9355m^3. Topsoil and subsoil excess will remain within the agricultural properties, as required by the individual landowners. Any surplus material will be removed off-site by a licenced contractor and in compliance with the Waste Management Act, 1996, as amended.

Any waste associated with the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation buildings and the underground cabling will be sent off site for recovery or disposal and will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment. The main waste stream arisings (including surplus materials) which are likely to be generated during the construction phase, are anticipated to be as included within Table 16.2.

In accordance with EU targets under the Waste Framework Directive (2008/98/EC). Waste management targets for anticipated waste arisings regarding reuse / recycling / recovery and disposal rates are to be agreed by the appointed Contractor.

Table 16.2: Main Waste Types and Associated EWC codes

Waste Type	European Waste Classification (EWC) Code	Waste Classification
Soil and Stones	17 05 04	Non-hazardous
Nominally Empty Containers containing residues of or contaminated by dangerous substances	15 01 10*	Hazardous
Waste Diesel and Oil	13 07 01*	Hazardous
Waste Fuels (Miscellaneous)	13 07 03*	Hazardous
Scrap Metal	17 04 07	Non-hazardous
Bitumen / Tarmacadam	17 03 02	Non-hazardous
Surplus Bitumen / Tarmacadam	17 03 02	Non-hazardous

Waste Type	European Waste Classification (EWC) Code	Waste Classification
Gypsum-based construction material	17 08 02	Non-hazardous
Mixed construction and demolition waste	17 09 04	Non-hazardous
Surplus Cabling	17 04 11	Non-hazardous
Plastic Pipe Cut-offs	17 02 03	Non-hazardous
Plastic Packaging	15 01 02	Non-hazardous
Paper and Cardboard Packaging	15 01 01	Non-hazardous
Concrete	17.01.01	Non-Hazardous
Bricks	17.01.012	Non-Hazardous
Tiles and ceramics	17.01.03	Non-Hazardous
Electrical and electronic components	20 01 35*	Hazardous
Electrical and electronic components	20 01 36	Non-hazardous
Batteries and accumulators	20 01 33*	Hazardous
Batteries and accumulators	20 01 34	Non-hazardous

The appointed Contractors will dispose of all debris, surplus material (including surplus excavated material) and all other waste materials arising from or connected with the proposed development to an appropriate licensed waste disposal site/facility, fully in accordance with the requirements of waste management legislation the Waste Management Act 1996, as amended, and associated Regulations and to the satisfaction of the Engineer and relevant local authorities.

Waste management targets for anticipated waste arisings regarding reuse / recycling / recovery and disposal rates are presented in Table 16.3.

Table 16.3: Typical Waste Management Targets

Waste Type	Reuse/Recovery %	Recycling %	Disposal %
Concrete	85	-	15
Topsoil	100	-	0
Subsoil	30	-	70
Rock	30	-	70
Nominally Empty Containers containing residues of or contaminated by dangerous substances	100	-	-
Waste Diesel and Oil	80	20	-
Waste Fuels (Miscellaneous)	80	20	-
Scrap Metal	85	10	5
Bitumen / Tarmacadum	20	50	30
Surplus Bitumen / Tarmacadum	20	50	30
Plastic Pipe Cut-offs	-	85	15
Plastic Packaging	-	85	15
Paper and Cardboard Packaging	15	85	-

Waste management during the construction works for the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation and underground cabling will be required. Impacts will be temporary in duration, however, the measures detailed above will ensure that this will not result in significant effects in the receiving environment, pre-mitigation effects are considered to be temporary and slight.

16.6.3 Operation and Maintenance Phase

16.6.3.1 Built Services

No significant adverse operational phase impacts on utilities services or utility use are anticipated. The substations will require potable water and power, but they will not require excessive utility use to operate.

16.6.3.2 Infrastructure

It is considered that the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation and associated underground cabling will have a long term**,** positive moderate effect as they will expand and strengthen the national electricity grid that will connect new generation to satisfy increased electricity demand. The expansion and strengthening of the electrical grid is consistent with Ireland’s Climate Action Plan and National Development Plan.

16.6.3.3 Utility Use

The proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation will have permanent welfare facilities and potable water use. Due to the minimal use and volumes associated the effects are considered to be imperceptible. The site will normally be unmanned, however a four-person operation and maintenance crew will visit the site once per week.

16.6.3.4 Waste Management

All waste generated during the operational phase at the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation sites, will be managed in accordance with the relevant provisions of the Waste Management Act 1996, as amended, and associated regulations.

It is anticipated that there will be minimal waste arisings during the operational phase for the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation and underground cable route, with the effect considered to be imperceptible, with waste materials dealt with as per the construction phase.

16.6.4 Decommissioning Phase

The proposed SLNG 220kV GIS substation is expected to have a design life of 25 years and as such, it is not possible to identify at this stage either the waste management routes or specific facilities that will be used, as these are liable to change over such a timescale and would be determined by the decommissioning contractor. Furthermore, and as part of the STEP Power Plant, it is expected that it would be a condition of the Industrial Emissions Licence (which will include the SLNG substation) that a closure and residuals management plan, including a detailed decommissioning plan, be submitted to the EPA for their approval. Where decommissioning takes place, all above-ground components associated with the proposed development will be disassembled and removed from the site, the waste types generated from this are likely to be similar or of a lesser magnitude than the construction effects.

All management of waste will be in accordance with the relevant regulations and waste will be transported by licenced waste hauliers to waste management sites which hold the necessary regulatory authorisation and / or permits for those wastes consigned to them. Therefore, decommissioning waste impacts have not been assessed.

It is not intended to decommission the electricity infrastructure associated with the proposed EirGrid/ESBN 220kV substation within the STEP Power Plant site boundary and the associated underground cable route, as outlined in Chapter 5 Description of the Proposed Development. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables and proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation and considered not significant.

16.7 Cumulative Effects

16.7.1 Intra-Project Effects – STEP Facility

There is potential that the construction phase of the STEP Power Plant (ABP reference number ABP-319566-24) project and the proposed development may coincide at the interface between the construction of the underground cable and the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation, and the gas pipeline, depending on the construction timetable. Impacts on utilities and infrastructure are considered to be localised and temporary in duration, the effects are likely to be slight with appropriate mitigation and not significant, with consultation between the contractors required, should the construction timetables coincide.

The STEP Power Plant (ABP-319566-24) master plan includes provision for a Data Centre Campus and a Strategic Gas Reserve Facility within the site. The Strategic Gas Reserve Facility (ABP-319717-24) is currently at pre-application consultation stage with An Bord Pleanála and therefore there is no detail of the potential effects from this proposal at this time. The Data Centre campus is only referenced in the STEP Power Plant master plan and there are no further details provided at this time. For these projects EIARs will be required to support any planning applications and will assess the potential for cumulative effects with this proposed development in the future.

16.7.2 Kerry County Council – L-1010 road upgrade and widening

In advance of the construction works of the main elements of the STEP Power Plant, the L-1010 will be widened by Kerry County Council to two-lanes within the vicinity of the proposed development. The KCC works also include the installation of cable ducts. These works are described in Chapter 5 Description of the Proposed Development. These works will be fully funded by the Applicant by means of a special development contribution under section 48(2)(c) of the Planning and Development Act 2000 to cover the full cost of the upgrade works including the ducting and joint bay installation.

During the construction phase, cumulative effects are considered to be temporary in nature, with the effects considered not significant, as the road widening works for the L-1010 will be in advance of the main construction works for the proposed development.

For completeness, for the proposed EirGrid/ESBN 220kV substation and the SLNG 220kV GIS substation site enabling works may start in parallel with Kerry County Council's works on the L-1010, however the main construction period will be post the L-1010 widening works.

16.7.3 Other Developments

There is a risk of cumulative construction phase impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of other developments in the within ca. 5km. These projects are detailed in Table 16.4.

Table 16.4: Other Permitted Projects in the vicinity

Reference (KCC Planning/ Other)	Location	Developer	Date Granted	Distance	Development Description	Included in Cumulative Assessment ?	Justification
18878	Kilpaddoge, Tarbert, Co. Kerry	Shannon Clean Tech Ltd	23/09/2019	~1km	For a 10-year permission to construct a battery energy storage system (BESS) facility.	**Yes**	Project is in close proximity to the proposed development. Construction duration will be six months, but no indicative construction dates provided.
20850	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	Kilpaddoge Green Engergy Ltd.	12/11/2020	1km	Change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.	**Yes**	Project is in close proximity to the proposed development. Construction duration will be 16-18 months, but no indicative construction dates provided.
21/549		Donal Murphy Glencloosagh Energy Limited	20/08/2021	1km	10 year planning permission for a high inertia synchronous compensator compound containing electrical equipment containers.	**Yes**	Project is in close proximity to the proposed development. Construction duration will be twelve months, but no indicative construction dates provided
20/438 and ABP appeal Ref. 308643	Meelcon, Carhoona, Farranawana, Tarbert, Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co. Kerry	Ballylongford Windfarm Group	21/06/2021	~1km	Amendment to previous granted permission which related to change in connection grid route for wind farm.	**Yes**	Project is in close proximity to the proposed development.

Reference (KCC Planning/ Other)	Location	Developer	Date Granted	Distance	Development Description	Included in Cumulative Assessment ?	Justification
18/392	Tarbert Island Tarbert Co. Kerry Tarbert Island	SSE Renewables (Ireland) Ltd	18/02/2019	2km	10-year permission to construct a battery storage facility.	**Yes**	Project is in close proximity to the proposed development. Construction duration will be four months, but no indicative construction dates provided.
ABP 318540	Meelcon, Carhoona, Farranawana, Tarbert, Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co. Kerry	SSE Generation Ireland Ltd	Case is due to be decided by 05/06/2024	3km	10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works	**Yes**	Project is in close proximity to the proposed development. Construction duration will be 29 months peaking in 2025/2026.
23284	Ballymacasy, Coolnagraigue, Ballyline East, Ballyline West, Leanamore and Dromalivaun, Co. Kerry	Harmony Solar Kerry Ltd	17/10/2023	5km	10 year permission and 40 year operation for a solar farm of 146.6 hectares.	**Yes**	Project is in close proximity to the proposed development. Construction duration will be eighteen months with construction commencing in year 2026.
2360050	Townlands Of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh, and Tullamore, Co. Kerry	Gaofar Limited	Decision Date: 23/01/2024	6km	A new grid connection route connecting the permitted Ballylongford windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanála ref- PL08.304807) at Aghanagran Middle and	**Yes**	Project is in close proximity to the proposed development.

Reference (KCC Planning/ Other)	Location	Developer	Date Granted	Distance	Development Description	Included in Cumulative Assessment ?	Justification
					Lower, Ballyline West and Tullahennel South, Ballylongford, to the proposed 38kV substation (Kerry County Council planning ref 23/431) at Tullamore, Listowel, Co Kerry		

The detail of the construction programmes for other projects is detailed (where known) in Table 16.4. There will be a need to ensure that where works are occurring in parallel that appropriate mitigation measures are considered within the parameters assessed in this EIAR, including the scheduling of works, regular liaison meetings between project teams to ensure plans are co-ordinated and impacts are minimised.

Considering that other permitted projects will comply with relevant Irish policy and legislation, it is considered that cumulative impacts on waste management infrastructure capacity are considered slight during construction. During operations, the proposed development will not generate large quantities of waste and cumulative impacts with other projects on waste management infrastructure capacity are considered not significant during the operational phase.

16.8 Mitigation and Monitoring

16.8.1 Construction Phase

16.8.1.1 Built Services

Prior to construction, confirmatory surveys will be conducted to identify and reconfirm the location of all utility infrastructure within the works areas and if required, utilities will be relocated.

16.8.1.2 Utilities

Although it has been determined that the effects identified during the assessment on the existing utilities network in the study area will likely be Not Significant or Imperceptible during the construction phase, the following best practice measures will be implemented by the Contractor during the construction phase:

- A CEMP has been prepared and is presented within the application documentation. This will be finalised by the Contractor prior to the start of construction.
- As with any excavations there is a potential to disrupt local underground services. A confirmatory survey of all existing services will be carried out prior to construction to identify the precise locations of any services.
- The Contractor will be obliged to put measures in place during the construction phase to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant service provider and local authority. When service suspensions are required during the construction phase, reasonable prior notice will be given to the residents in the area. The disruption to services or outages will be carefully planned so the duration is minimised. The timing of local domestic connections will be addressed between the Contractor and the local community at the detailed design stage.
- All potential temporary connections will be agreed in advance with the relevant service provider.
- All utilities work shall be carried out in accordance with the relevant requirements of the respective service providers / authorities (i.e., ESB, GNI, EirGrid, Virgin Media and any others of relevance). These works will be carried out in a manner that is safe, and which avoids or minimises interruptions of service which might affect local residents and businesses and adjacent development.
- Works during the construction phase, including service diversions and realignment will be carried out in accordance with relevant guidance documents, including GNI's publication 'Safety advice for working in the vicinity of natural gas pipelines'; the ESB's 'Code of Practice for Avoiding Danger from Overhead Electricity Lines', and the Health and Safety Authorities (HSA) 'Code of Practice for Avoiding Danger from Underground Services'.

- All new infrastructure will be installed in accordance with best practice, applicable standards, guidelines and codes of practice.
- The Proposed Development will incorporate water efficiency measures such as collection of grey water to minimise water consumption as far as possible.
- Prior to the operational phase of the proposed development, utilities infrastructure connections will be tested regularly by a suitably qualified person using an appropriate methodology, approved by the relevant service provider, and under the supervision of the local authority.
- The water supply will be tested to the satisfaction of the local authority and Uisce Éireann prior to the connection to the public potable water.
- Potable water during the operational phase will be regulated and monitored under the Industrial Emissions licence for the proposed STEP Power Plant.
- Routine maintenance will be carried out in accordance with the maintenance procedures provided by the Contractor and manufacturer.

16.8.1.3 Waste Management

A Construction Resource Waste Management Plan (as part of the Construction and Environmental Management Plan (CEMP)) is included with the application documentation. Waste arisings will be handled, stored, managed and re-used or recycled as close as practicable to the point of origin. The closest landfill facility is located in Tralee, Co. Kerry (North Kerry Landfill site). There is a waste and recycling centre at Ballyhahill, Co. Limerick.

All operations will be managed and programmed in such a manner as to prevent/minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery).

Wastes will be sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery / disposal in accordance with the Waste Management Act 1996 and associated amendments and regulations and in a manner which will not adversely affect the environment. All employees will be made aware of their obligations under the CEMP and CRWMP.

The CEMP and CRWMP will be available for inspection at all reasonable times for examination by the Local Authority.

- The portable chemical toilets provided for the duration of construction works and all waste material will be removed from site and disposed of to an appropriately licensed facility.
- Excavated material from ground preparation works will be either reused onsite if suitable or otherwise disposed of offsite at a suitably licenced facility.
- The recommendations set out in ‘Ireland’s Invasive Alien Species Soil and Stone Pathway Action Plan 2023-2027 shall be taken into account.
- Any excess spoil material will be removed from site by a dumper or suitable lorry and will be treated if required before being disposed of appropriately in a licensed facility.
- All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the Waste Management Act 1996, as amended.
- Waste will be managed in accordance with the Waste Management Hierarchy and Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA, 2020) and the Waste Management Act 1996, as amended, and associated Regulations.
- Wastes sent offsite for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment.

- The Contractor will be obliged to aim for an overall recycling rate of 70% of construction and demolition waste, in accordance with EU targets under the Waste Framework Directive (2008/98/EC).
- All employees will be made aware of their obligations under the CEMP. The CEMP will be available for inspection at all reasonable times for examination by the Local Authorities.

16.8.2 Operational Phase

16.8.2.1 Built Services

Service disruptions will be kept to a minimum, only occurring where unavoidable. Should any works be required along the underground cable route, prior notification of disruptions will be given to all those affected. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

16.8.2.2 Utilities

As no adverse operational phase impacts on utilities are anticipated, no specific mitigation measures are proposed.

16.8.2.3 Waste Management

All waste generated during the operational phase will be managed in accordance with the relevant provisions of the Waste Management Act 1996, as amended, and associated regulations, particularly with regard to the use of appropriately permitted waste contractors and appropriately authorised destinations for waste materials. Waste generated by staff during the operational phase is considered to be minimal.

16.9 Residual Effects

Once construction is complete significant adverse residual impacts associated with the proposed development on built services, waste management and natural assets are unlikely and not significant.

The implementation of the mitigation measures detailed above, including the CEMP, will reduce the environmental impact of the proposed development during construction. Certain brief and temporary slight impacts such as diversion/relocation of utilities may be unavoidable, but the effects are considered not significant provided the mitigation described herein is implemented.

16.10 References

Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Advice Notes for Preparing Environmental Impact Statements (EPA, Draft September 2015).

Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects (EPA, 2021).

Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA, 2020).

Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-hazardous (EPA, 2019).

Design Out Waste: A Design Team Guide to Waste Reduction in Construction and Demolition Projects (EPA, 2015).

Institute of Environmental Management and Assessment (IEMA, 2020). Best practices for material and waste environmental impact assessments.

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 17 - Roads and Traffic

July 2024

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Contents

Tables

Figures

17 Roads and Traffic

17.1 Introduction

This chapter of the EIAR presents an assessment of the likely Roads and Traffic effects on public roads impacted by the construction of the proposed Shannon Technology and Energy Park (STEP) 220kV Grid Connection development (hereafter referred to as 'the proposed development').

The proposed development consists of two 220kV substations and two 220 kV underground cable circuits between the Shannon Technology and Energy Park (STEP) Power Plant and the existing line cable interface mast adjacent to the existing Kilpaddoge Substation, which in turn feeds into the electricity network. The proposed development will be known as the Shannon Technology and Energy Park 220kV Grid Connection.

The proposed development will include:

- Approximately 5km of two 220kV underground cables (ca. 2.2km within the L-1010 and ca. 2.8km off road in greenfield land);
- Two 220kV Gas Insulated Switchgear (GIS) substations, including two-storey GIS buildings and associated transmission infrastructure.
- A 50MVAr shunt reactor including all ancillary equipment
- Buried optical fibre within the cable ducts from the proposed Glansillagh GIS substation to the Line Cable Interface Mast at Kilpaddoge

This chapter sets out the existing conditions of the receiving environment and details the traffic that is likely to be generated during the construction phase of the proposed development, including the movements of construction materials, equipment and staff to and from site. The assessment will consider the effect upon the local, regional and national road network, and identifies measures to reduce network disruption.

Potential Roads and Traffic-related environmental impacts during the *operational* phase of the proposed development have also been considered. Due to the negligible volume of road traffic associated with the operation of the proposed development, no significant effects are anticipated as a result. Consistent with advice set out in the *Transport Infrastructure Ireland (TII) Traffic and Transport Assessment Guidelines* (May 2014), a full Traffic and Transport Assessment (TTA) is therefore not warranted in respect of the operational phase.

Cumulative effects associated with committed projects which are likely to generate traffic utilising the same public roads within the proposed development study area at the same time as traffic generated by the proposed development have also been assessed.

A Workplace Travel Plan is not considered necessary in support of the proposed development due to the relatively low number of construction phase personnel (expected to peak at approximately 60) accessing the site.

Further detail regarding the proposed development is provided in Chapter 5. Air Quality and Noise matters pertaining to Roads and Traffic are discussed in Chapters 11 and Chapter 13 respectively.

17.2 Policy and Guidance

The Planning Report[1] describes the wider policy and legislative context applicable to the proposed development. Policies and guidance documents relevant to the assessment of Roads and Traffic effects of the proposed development are set out in this section.

17.2.1 Policy

Table 17.1 provides a summary of the policies relevant to Roads and Traffic.

Table 17.1: Relevant Roads & Traffic Policies

Document Title	Source and Year	Policy Detail	Relevance to Assessment
Kerry County Development Plan 2022-2028	Kerry County Council website, 2022	The Kerry County Development Plan 2022-28 (KCDP 22-28) sets out the strategy that will inform and guide the development of the county over the next six years. The following policies are of direct relevance: Kerry County Council Development Plans (469474)_Volume 1 • KCDP 2-11 "Improve the efficiency, sustainability and the integration of sustainable transport and mobility, with a preference for active travel and including improved and expanded public transport capacity, networks and infrastructure, attractive fares, encouraging vehicle sharing (where appropriate), integrated walking and cycling infrastructure and improved traffic management and bus priority." • KCDP 9-19 "Ensure that employment areas maximise infrastructural provision and public transport networks." • KCDP 11-33 "Promote a modal change from private car use to other types of travel and to promote the use of public transport as a means of reducing greenhouse gas emissions and improving air quality." • KCDP 11-41 "Ensure all new road infrastructure projects will be assessed in accordance with Transport Infrastructure Ireland (TII) Guidance and mitigation measures provided where deemed appropriate. Development proposals should identify and implement noise mitigation measures, where warranted, for development proposed in the vicinity of existing or proposed national roads. The costs of implementing mitigation measures shall be borne by the developer, as the Authority will not be responsible for the provision of additional noise mitigation. • KCDP 14-7 "Promote and support the provision of new technologies on decarbonising transport." • KCDP 14-22 "Protect and sustainably develop the County's principal transportation assets including ports, Kerry Airport, and strategic road and rail corridors." • KCDP 14-25 "Seek to protect and safeguard the significant investment made in strategic economic infrastructure, in particular the network of roads, the existing rail line to Tralee and major water and wastewater projects, through the promotion of appropriate development and settlement patterns and the integration of land use and transportation activities."	These policies are integrally relevant to the assessment process and have been duly considered unless stated otherwise.

[1] Shannon Technology and Energy Park (STEP_ 220kV Grid Connection, Planning Report, May 2024)

Document Title	Source and Year	Policy Detail	Relevance to Assessment
Kerry County Council Local Authority Climate Action Plan 2024-2029	Kerry County Council website, 2024	The Kerry County Council Local Authority Climate Action Plan 2024 outlines the council's strategies to address climate change with a key focus on the reduction of greenhouse gas emissions and enhancing climate resilience across the built environment, transport, energy (and other) sectors. The plan includes the following relevant actions: • 1.4.1: Ensure, where possible that EV infrastructure is integrated with public transport and active travel infrastructure • 1.5.3: Collaborate with Transport Infrastructure Ireland (TII) to secure funding for Greenway infrastructure in Kerry • 1.5.5: Ensure plan-led integration between public transport routes/infrastructure with active travel programme, including park and ride/bike and parking/park'n stride • 1.5.8: Collaborate on a Traffic Management Plan to investigate sustainable transport options to address visitor traffic movement throughout the Dingle Peninsula • 1.6.2: ensure Land Use Plans support an equitable and inclusive modal shift and sustainable transport policy via the integration of land use and transport planning	These policies are integrally relevant to the assessment process and have been duly considered unless stated otherwise.
Project Ireland 2040	Government of Ireland website, 2019	The National Development Plan 2021-2030, which makes up part of Project Ireland 2040, includes the Irish Government's strategy for sustainable mobility. Geographically the relevant area is the Mid-West (Southern Regional Assembly) and is composed of several National Strategic Outcomes (NSOs). NSO 4: Sustainable Mobility • This NSO generically covers expanding public transport alternatives, reducing congestion and meeting the transportation demands for a growing population. NSO 8: Transition to Low Carbon and Climate Resilient Society • References to the Irelands' Climate Action Plan to reduce transport emissions in line with necessary EU and Irish targets in respect of active travel and public transport.	These policies are integrally relevant to the assessment process and have been duly considered unless stated otherwise.

Sources: Government of Ireland & Clare County Council

17.2.2 Guidance

This assessment has been carried out in accordance with the principles contained within the following key documents:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA) (2022)
- Traffic and Transport Assessment Guidelines, Transport Infrastructure Ireland (TII) (2014)
- The Institute of Environmental Management and Assessment (IEMA) Guidelines Environmental Assessment of Traffic and Movement (2023)
- Rural Road Link Design, (DN-GEO-03031), TII Publications, TII (2017)

The IEMA Guidelines are intended for the assessment of the effect of road traffic associated with new developments. It is common and established practice that they are applied to energy-related developments and, as such, these guidelines are defined as suitable to assess the construction and operation phases of the proposed development.

A brief overview of core guidance documents used for this assessment is summarised in Table 17.2.

Table 17.2: Core Guidance Summary

Document Title	Source and Year	Guidance Detail
Guidelines on the Information to be Contained in Environmental Impact Assessment Reports	Environmental Protection Agency (EPA) (2022)	These guidelines provide advice of best practice, principles and practice of developing an EIAR. Specific reference to transport assessment includes: “Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure.” & “The provision of new access facilities (e.g. links to motorways) or the upgrading of existing facilities (e.g. road widths, bridges and junctions) carried out by other parties can give rise to significant environmental effects” The importance of a Construction Management Plan is acknowledged in this document. These are often provided to supplement the project description and to set out specific details of the construction plan. While inclusion of full details may not be practicable at pre-consent stage, it should set out the environmental envelope within which the project will be built, including working areas, hours of work, principal construction methods and phases, volumes of materials, traffic and environmental controls.
Traffic and Transport Assessment Guidelines	Transport Infrastructure Ireland (TII) (2014)	The guidelines provide guidance for scoping and developing traffic and transport assessment requirements to support development proposals. The guidelines outline the need for assessment of public transport, walking and cycling networks, rather than singularly focussing on the road network. The focus of these guidelines relates to operational traffic aspects.
The Institute of Environmental Management and Assessment Guidelines: Environmental Assessment of Traffic & Movement	The Institute of Environmental Management and Assessment (IEMA) (2023)	The guidelines provide internationally referable guidance specific to best practice in transport Environmental Impact Assessment (EIA) process and practice.
Rural Road Link Design, (DN-GEO-03031)	TII Publications (2017)	The TII document provides guidance for assessing rural road capacities.

Source: Varies by guidance document.

17.3 Assessment Methodology

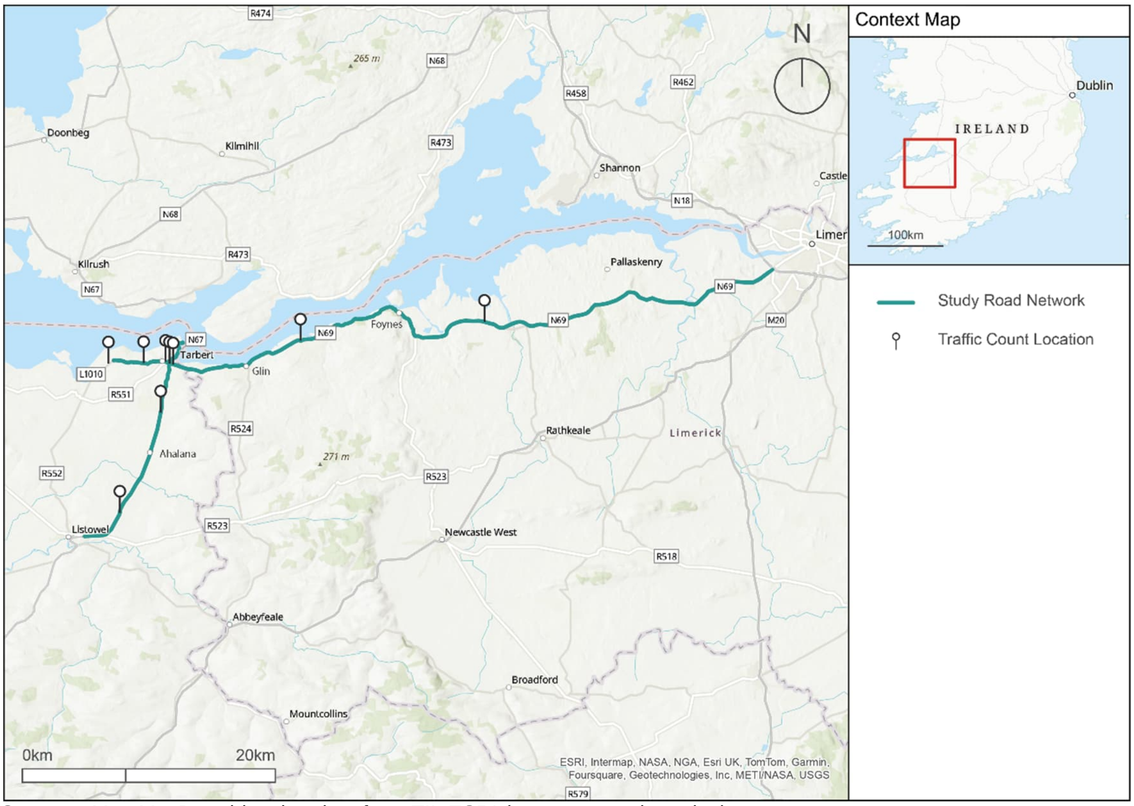
17.3.1 Study Area

The study area for the Roads and Traffic Chapter is the public road network associated with the construction of a 220kV cable route and two 220kV insulated switchgear (GIS) substations.

Further information regarding the cable route and substations can be found in Chapter 5 – Description of the Proposed Development.

Figure 17.1 and Figure 17.2 provide an overview of the proposed development study area for the purposes of this Roads and Traffic Chapter.

Figure 17.1: Study Area (In County Kerry and County Limerick)



Source: Mott MacDonald, using data from TII, ESRI (sources noted on plan)

Figure 17.2: Study Area (In Vicinity of Tarbert and Proposed Development)

Source: Mott MacDonald, using data from TII, ESRI (sources noted on plan)

Local public road sections included in the study area which are proposed to be utilised during construction of substations and cable routes are listed below:

National Roads

The primary traffic routes in the local area include the following roads:

- N67 – which links the L-1010, N69, R551 and Tarbert with Tarbert Power Station and Tarbert Ferry Port.
- N69 - which links the L-1010, N67, R551 and Tarbert with the N18 and Limerick to the east and Tralee to the south.
- N18 - national road which links the N69 and Limerick to the M7 and M20 motorways to the east and with Shannon and the M18 to the north.

Based on professional judgement and experience in the assessment of Roads and Traffic effects associated with major development projects, no significant effects are anticipated for the N18 (AADT = c.36,260)[2] and accordingly no further assessment for this road has been undertaken and reported upon in this chapter. This is due to the residual capacity and strategic nature of the road and recognising that the proposed development is unlikely to result in an intensification of use exceeding 30%[3] of the existing Annual Average Daily Traffic (AADT) on the N18.

Beyond the study area traffic will subdivide into smaller volumes and professional judgement therefore suggests that effects relating to Roads and Traffic across the wider road network

[2] https://trafficdata.tii.ie/publicmultinodemap.asp site id: TMU N18099.5N (Year 2023)

[3] IEMA Guidelines 2023, see Section **17.3.3**

beyond the study area (shown in Figure 17.2) are unlikely to be significant, and therefore are not reviewed further in this chapter.

17.3.2 Approach to Data Collection

A desktop study was undertaken to review likely construction traffic routes and to identify constraints and for any potentially sensitive locations i.e., locations which are likely to be more vulnerable to change in traffic flow or profile, e.g., collision clusters, high footfall areas, and/or areas in close proximity to a school.

Data sources for the desktop study include:

- Automatic Traffic Counts (ATC) commissioned by Mott MacDonald and undertaken by Nationwide Data Collection (NDC) between 5th and 11th December 2023;
- ATC and Junction Turning Counts (JTC) commissioned by AECOM for the STEP Power Plant Development and undertaken by Idaso. The ATCs were undertaken between 28th January and 3rd February 2020, and the JTCs were undertaken on 25th January 2024;
- National Transport Model (NToM) Update, Travel Demand Forecasting Report, NToM Volume 3, December 2019, TII, AECOM; and
- TII Traffic Count Data Portal (www.trafficdata.tii.ie).

Data relating to Personal Injury Collisions (PIC) was sought from the Road Safety Authority (RSA) website. However, it is understood that the RSA is in the process of reviewing its collision data sharing policies and procedure and therefore data cannot be shared until this review is complete[4].

Information in relation to existing traffic volumes within the study area was obtained from traffic surveys undertaken in December 2023, by Nationwide Data Collection and January and February 2020 and January 2024 by Idaso. Traffic data was also obtained from the TII Traffic Count Portal for year 2023. The January and February 2020 traffic surveys included two 7-day ATCs and four 1-day JTCs which provided information including total number of vehicles in both directions, of the specified road/junction, broken down into standard vehicle classifications. The January 2024 data included updated data for the four JTCs originally surveyed in 2020. The December 2023 traffic surveys included two 7-day ATCs and included the resurvey of one location surveyed in January/February 2020 for the purpose of comparing the difference in traffic volume pre and post Covid-19 pandemic.

17.3.3 Approach to Impact Assessment

The assessment detailed in this chapter has been undertaken combining desktop study and reference to current policy advice and best practice in line with consultation with statutory agencies. Predicted construction vehicle movements have been compared to baseline traffic flows to identify if there are likely to be periods where the increase in traffic volume, either all traffic or specifically heavy goods vehicle (HGV) traffic, exceed standard thresholds. Such additional traffic has potential to cause detrimental effects, for example, on driver delay, road safety or community (pedestrian delay, non-motorised user (NMU) amenity, fear and intimidation).

17.3.3.1 Significance

The *IEMA Guidelines (IEMA, 2023)* infer two-fold rules that can be used to determine both the scale and extent of the assessment of road traffic as a screening process[5]:

[4] RSA Website, https://www.rsa.ie/road-safety/statistics/road-traffic-collision-data, accessed on 10 May 2024.

[5] IEMA Guidelines 2023, 11 para 2.16-2.21

- Rule 1 – Include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%).
- Rule 2 – Include highway links of high sensitivity where traffic flows have increased by 10% or more.

Highway links, in this instance, refer to a section of the road network between two given points. Sensitivity is defined within the *IEMA Guidelines* as any “link or location where it is felt specific environmental or population sensitivities may occur”[6]. While this will vary depending upon the specific receptor, this could – for example – refer to highway links where there are high concentrations of locations such as hospitals, schools or tourist attractions that have the potential to be impacted by changes in traffic flows.

It is acknowledged by the *IEMA Guidelines* that daily variation can vary +/- 10%. As such, it is assumed that projected changes in traffic below 10% means no discernible environmental impact.

Where the predicted increase in traffic volume (whether general or HGV) falls short of these thresholds, the significance of the effects can be termed as not significant. This means that further assessment is not warranted. Consequently, where the predicted traffic flow increase exceeds thresholds, the effects are considered to be potentially significant and accordingly, are assessed in greater detail.

The assessment has clearly identified transport routes which are to be used in connection with the proposed development. Quantitative assessments have been undertaken alongside the application of professional judgement to determine whether or not the effects are considered to be of significance. Based on the Rule 1 and 2 of the *IEMA Guidelines*, the predicted significance of the effect was determined considering both the sensitivity of the receiving environment and the magnitude of change against the baseline. As a guide to inform the assessment, but not as a substitute for professional judgement, criteria for determining the significance of traffic related effects are set out in Table 17.3. It should be noted that the assessment considers the effects of the % increase in general traffic (HGV + Light Goods Vehicles (LGV) and cars) and also % increase in HGV traffic only based on related baseline traffic flows e.g., % increase in HGVs from existing HGV baseline flow.

The study area is predominately rural in context; as such, the majority of routes have been treated as not sensitive and therefore the 30% significance threshold has been applied in view of Rule 1 of the IEMA Guidelines.

The thresholds shown in Table 17.3 have been developed based upon the Rule 1 and Rule 2 criteria above, as well as the consideration that Major and Moderate effects are significant in the context of *Environmental Protection Agency (EPA) Guidelines*.

A small number of road sections have been treated as sensitive and therefore the 10% significance threshold has been applied in view of Rule 2 of the IEMA Guidelines. These are listed with supporting reasoning in Table 17.4.

[6] IEMA Guidelines 2023, 12 para 2.21

Table 17.3: Effect Significance Matrix

Significance of Effect	% Increase in general traffic (HGV + LGV) volume % Increase in HGV traffic volume	
	Rule 1 (Majority of Route sections)	**Rule 2 (Route sections in Table 17.4)**
Major (Significant)	Greater than or equal to 60%	Greater than or equal to 60%
Moderate (Significant)	Greater than or equal to 30% and less than 60%	Greater than or equal to 10% and less than 60%
Minor (Not Significant)	Greater than or equal to 5% and less than 30%	Greater than or equal to 5% and less than 10%
None (Not Significant)	Less than 5%	Less than 5%

Source: IEMA (2023)

Table 17.4: Road Sections Considered Sensitive (whereby Rule 2 Applies)

Road Section	Reasoning for 'Sensitive' Assignment
L-1010 - Between R551 and Tarbert Comprehensive School	Existing school (Tarbert Comprehensive School) accessed from road.
N67 between Tarbert Ferry Terminal and N67/R551 junction	Existing pre-school (Wishing Tree pre-school) accessed from road.
N69 between N67/N67 junction and Ahalana	Existing school (Tarbert National School) and park (Tarbert Community Playground) accessed from road

Source: Mott MacDonald

The significance of all effects under consideration are linked to the volume of traffic generated by the proposed development, therefore it is deemed appropriate to link significance criteria with the scale of the forecast traffic increase. The *IEMA Guidelines* also state however that:

"For many effects there are no simple rules or formulae that define appropriate assessment thresholds and therefore there is a need for interpretation and judgement on the part of the competent traffic and movement expect, backed-up by data or quantified information wherever possible."[7]

As such, professional judgement (led by good practice guidance) has also been applied in the assessment of effects so as to provide more meaningful conclusions in particular where it is not quantifiable by set rules or formulae, particularly in relation to driver delay, the assessment of community (pedestrian delay, non-motorised user amenity) and road safety effects. Information of this nature, gathered from desktop research, where available, in addition to technical knowledge from the wider technical team, has also been used.

Furthermore, where baseline traffic flows are very low, it is possible to derive unrealistic determinations of significance when considered against purely numerical assessment criteria. For example, when traffic flow is very low, it is possible to show relatively large traffic increases and for the road to operate well below capacity. Under the numerical criteria defined above, a 60% increase in traffic volume would represent a major effect, but in reality, the effect is likely to be less significant, given the residual capacity of the road.

The following effect classifications are considered;

- Driver delay;
- Road safety; and
- Community effects (pedestrian delay, severance, NMU amenity, fear and intimidation).

[7] IEMA Guidelines 2023, 15 para 3.12

The *IEMA Guidelines* also necessitate the consideration of Noise, Visual Impact, Air Pollution and Dust and Dirt associated with development generated traffic; these topics are addressed in Chapter 13: Noise and Vibration, Chapter 14: Landscape and Chapter 10: Air respectively.

The predicted significance of any potential Roads and Traffic-related environmental impacts has been determined by considering both the sensitivity of the receiving environment and the magnitude of change against the baseline.

The likely duration of an effect is also a relevant consideration and the Environmental Protection Agency have categorised duration of effects in their *2022 Guidelines*. Potentially of relevance, in respect of the proposed development, the categories include:

- 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

17.3.3.2 Sensitivity

Subject to guidelines from the IEMA, road links may be highlighted as 'specifically sensitive'. In other words, these portions of road are considered to be more vulnerable to changes in either the profile or volume of flows of traffic.

Within the context of this study and using the *IEMA Guidelines* for reference, the receptors of sensitivity have been defined in Table 17.5 for various road links using professional judgement and the UK Design Manual for Roads and Bridges (DMRB) LA112 dated January 2020.

Table 17.5: Receptor Sensitivity

Receptor Sensitivity / Importance	Description
High	• Urban/residential roads without pedestrian/cycle facilities that are used by pedestrians
Medium	• Main vehicular route with pedestrian/cycle facilities provided in a built-up area • Congested Junctions, roads with degree of active frontage
Low	• National roads or 'N' class roads constructed to accommodate significant HGV volumes, Strategic vehicular route, such as Regional Roads, in a rural setting with pedestrian/cycle facilities provided • Urban road with limited active frontage and pedestrian/cycle facilities provided
Negligible	• Roads with no significant settlements including new strategic national roads or motorways • Rural road with no/pedestrian cycle facilities provided

Source: UK DMRB LA112/ Mott MacDonald

17.3.3.1 Magnitude

The magnitude of change has been calculated as the proportional change in traffic flow anticipated on each public road section within the study area. This calculation compares the forecast development traffic generation against the baseline traffic during the assumed construction years. It is crucial to ensure that professional judgement is applied in tandem with the criteria stated above; particularly when considering numerical (as opposed to percentage) changes in traffic volume.

Additional qualitative criteria have also been employed when assessing magnitude, details of which are provided in Table 17.6. This is of particular importance when considering community effects.

Table 17.6: Magnitude Criteria

Magnitude	Impact
High / Major (Significant)	Where the proposed development could be expected to have a considerable effect (either positive or negative) on receptors
Medium / Moderate (Significant)	Where the proposed development could be expected to have a noticeable effect (either positive or negative) on receptors
Low / Minor (Not Significant)	Where the proposed development could be expected to result in a small, barely noticeable effect (either positive or negative) on receptors
None (Not Significant)	Where no discernible effect is expected as a result of the proposed development on receptors (i.e. the effect is insignificant)

Source: Mott MacDonald

As a guide to inform the assessment, but not as a substitute for professional judgement, criteria for determining the significance of traffic-related effects are set out in Table 17.7 and are based on combining the magnitude of the effect with the receptor sensitivity.

Table 17.7: Significance Assessment Matrix

Magnitude of Change	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
High / Major (Significant)	Substantial Adverse (Significant)	Substantial Adverse (Significant)	Moderate Adverse (Significant)	Minor Adverse (Not Significant)
Medium / Moderate (Significant)	Substantial Adverse (Significant)	Moderate Adverse (Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)
Low / Minor (Not Significant)	Moderate Adverse (Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Negligible (Not Significant)
Negligible / None (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)

Source: Mott MacDonald

Significance is categorised as Substantial Adverse, Moderate Adverse, Minor Adverse or Negligible. Effects deemed to be Substantial Adverse or Moderate Adverse are considered to be ‘Significant’ and effects that are judged to be Minor Adverse or Negligible are considered ‘Not Significant’. The same criteria also apply to positive/beneficial impacts.

17.3.3.2 Fear and Intimidation

The *IEMA Guidelines (2023)* include a methodology for assessing magnitude of change for fear and intimidation (caused by all moving objects including traffic). Table 17.8 shows the initial assessment for a road section. The score is then combined, and a level of fear and intimidation is determined from Table 17.9.

Table 17.8: Fear and Intimidation Degree of Hazard

Average Traffic Flow Over 18-Hour Day – All Vehicles/hour 2-way flow (a)	Total 18-hour Heavy Vehicle Flow (b)	Average Vehicle Speed (c)	Degree of Hazard Score
+1800	+3000	>40mph	30
1200-1800	2000-3000	30-40mph	20
600-1200	1000-2000	20-30mph	10
<600	<1000	<20mph	0

Source: IEMA 2023

Table 17.9: Levels of Fear and Intimidation

Level of Fear and Intimidation	Total Hazard Score (a)+(b)+(c)
Extreme	71+
Great	41-70
Moderate	21-40
Small	0-20

Source: IEMA 2023

The magnitude of change of the effect (compared to baseline conditions) is then calculated as shown in Table 17.10.

Table 17.10: Fear and Intimidation Magnitude of Effect

Magnitude of Effect	Change in Step/Traffic Flows (AADT) from Baseline Conditions
High (Significant)	**Two step changes in level**
Medium (Significant)	**One step change in level, but with** ● >400 veh increase in average 18 hr AV two-way all vehicle flow; and/or ● >500 HV increase in total 18 hr HV flow
Low (Not Significant)	**One step change in level, with** ● <400 veh increase in average 18 hr AV two-way all vehicle flow; and/or ● <500 HV increase in total 18 hr HV flow
Negligible (Not Significant)	**No change in step changes**

Source: IEMA 2023

17.3.3.3 Traffic Forecasting Assumptions

It has been necessary to make a number of assumptions to enable the Roads and Traffic assessment to be undertaken. During the COVID pandemic there had been a general trend of reduced motorised traffic on the road, as more people worked from home, travelled on foot and cycled, travelled shorter distances and some shops and services had been closed. Whilst restrictions have been lifted and general trends are moving again it is become difficult to predict when ‘normal’ travel patterns will resume again and/or how patterns of work will change, it is considered robust and reasonable to proceed on the basis of the pre-COVID traffic growth factor applied to future baseline flows.

17.4 Receiving Environment

17.4.1 Road Network

The road network included in the study area was determined on the basis of likely construction access routes and the location of physical construction works, defined in Section 17.3.1. Confirmation of route selection will be agreed with the relevant local authorities/TII.

The key characteristics of the defined public road sections in the study area have been appraised through desktop study and are set out in Table 17.11. Receptor sensitivity has been outlined using the criteria detailed in Table 17.5.

Table 17.11: Road Network and Route Profiles

Route Section	Speed Limit (km/h)	Description	Receptor Sensitivity
L-1010 between Kilcolgan Upper boundary and Ballylongford	80	Single lane carriageway majority of length. Forms a junction with the R551 and R552 in Ballylongford. Road surroundings predominately rural with access to residential and agricultural properties.	Negligible
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	80	Single lane carriageway majority of length. Two-way single lane carriageway section of c.480 m. Road surroundings predominately rural with access to residential and agricultural properties. Kerry County Council intend to widen a short stretch of this road section, with works expected to be completed in advance of the proposed development. Please see Section 17.4.1.1 for further detail.	Negligible
L-1010 between R551 and Tarbert Comprehensive School	50	Two-way single lane carriageway majority of length. Road surroundings urban within Tarbert with access to residential properties and education (Tarbert Comprehensive School) and rural (west of school) with access to residential and agricultural properties. Road section features footway and street lighting within Tarbert urban area.	Low
N67 between Tarbert Ferry Terminal and N67/R551 junction	50-80	National road. Route links Tarbert Ferry Terminal with the N67/R551 junction in Tarbert centre. Two-way single carriageway with footway and street lighting in Tarbert and adjacent to the ferry terminal. Road surroundings predominately rural. Urban section within Tarbert with access to residential and commercial properties and health, educational and recreational facilities.	Low
N67 between N67/R551 junction and N67/N69 junction	50	National road. Route links the N67/R551 junction and N67/N69 junction in Tarbert centre. Two-way single carriageway with footway and street lighting. Road surroundings urban section with access to residential and commercial properties.	Low
N69 between N67/N6 junction and Ahalana	50-100	National road. Route links Tarbert with Ahalana. Two-way single carriageway single carriageway with footway and street lighting within Tarbert and then intermittently along route. Road surroundings predominately rural with access to residential and agricultural properties. Within Tarbert road surroundings include access to residential and commercial properties and educational, leisure and worship facilities.	Low
N69 between Ahalana and Listowel	50-100	National road. Route section links Ahalana with Listowel. Two-way single carriageway with footway and street lighting within Listowel and intermittently along route. Road surroundings predominately rural with access to residential and agricultural properties. Within Listowel road surroundings include access to residential and commercial properties.	Low
N69 between N67/N69 junction and Glin	50-100	National road. Route section links N67/N69 junction in Tarbert with Glin. Two-way single carriageway with footway and street lighting within Tarbert and Glin and intermittently along route. Road surroundings predominately rural with access to residential, commercial and agricultural properties.	Low
N69 between Glin and Foynes	50-100	National road. Route section links Glin with Foynes. Two-way single carriageway with footway and street lighting within Glin and Foynes and intermittently along route. Road surroundings predominately rural with access to residential, commercial and agricultural properties.	Low

Route Section	Speed Limit (km/h)	Description	Receptor Sensitivity
N69 between Foynes and N18	50-100	National road. Route section links Foynes with the N18. Two-way single carriageway single carriageway with footway and street lighting within Foynes and then intermittently along route. Road surroundings predominately rural with access to residential, commercial and agricultural properties.	Low

Source: Mott MacDonald

17.4.1.1 L-1010 Road Widening Scheme

In advance of the construction works of the main elements of the STEP Power Plant, the L-1010 will be widened by Kerry County Council to two-lanes within the vicinity of the proposed development. The KCC works also include the installation of cable ducts and joint bays. These works are described in Chapter 5: Description of the Proposed Development. These works will be fully funded by the Applicant by means of a special development contribution under section 48(2)(c) of the Planning and Development Act 2000 to cover the full cost of the upgrade works including the ducting and joint bay installation.

17.4.2 Existing Traffic Flows

Theoretical capacities for a variety of road types have been determined through a review of TII Publications, *'Rural Road Link Design' (DN-GEO-03031)*. These capacities are quoted as Average Annual Daily Traffic (AADT).

Table 17.12 details the existing traffic flows and capacities on the routes within the study area considered in the assessment.

For the following route sections traffic data (two way) was only available for twelve hours (07:00 – 19:00):

- L-1010 between R551 and Tarbert Comprehensive School
- N67 between Tarbert Ferry Terminal and N67/R551 junction
- N67 between N67/R551 junction and N67/N69 junction
- N69 between N67/N67 junction and Ahalana
- N69 between N67/N69 junction and Glin.

A factor was derived to convert twelve hour (two way) traffic flows to 24 hour (two way) from TII surveys used for three N69 route sections[8] on the same day (28 January 2020) as the twelve hour surveys. An average of the three sections was calculated and the factor derived was of 1.19.

Traffic calculations are included in Appendix 17.1.

Table 17.12: Route Capacities and Existing Traffic Count Data

Route Section	Road Capacity (AADT)	Existing AADT (two way) All Vehicles [Year]	Existing HGV proportion
L-1010 between Kilcolgan Upper boundary and Ballylongford	8600*	221 [2023]	7%
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	8600*	274 [2023]	6%
L-1010 between R551 and Tarbert Comprehensive School	8600*	1370 [2024]	4%
N67 between Tarbert Ferry Terminal and N67/R551 junction	8600	1253 [2024]	10%
N67 between N67/R551 junction and N67/N69 junction	8600	3603 [2024]	6%
N69 between N67/N67 junction and Ahalana	8600	3228 [2024]	7%
N69 between Ahalana and Listowel	8600	3939 [2023]	4%

[8] N69 between Ahalana and Listowel, N68 between Glin and Foynes, N69 between Foynes and N18

Route Section	Road Capacity (AADT)	Existing AADT (two way) All Vehicles [Year]	Existing HGV proportion
N69 between N67/N69 junction and Glin	8600	3384 [2024]	7%
N69 between Glin and Foynes	8600	3410 [2023]	5%
N69 between Foynes and N18	8600	6360 [2023]	9%

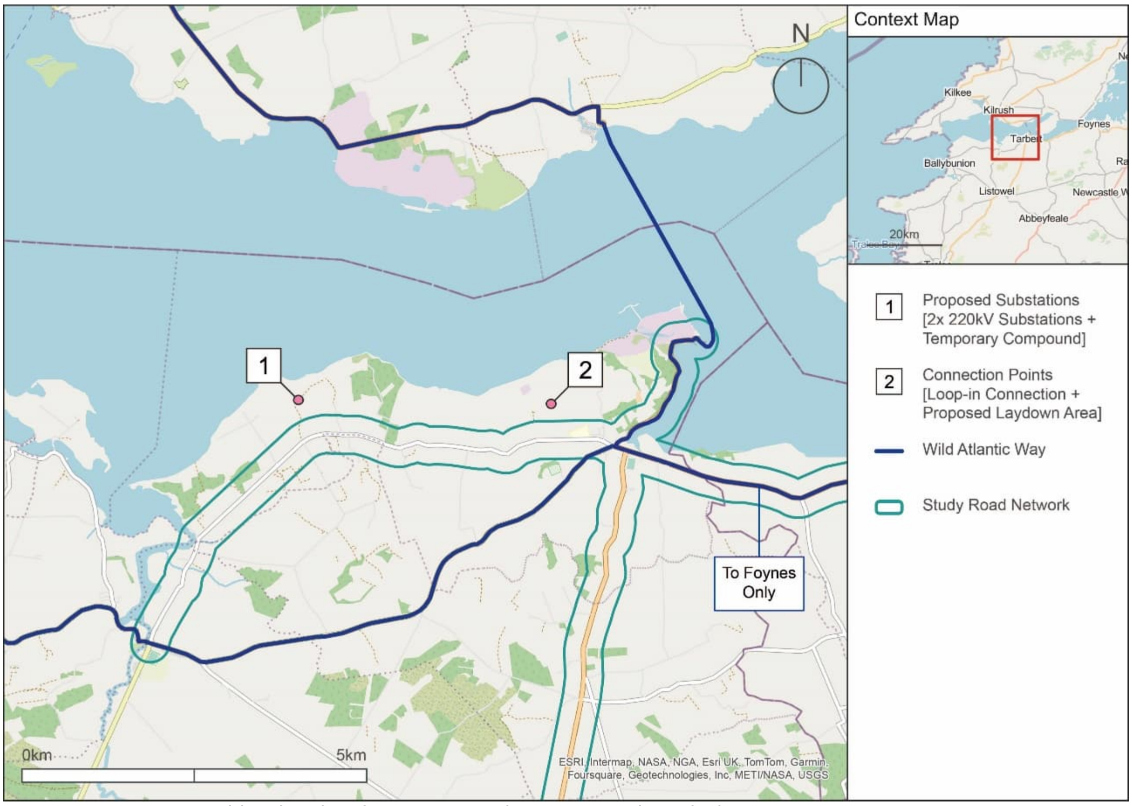
Source: Mott MacDonald, TII , NDC, Idaso * = road capacity following road widening by Kerry County Council

17.4.3 Tourism and Leisure

Part of the Wild Atlantic Way[9], a coastal tourist route predominately utilised by motorised traffic on the west coast of Ireland, is located within the study area; on the N67/R551 between Tarbert and Astee and on the N69 between Tarbert and Foynes. The route is clearly signposted.

A plan showing the section of the Wild Atlantic Way which interfaces with the study area road network has been illustrated in Figure 17.3.

Figure 17.3: Wild Atlantic Way within Study Area



Source: Mott MacDonald, using data from TII, ESRI (sources noted on plan)

[9] https://www.discoverireland.ie/wild-atlantic-way/map

17.4.4 Walking and Cycling

Notable walking and cycling infrastructure is evident in the study area.

Footway of good condition and width is present on the L-1010 between the R551/L-1010 junction in Tarbert and Tarbert Comprehensive School on the north side of the road. There is intermittent footway on the south side of the road between these locations.

There is footway present on the N67 within Tarbert and intermittently on the west side of the carriageway between Tarbert and Tarbert Ferry Terminal.

Footway is present on both sides of the N69 carriageway within Tarbert. Between Tarbert and Listowel and Tarbert and Limerick (N18) there is only intermittent footway within settlement areas

The N67 and L-1010 are part of the North Kerry Cycleway which links Tarbert with Ballybunion, Ballyheighe, Artfert and Tralee. This cycle route is signposted.

17.4.5 Public Transport

17.4.5.1 Bus

Three bus services utilise sections of the road network in the study area. Table 17.13 summarises the local services and their associated frequencies.

Table 17.13: Local Bus Routes

Route Number	Operator	Route	Weekday Frequency	Weekend Frequency
274	TFI Local Link	Tarbert – Tralee (via N67 and R551)	Three services per day in both directions	Three services per day in both directions
314	Bus Eireann	Limerick – Tarbert – Ballybunion (via N69)	Four services per day in both directions (to/from Tarbert)	Four services per day in both directions (to/from Tarbert)
595	TFI Local Link	Tarbert – Croom & Mid-Western Regional Hospital (via part N69 between Tarbert and Glin)	Three services per day in both directions	Three services per day in both directions

Source: bustimes.org, locallinkkerry.ie, transportforireland.ie, busireann.ie, locallinklc.ie

17.4.5.2 Rail

The closest railway services to the proposed development can be accessed from Limerick Colbert Railway Station, which is c. 65 km east (approximately 1 hour ten minutes' drive) of the proposed development and Tralee Casement Railway Station which is c. 50 km south (approximately 50 minutes' drive) of the proposed development.

Limerick Colbert Railway Station has direct rail links to Dublin and Galway. A new bus terminal was opened at the station in January 2024. Tralee Casement Railway Station has direct rail links to Dublin and Cork.

The Limerick to Foynes Railway Line closed in 2001 however works commenced in 2023 to reopen the 42km to freight services.

17.4.5.3 Ferry

Tarbert Ferry Terminal is located c. 2.5 km north of Tarbert. A vehicle (and passenger) ferry service (operated by Shannon Ferries) links Tarbert with Killimer (Co. Clare) via the Shannon Estuary. The ferries typically operate every 30 minutes between May and September and every 60 minutes between October and April (in both directions).[10] The crossing duration is c.20 minutes. The ferries have a capacity of 350 people and 52-60 cars (depending on the vessel). The ferry operating hours over a calendar year are summarised in Table 17.14.

Table 17.14: Ferry Operating Hours

	Direction	
Month	**Tarbert to Killimer**	**Killimer to Tarbert**
April – May & September	07:30-20:30 Monday to Saturday 09:30-20:30 Sunday	07:00-20:00 Monday to Saturday 09:00-20:00 Sunday
June – August	07:30-21:30 Monday to Saturday 09:30-21:30 Sunday	07:00-21:00 Monday to Saturday 09:00-21:00 Sunday
October – March	07:30-19:30 Monday to Saturday 09:30-19:30 Sunday	07:00-19:00 Monday to Saturday 09:00-19:00 Sunday

Source: shannonferries.com

17.4.6 Collision Data

Up-to-date Personal Injury Collision (PIC) data for the study area was unavailable for review at the time of assessment. A review of historic data (for the five year period covering 2012-2016 inclusive) reveals a small number of incidents within the vicinity of the site (n=13); only two of which were classed as 'serious' and none 'fatal'. There is no evidence to suggest the presence of 'crash clusters' or similarities in causation factors and it is therefore concluded that, historically, the road network adjacent to the proposed development has not had a poor safety record.

On the basis that neither the adjacent road network has altered in any meaningful way, nor road traffic levels increased significantly, it can reasonably be assumed that the road safety in the study area is unlikely to have worsened in the years since.

17.5 Likely Significant Effects

17.5.1 Construction Phase

The construction phase is scheduled to commence in Q4 2026 with a duration of approximately 27 months.

The intensity of traffic will vary over the course of the construction phase. An indicative construction programme is summarised in Table 17.15Table 17.15 and Table 17.16.

[10] https://www.shannonferries.com/

Table 17.15: Indicative Construction Programme – Substations

Construction Phase	Activity	Approximate Timeline
Site Preparation (GIS Substation)	Preliminary site Drainage Works Site Preparation and Groundworks Drainage Permanent Fencing Installation Ducting for cable circuits to Demand Customer from substation to transition pit	18 Weeks
GIS Substations (civils)	Civil construction of new GIS Substation Building Compound levelling and finishing surface	34 weeks
GIS Substations (electrical)	Electrical Installation Pre-commissioning	32 weeks
Substation Energisation	Final commissioning and energisation	12 weeks

Source: Mott MacDonald

Table 17.16: Indicative Construction Programme – Underground Cabling

Construction Phase	Activity	Approximate Timeline
Civil Works		
	Pre-construction	12 weeks
	Trenching and ducting works and temporary reinstatement	30 weeks
Total		42 weeks
Electrical Works		
	Pre-construction works	4 weeks
	HV cable joint bay re-excavation	3 weeks
	Proving of ducting/HV cable jointing	2 weeks
	HV cable jointing	28 weeks
	HV cable commissioning (sheath test, cross bonding and HV/AC testing)	4 weeks
	Permanent re-instatement of joint bays (Civils contractor)	3 weeks
Total		44 weeks

Source: Mott MacDonald

Based upon review of the preliminary construction programme for the civil works, it is evident that the substation construction and the works associated with the cable route are not proposed to be undertaken at the same time, i.e., the electrical works phase follows the completion of the civil works phase.

17.5.1.1 Working Hours

Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday).

However, there may be instances where extended hours / days are required and should working outside these hours / days be necessary, prior agreement with relevant statutory authorities will be required. The requirement for notification and liaison with any other relevant parties will also be agreed during these discussions with the relevant statutory authorities.

Additionally, construction traffic timing will be agreed with KCC in advance to avoid coinciding with the peak time associated with Tarbert Comprehensive School.

17.5.1.2 Construction Compounds

A construction compound will be located adjacent to the proposed substations and main STEP Power Plant. There will also be three temporary laydown areas, two located in close vicinity to the Line Cable Interface Mast (LCIM) at the connection point and one located south of the construction compound. The construction compound will accommodate construction phase car parking, welfare facilities and laydown areas as necessary.

Further detail regarding construction compounds is provided in Section 5.5.3 of Chapter 5: Description of the Proposed Development.

17.5.1.3 Construction Access

Construction traffic will access the main construction compound and a smaller compound from the L-1010.

The main construction compound will be accessed via the STEP Power Plant access road (which forms a junction with the L-1010). The smaller compound will be accessed from a track via the Kilpaddoge Substation access road which also forms a junction with the L-1010.

Heavy Goods Vehicles (HGVs) generated by the proposed development and originating from outside the local area will be required to access the L-1010 via the N67/N69.

As per the STEP Power Plant application, no HGV traffic will be allowed pass the existing school on the Coast Road at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure the continued safe delivery and collection of children at the school.

17.5.1.4 Construction Personnel

As detailed in Chapter 5: Description of the Proposed Development, the number of construction personnel required during the construction phase is expected to peak at approximately 60 persons for the substation construction (civil works phase), and eight persons per crew working on the cable route (civil and electrical works phases). It is expected that up to three crews may be working on the cable route at a time.

It has been assumed that construction personnel will travel to site using van/minibus or private passenger vehicle (in some cases accommodating more than one occupant).

A vehicle occupancy rate of 1.25 is assumed and in the robust-case scenario this would equate to a peak daily number of 48 vehicles (96 two-way movements per day) for the civil works phase and 20 vehicles (40 two-way movements per day) for the electrical works phase.

Adequate car parking for contractors’ vehicles will be provided within the temporary contractor’s compounds.

Construction personnel traffic movements will be staged to avoid coinciding with the peak time associated with Tarbert Comprehensive School. i.e. Construction personnel traffic will be avoided between 8:30 am to 9:15 am.

17.5.1.5 Heavy Good Vehicles (HGV) Volumes

It is estimated that there would be eight daily HGVs (sixteen HGV two-way movements) associated with the construction of the substations (civil works phase) and 24 daily HGVs (48 HGV two-way movements) for the construction of the cable route (civil works phase). There would be a maximum of six daily HGVs (twelve HGV two-way movements) for the electrical phase.

17.5.1.6 Construction Traffic Summary

A summary of the construction traffic generated at each construction phase is shown in Table 17.17.

Table 17.17: Construction Traffic Summary

	Vehicle Movements (2-way)		
Construction Phase	Cars/LGVs	HGVs	All Traffic
Civil Works – Substation	96	16	112
Civil Works – Cable Route	40	48	88
Electrical Works	40	12	52

Source: Mott MacDonald, ESB

As the peak traffic movements associated with the construction of the proposed development are in the substation construction stage of the "civil works" phase this has therefore been assessed as the peak construction period.

It has been assumed that construction traffic would have a similar distribution to the construction traffic for the proposed STEP Power Plant development:[11]

HGV Traffic

- 80% to/from Limerick direction
- 20% to/from Listowel direction

Cars/LGV Traffic

- 5% to/from (N67 (via Tarbert Ferry)
- 70% to/from Limerick direction
- 25% to/from Listowel direction

17.5.1.7 Abnormal Loads

There will be no abnormal loads during the construction period associated with the proposed development, therefore an abnormal load assessment was not required for this assessment.

17.5.1.8 L-1010 Works

As discussed in Section 17.4.1.1 the L-1010, in the vicinity of the proposed development, is to be widened to accommodate a 2-way single carriageway by Kerry County Council in advance of the main elements of construction of the STEP Power Plant. These works include the construction/installing of cable ducts.

Following the completion of civil works associated with the cable route (off the public road network) electrical works will commence including the re-excavation of joint bays, proving of ducting, HV cable jointing, HV cable commissioning and the permanent re-installation of joint bays.

A proportion of these works will be undertaken on the L-1010 (approximately 2.5 km in length). During these works localised lane closures on the L-1010 will be required. The electrical phase will be undertaken over a period of 44 weeks. Partial road closures and diversions may be required in some areas along the route during cable installation. However, all reasonable and practically achievable measures, such as the moving of equipment and placing temporary

[11] STEP Power Station EIAR Chapter 11 https://steppowerplant.com/eiar-volume-2-main-report/

covers over the joint bays to allow essential access for vehicles, will be implemented to facilitate local access requirements for emergency services, residential and commercial purposes. Specific traffic management requirements and localised arrangements will be developed by the appointed contractor(s) and will be agreed in advance of implementation with the appropriate local authority.

Further detail regarding the electrical works phase is detailed Section 5.5.2 of Chapter 5: Description of the Proposed Development.

17.5.1.9 Future Baseline Traffic Flow

The *Project Appraisal Guidelines for National Roads Unit 5.3, TII, October 2021* has been referenced to predict road network traffic flows in the absence of the proposed development.

A ‘low growth’ traffic uplift scenario has been used on the basis that the study area of the proposed development is sparsely populated. The likelihood of high or medium levels of traffic growth would be used where there is likely to be a notable increase in population and associated vehicle ownership either during or prior to the construction of the proposed development, which, in this case, is not foreseen. Table 17.18 summarises future year traffic growth scenarios without the proposed development.

Table 17.18: Future Year Scenario Growth Rates

Future Year Scenario	Growth Rate from 2023		Growth Rate from 2024	
	LGV/Cars	HGV	LGV/Cars	HGV
2026	2.85%	8.29%	1.89%	5.45%
2027	3.81%	11.20%	2.85%	8.29%
2028	4.49%	14.19%	3.81%	11.20%

Source: TII Publications, Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, Table 6.1, October 2021

Table 17.19 lists forecast future baseline traffic flows factored upwards in accordance with the rates indicated in Table 17.18.

Table 17.19: Future Baseline Traffic Flow Data

	2026 Average Daily Traffic Flow		2027 Average Daily Traffic Flow		2028 Average Daily Traffic Flow	
Route Section	**All Vehicles (Two-Way Flow)**	**HGV Only (Two-Way Flow)**	**All Vehicles (Two-Way Flow)**	**HGV Only (Two-Way Flow)**	**All Vehicles (Two-Way Flow)**	**HGV Only (Two-Way Flow)**
L-1010 between Kilcolgan Upper boundary and Ballylongford	228	17	231	18	233	18
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	283	17	286	18	289	18
L-1010 between R551 and Tarbert Comprehensive School	1398	58	1412	59	1426	61
N67 between Tarbert Ferry Terminal and N67/R551 junction	1281	126	1295	129	1310	132
N67 between N67/R551 junction and N67/N69 junction	3679	226	3718	232	3757	238
N69 between N67/N67 junction and Ahalana	3297	226	3332	232	3367	238
N69 between Ahalana and Listowel	4059	153	4100	157	4141	161
N69 between N67/N69 junction and Glin	3457	254	3494	261	3531	268
N69 between Glin and Foynes	3517	198	3554	203	3591	209
N69 between Foynes and N18	6572	625	6645	642	6719	659

Source: Mott MacDonald. TII, NDC, Idaso

17.5.2 Assessment of Effects of Construction Phase

The peak movement of construction vehicles is scheduled in year 2027 which is associated with the substation civil works construction stage. This construction stage has therefore been assessed for construction effects on the public road network.

Possible effects associated with the construction works are:

- Driver delay;
- Road safety; and
- Community effects (pedestrian delay, severance, non-motorised users (NMU) amenity, fear and intimidation).

These effects have potential to be caused due to an increased volume of traffic on the construction vehicle routes, however as these vehicle movements will occur during construction operations only, they are categorised to be short term effects, given the construction duration is between one and seven years.

Table 17.20 outlines the change in traffic volume on the public road network within the study area in 2027 and assesses the aligned effect significance in terms of the IEMA thresholds. It should be noted that the effect significance set out below is based purely on the degree of change as described in Table 17.3 and therefore requires professional judgement (led by good practice guidance) in order to provide meaningful conclusions.

Where baseline traffic flows are low, it is possible to derive unrealistic determinations of significance when considered against purely numerical assessment criteria and it is possible to show relatively large traffic increases yet for the road to operate well below capacity. For example, using the numerical criteria defined in Table 17.3, anything above a 60% increase in traffic volume would represent a major effect, but in reality, the effect is likely to be less significant, given the residual capacity of the road.

Table 17.20: IEMA Threshold Assessment Summary

Route Section	Capacity (AADT)	Baseline 2027 AADT – All Vehicles (Two-Way Flow)	Baseline 2027 AADT – HGV (Two-Way Flow)	Peak Daily Additional Movements – All Vehicles	% Increase – All Vehicles	Peak Daily Additional Movements – HGVs	% Increase – HGVs	Effect Significance of Increase – All Vehicles	Effect Significance of Increase – HGVs
L-1010 between Kilcolgan Upper boundary and Ballylongford	8600*	231	18	112	49%	16	90%	Moderate (Significant)	Major (Significant)
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	8600*	286	18	112	39%	16	90%	Moderate (Significant)	Major (Significant)
L-1010 between R551 and Tarbert Comprehensive School	8600*	1412	59	112	8%	16	27%	Minor (Not Significant)	Moderate (Significant)
N67 between Tarbert Ferry Terminal and N67/R551 junction	8600	1295	129	5	0%	0	0%	None (Not Significant)	None (Not Significant)
N67 between N67/R551 junction and N67/N69 junction	8600	3718	232	107	1%	16	7%	None (Not Significant)	Minor (Not Significant)
N69 between N67/N69 junction and Ahalana	8600	3332	232	27	1%	3	1%	None (Not Significant)	None (Not Significant)
N69 between Ahalana and Listowel	8600	4100	157	27	1%	3	2%	None (Not Significant)	None (Not Significant)
N69 between N67/N69 junction and Glin	8600	3494	261	80	2%	13	5%	None (Not Significant)	Minor (Not Significant)
N69 between Glin and Foynes	8600	3554	203	80	2%	13	6%	None (Not Significant)	Minor (Not Significant)
N69 between Foynes and N18	8600	6645	642	80	1%	13	2%	None (Not Significant)	None (Not Significant)

Source: Mott MacDonald. IEMA, TII, NDC, Idaso, * = road capacity following road widening by Kerry County Council

17.5.2.1 Driver Delay

The road sections in the study area where the significance threshold has been met or to be exceeded are;

- L-1010 between Kilcolgan Upper and Ballylongford boundary
- L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary
- L-1010 between K551 and Tarbert Comprehensive School

As described in Section 17.4, the L-1010 will be widened in advance of construction of both the STEP Power Plant and the proposed development. The affected L-1010 road sections will operate notably below their theoretical capacity (which are shown in Table 17.20). These road sections all feature low existing traffic volumes and as such show a relatively large proportional increase which would represent a significant effect. However, the significance of effect of driver delay for all road users on these road sections is considered to be minor based on professional judgement and accordingly considered to be not significant in the context of the EPA Guidelines (2022).

17.5.2.2 Road Safety

Based on professional judgement and experience in the assessment of Road and Traffic impacts relation to major development projects, the impact to road safety is considered to be at worst minor and therefore not significant within the context of the EPA Guidelines (2022). Historic evidence has not revealed any evidence of a poor safety record for the study area road network and, considering the volume of additional traffic expected to be generated during the construction of the proposed development, it is unlikely that an associated road safety problem will manifest.

17.5.2.3 Community Effects (Severance, Pedestrian Dela, NMU Amenity, Fear and Intimidation)

Severance

The IEMA Guidelines define severance as ‘the perceived division that can occur within a community when it becomes separated by major transport infrastructure’. Severance may result from a road carrying large traffic flows or a physical barrier created by the road itself, and the IEMA Guidelines suggest that consideration is given to the severity of existing severance and how this might be exacerbated by proposed construction traffic generated by a development.

Although the study area does feature routes which could be considered as ‘major traffic arteries’, as shown in Table 17.20, the roads within the study area will continue to operate notably below theoretical capacity, even with the addition of traffic generated during construction of the proposed development. Severance should not occur when there is such a notable level of residual road capacity.

Pedestrian Delay

For similar reasoning, pedestrian delay is not considered to be an existing problem on any of the route sections within proposed development study area, nor one that shall be created by the addition of proposed construction traffic to these routes.

NMU Amenity

Non-motorised user (NMU) amenity is broadly defined by the IEMA Guidelines as the ‘relative pleasantness of a journey’. The IEMA Guidelines suggest that ‘a tentative threshold for judging the significance of changes in pedestrian amenity would be where traffic flows (or its HGV component) are halved or doubled.

The construction of the proposed development is predicted to generate increased HGV flows on the roads within the study area, with up to 16 HGV movements per day occurring during the peak construction period (an increase of up to c.90% for HGVs on the L-1010 in year 2027).

On this basis, the significance of the effect on NMU amenity, is considered to be at worst minor and accordingly considered to be not significant in terms of the EPA Guidelines (2022).

Fear and Intimidation

As referenced in Section 17.3, the *IEMA Guidelines* (2023) sets out a methodology for assessing magnitude of change for fear and intimidation (caused by all moving objects including traffic).

Fear and intimidation have been assessed for the peak level of construction traffic in year 2027. Table 17.21 shows the 2027 future baseline assessment and Table 17.22 shows the “with construction traffic” assessment with a reference to the fear and intimidation magnitude of impact.

Table 17.21: Fear and Intimidation Assessment – 2027 Future Baseline

Road Section	Average Traffic Flow (18 hours) – All Vehicles (Two-way Flow) [DEGREE OF HAZARD SCORE]	HGVs (24 hours) – (Two-way Flow) [DEGREE OF HAZARD SCORE]	Average Vehicle Speed [DEGREE OF HAZARD SCORE]	Total Degree of Hazard Score	Level of Fear and Intimidation
L-1010 between Kilcolgan Upper boundary and Ballylongford	226 [0]	18 [0]	>40mph [30]	30	Moderate
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	279 [0]	18 [0]	>40mph [30]	30	Moderate
L-1010 between R551 and Tarbert Comprehensive School	1263 [10]	55 [0]	30-40mph [20]	20	Moderate
N67 between Tarbert Ferry Terminal and N67/R551 junction	1163 [10]	120 [0]	>40mph [30]	30	Moderate
N67 between N67/R551 junction and N67/N69 junction	3330 [30]	217 [0]	30-40mph [20]	20	Great
N69 between N67/N69 junction and Ahalana	2986 [30]	217 [0]	>40mph [30]	30	Great
N69 between Ahalana and Listowel	4020 [30]	131 [0]	>40mph [30]	30	Great
N69 between N67/N69 junction and Glin	3132 [30]	243 [0]	>40mph [30]	30	Great
N69 between Glin and Foynes	3462 [30]	173 [0]	>40mph [30]	30	Great
N69 between Foynes and N18	6474 [30]	576 [0]	>40mph [30]	30	Great

Source: IEMA, Mott MacDonald, TII , NDC, Idaso

Table 17.22: Fear and Intimidation Assessment – 2027 "With Proposed Development Construction Traffic"

Road Section	Average Traffic Flow (18 hours) – All Vehicles (Two-way Flow) [DEGREE OF HAZARD SCORE]	HGVs (24 hours) – (Two-way Flow) [DEGREE OF HAZARD SCORE]	Average Vehicle Speed [DEGREE OF HAZARD SCORE]	Total Degree of Hazard Score	Level of Fear and Intimidation	Fear and Intimidation Magnitude of Impact
L-1010 between Kilcolgan Upper boundary and Ballylongford	338 [0]	34 [0]	>40mph [30]	30	Moderate	Negligible (No Change)
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	391 [0]	34 [0]	>40mph [30]	30	Moderate	Negligible (No Change)
L-1010 between R551 and Tarbert Comprehensive School	1375 [20]	71 [0]	30-40mph [20]	40	Moderate	Negligible (No Change)
N67 between Tarbert Ferry Terminal and N67/R551 junction	1168 [10]	120 [0]	>40mph [30]	40	Moderate	Negligible (No Change)
N67 between N67/R551 junction and N67/N69 junction	3437 [30]	233 [0]	30-40mph [20]	50	Great	Negligible (No Change)
N69 between N67/N69 junction and Ahalana	3013 [30]	220 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Ahalana and Listowel	4047 [30]	134 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between N67/N69 junction and Glin	3212 [30]	256 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Glin and Foynes	3542 [30]	186 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Foynes and N18	6554 [30]	589 [0]	>40mph [30]	60	Great	Negligible (No Change)

Source: IEMA, Mott MacDonald, TII

As shown in Table 17.21 and Table 17.22, the magnitude of impact is negligible (no change) with reference to *IEMA Guidelines (2023)*.

Therefore, the significance of the effect on fear and intimidation, is considered to be **negligible** and accordingly not significant in terms of the EPA Guidelines (2022).

Community Effects Summary

Overall, based on professional judgement, the construction traffic generated by proposed scheme study area will at worst have a minor effect upon community receptors and is therefore not significant in the context of the EPA Guidelines (2022).

17.5.2.4 Summary of Effects

A summary of the assessment the construction effects are shown in Table 17.23.

Table 17.23: Summary of Effects

Effect	Significance
Driver Delay	Minor (Not Significant)
Road Safety	Minor (Not Significant)
Community Effects	Minor (Not Significant)

Source: Mott MacDonald, IEMA Guidelines, EIAR Guidelines

17.6 Decommissioning Phase

Subject to the granting of statutory approval, the EirGrid/ESBN substation and grid connections will form part of the national electrical grid infrastructure. The design life of the substation is approximately 40 years. It is expected that the substation site will remain a permanent part of the national electricity transmission network and will be refurbished and / or redeveloped as required rather than be decommissioned.

The SLNG substation is expected to have a design life of 25 years. Where decommissioning takes place, all above-ground components associated with the substation will be disassembled and removed from the site and effects are likely to be similar or of a lesser magnitude than the construction effects.

17.7 Cumulative Effects

A number of proposed developments, some of which are committed in terms of planning, are located close to the proposed development. These developments are listed in Table 17.24 with associated commentary regarding their inclusion, or otherwise, in the cumulative assessment. Further information regarding each of these developments can be found in Section 4.3.10 of Chapter 4.

Table 17.24: Committed Development Proposals

Reference (KCC Planning/Other)	Location	Developer	Date Granted	Distance	Development Description	Traffic Management Plan (TMP) Produced?	Included in Cumulative Assessment?	Justification
18878	Kilpaddoge, Tarbert, Co. Kerry	Shannon Clean Tech Ltd	23/09/2019	~1km	For a 10-year permission to construct a battery energy storage system (BESS) facility.	Yes	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area. Construction duration will be six months, but no indicative construction dates provided.
19115	Kilpaddoge, Tarbert, Co. Kerry	Glencloosagh Energy Limited	07/02/2020	1km	For a 10-year permission for a grid stabilisation facility comprising of: the construction up to 4 no. rotating stabilisers, 5 no. battery storage containers, 1 no. control room, 2	Yes	No	Understood to be built and fully operational. Operational traffic will be accounted for in future baseline.
ABP 304807-19	Townlands of Aghanagran Middle, Aghanagran Lower, Ballyline West, Tullahennell South, Ballylongford, Co. Kerry	The Ballylongford Wind Farm Group	06/01/2020	7km	Construction of a Windfarm consisting of up to 6 Wind Turbines. Previously refused by Kerry County Council (19381)	Yes	No	Understood to be built and fully operational. Operational traffic will be accounted for in future baseline.
VA03.307798	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	Eirgrid Plc	04/06/2021	1km	Installation of 400kV electricity transmission cables, extension to the existing Kilpaddoge Electrical Substation and associated works.	Documents not available to view	No	Understood to be built and fully operational. Operational traffic will be accounted for in future baseline.
20850	Townland of Carrowdotia South, Co.Clare and Kilpaddoge, Co. Kerry.	Kilpaddoge Green Engergy Ltd.	12/11/2020	1km	Change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.	Not included in application documents	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area. Construction duration will be 16-18 months, but no indicative construction dates provided.
21/549		Donal Murphy Glencloosagh Energy Limited	20/08/2021	1km	10 year planning permission for a high inertia synchronous compensator compound containing electrical equipment containers.	Yes	**Yes** (Construction traffic only, operational stage traffic negligible) .	Project is in close proximity to the proposed development and/or affected roads within study area Construction duration will be twelve months, but no indicative construction dates provided
21/305 and ABP 310521	Kilpaddoge Tarbert Co. Kerry Kilpaddoge Tarbert	Ontower Ireland Limited	29/11/2021	1km	Retain an existing telecommunications support structure (previously granted under Reg. Ref. 11/969 and ABP Ref. PL08.240232) together with associated ground equipment, security fencing and access track at Kilpaddoge, Tarbert, Co. Kerry.	Not included in application documents	No	Understood to be built and fully operational. Operational traffic will be accounted for in future baseline
20/438 and ABP appeal Ref. 308643	Meelcon, Carhoona, Farranawana, Tarbert, Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co. Kerry	Ballylongford Windfarm Group	21/06/2021	~1km	Amendment to previous granted permission which related to change in connection grid route for wind farm.	Not included in application documents	No	Cable construction would not have a significant effect on R151 or L-1010. It is understood that a TMP will be produced.
19/381 and ABP appeal Ref. PL08.304807	Aghanagran Middle and Lower, Ballyline West and Tullahennel South, Ballylongford Co. Kerry Aghanagran Middle and Lower Etc.	The Ballylongford Windfarm Group	06/01/2020	7km	Construction of a windfarm consisting of up to 6No. Wind Turbines	Yes	No	Programmed to be built and fully operational before Proposed Development construction commences. Operational traffic negligible and accounted for in future baseline.
18/392	Tarbert Island Tarbert Co. Kerry Tarbert Island	SSE Renewables (Ireland) Ltd	18/02/2019	2km	10-year permission to construct a battery storage facility.	Yes	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area

Reference (KCC Planning/Other)	Location	Developer	Date Granted	Distance	Development Description	Traffic Management Plan (TMP) Produced?	Included in Cumulative Assessment?	Justification
								Construction duration will be four months, but no indicative construction dates provided.
302681-18	Tullamore, Drombeg , and Coolkeragh, Listowel, Co. Kerry	Terra Solar Ii Ltd	22/05/2019	10km	Planning permission with a duration of 10 years for a solar PV farm.	Yes	No	Affected roads not in proposed development study area.
1825	Beal East, Ballybunion, Co. Kerry	Dan Ahern (Portfinch Ltd.)	19/01/2019	12km	Solar PV farm consisting of a solar PV array of approximately 12.5 ha of solar panels within a total red line boundary of 14.16 ha.	Not included in application documents	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area Construction duration will be three months, but no indicative construction dates provided.
309156-21	Townlands of Ballyline West,	Shronowen Wind Farm Ltd.	27/09/2022	8km	For a 10-year permission for 12 wind turbines, substation, grid connection and ancillary site works.	Yes	No	Programmed to be built and fully operational before Proposed Development construction commences. Operational traffic negligible.
ABP 308643	Coolkeragh, Dromalivaun and Tullamore, Co. Kerry	Ballylongford Windfarm Group	21/6/2021	~1km	Amendment to previous granted permission which related to change in connection grid route for wind farm. An NIS was submitted with this application.	Not included in application documents	No	Duplicate.
ABP 318540	Meelcon, Carhoona, Farranawana, Tarbert, Doonard upper and lower, Kilpaddoge, Ballyline West, Ballymacasy, Lislaughtin, Glamcullare south, Gurteenavallig, Co. Kerry	SSE Generation Ireland Ltd	Case is due to be decided by 05/06/2024	3km	10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works	Yes	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area Construction duration will be 29 months peaking in 2025/2026.
23284	Ballymacasy, Coolnagraigue, Ballyline East, Ballyline West, Leanamore and Dromalivaun, Co. Kerry	Harmony Solar Kerry Ltd	17/10/2023	5km	10 year permission and 40 year operation for a solar farm of 146.6 hectares.	Yes	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area Construction duration will be eighteen months with construction commencing in year 2026.
2360050	Townlands Of Aghanagran Lower, Ballyline West, Kilgarvan, Coolkeragh, and Tullamore, Co. Kerry	Gaofar Limited	Decision Date: 23/01/2024	6km	A new grid connection route connecting the permitted Ballylongford windfarm (Kerry County Council planning ref 19/381) (An Bord Pleanála ref- PL08.304807) at Aghanagran Middle and Lower, Ballyline West and Tullahennel South, Ballylongford, to the proposed 38kV substation (Kerry County Council planning ref 23/431) at Tullamore, Listowel, Co Kerry	Yes	No	Affected roads not in proposed development study area.
ABP 315838	Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	SSE Generation Ireland Ltd	Recommendation/ Conclusion that AA is required 29/03/23	3km	Application received under Section 4 of the Development (Emergency Electricity Generation) Act 2022 (the Act) for a designated development (construction of a temporary, 5 year, 150 MW emergency generation plant – limited to a maximum of 500 operational hours per annum) located at Tarbert Power Station, Tarbert, in the townland of Tarbert Island, Co. Kerry	Yes	No	Construction has commenced and is due to be completed by the end of 2024. Operational traffic low with up to five operation staff in day time and two operational staff at night time, seven days a week and would be accounted for in future baseline.
Intra-Project								
319717 ABP	STEP Power Station	Shannon LNG	Yet to be concluded	<1km	Proposed development of a strategic gas emergency reserve facility, and	Yes	No	No EIAR has been undertaken and therefore no traffic information is available. As such, no reasonable assumptions can be made to account for potential impacts.

Reference (KCC Planning/Other)	Location	Developer	Date Granted	Distance	Development Description	Traffic Management Plan (TMP) Produced?	Included in Cumulative Assessment?	Justification
					associated development works (Shannon LNG)			
ABP-PA08.319566	STEP Power Station	Shannon LNG		<1km	Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024	Yes	**Yes** (Construction traffic only)	Project is in close proximity to the proposed development and/or affected roads within study area Construction duration will be 32 months commencing in 2026 peaking with in year 2027 and the development becoming operational in August 2028. Traffic associated with construction greater than operational traffic therefore construction traffic used for cumulative assessment.
08.GA0003	STEP Power Station	Shannon LNG		<1km	Gas Pipeline – planning permission was approved in 2009 for the development of a 26 km natural gas pipeline which will facilitate connection from the STEP Power Plant to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick. The planning permission was approved under Section 182 (D) and remains valid.	Yes	**Yes** (Construction traffic only, operational stage traffic negligible)	Project is in close proximity to the proposed development and/or affected roads within study area. Construction duration will be nine months, commencing in March 2026.

Source: Varies by Development

Based on a review of the information available and applied professional judgement, the following developments have been considered for cumulative assessment:

- 18878 – (Location: Kilpaddoge, Tarbert, Developer: Shannon Clean Tech Ltd) Construct a battery energy storage system (BESS) facility.
- 20850 - (Location: Kilpaddoge, Tarbert, Developer: Kilpaddoge Green Energy Ltd) Change the energy source for the charging of the battery energy storage system (BESS) containers from diesel to charging off the national grid and to change the permitted layout for electrical equipment.
- 21/549 - (Developer: Donal Murphy Glencloosagh Energy Ltd) 10 year planning permission for a high inertia synchronous compensator compound containing electrical equipment containers.
- 18/392 - (Location: Tarbert Island, Tarbert, Developer: SSE Renewables (Ireland) Ltd) 10-year permission to construct a battery storage facility.
- 1825 - (Location: Ballybunion, Developer: Dan Ahern (Portfinch Ltd)) Solar PV farm consisting of a solar PV array of approximately 12.5 ha of solar panels within a total red line boundary of 14.16 ha.
- ABP 318540 (Location: Tarbert, Developer: SSE Generation Ireland Ltd) - 10 year planning permission for the proposed Open Cycle Gas Turbine (OCGT) power plant fuelled by Hydrotreated Vegetable Oil (HVO) and associated site works.
- 23284 (Location: Various Locations in Co. Kerry, Developer: Harmony Solar Kerry Ltd) -10 year permission and 40 year operation for a solar farm of 146.6 hectares.
- ABP-PA08.319566 (Location: STEP Power Station, Developer: Shannon LNG) - Combined Cycle Gas Turbines (CCGT) Power Plant, Battery Energy Storage System (BESS), Above Ground Installation and associated ancillary works – a planning application was lodged with An Bord Pleanála on 19th April 2024.
- Gas Pipeline (Location: STEP Power Station, Developer: Shannon LNG) – planning permission exists for the development of a 26 km natural gas pipeline which will facilitate connection from the STEP Power Plant to the GNI transmission network at Leahy's, west of Foynes, Co. Limerick.

Table 17.25 outlines the cumulative change in traffic volume on the public road network within the study area in 2027, considering traffic generated by both the proposed development as well as the additional developments outlined above. The aligned effect significance, in terms of the IEMA thresholds, has been provided using the process set out in Table 17.3.

It should be noted that the effect significance set out in the table below is based purely on the degree of change as described in Table 17.3 and therefore requires professional judgement (led by good practice guidance) in order to provide meaningful conclusions; particularly in relation to the assessment of community (pedestrian delay, pedestrian amenity / fear and intimidation) and road safety.

Where baseline traffic flows are low, it is possible to derive unrealistic determinations of significance when considered against purely numerical assessment criteria. It is possible to show relatively large traffic increases yet for the road to operate well below capacity. Under the numerical criteria defined above, anything above a 60% increase in traffic volume would represent a major effect, but in reality, the effect is likely to be less significant, given the residual capacity of the road.

Further commentary on each of the potential impacts is provided in Section 17.7.1 to 17.7.3. Traffic calculations are included in Appendix 17.1.

Table 17.25: The Proposed Development and Cumulative Development

Route Section	Road Capacity (AADT)	Cumulative Development Additional Vehicle Movements During Construction Period (Two-way)	% Increase – All Vehicles	Cumulative Development Additional HGV Movements During Construction Period (Two-way)	% Increase – HGVs	Proposed Development + Cumulative Development Additional Vehicle Movements During Proposed Development Peak Construction Period (Two-way)	% Increase – All Vehicles	Proposed Development + Cumulative Development Additional HGV Movements During Proposed Development Peak Construction Period (Two-way)	% Increase – HGVs	Effect Significance of Increase – All Vehicles	Effect Significant of Increase – HGVs
L-1010 between Kilcolgan Upper boundary and Ballylongford	8600*	1935	839%	164	923%	2047	888%	180	1013%	Major (Significant)	Major (Significant)
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	8600*	2111	739%	308	1732%	2223	778%	324	1822%	Major (Significant)	Major (Significant)
L-1010 between R551 and Tarbert Comprehensive School	8600*	2111	150%	308	519%	2223	157%	324	546%	Major (Significant)	Major (Significant)
N67 between Tarbert Ferry Terminal and N67/R551 junction	8600	426	33%	62	48%	431	33%	62	48%	Moderate (Significant)	Moderate (Significant)
N67 between N67/R551 junction and N67/N69 junction	8600	2381	64%	333	143%	2488	67%	349	150%	Major (Significant)	Major (Significant)
N69 between N67/N69 junction and Ahalana	8600	483	15%	122	53%	510	15%	125	54%	Minor (Not Significant)	Moderate (Significant)
N69 between Ahalana and Listowel	8600	483	12%	122	78%	510	12%	125	80%	Minor (Not Significant)	Major (Significant)
N69 between N67/N69 junction and Glin	8600	1993	57%	278	107%	2073	59%	291	112%	Moderate (Significant)	Major (Significant)
N69 between Glin and Foynes	8600	1993	56%	278	137%	2073	58%	291	143%	Moderate (Significant)	Major (Significant)
N69 between Foynes and N18	8600	472	7%	140	22%	552	8%	153	24%	Minor (Not Significant)	Minor (Not Significant)

Source: Varies by Development, * = road capacity following road widening by Kerry County Council

17.7.1 Driver Delay

From a review of Table 17.25 all road sections highlighted an increase in traffic volumes which, according to IEMA guidelines, trigger the threshold as potentially significant (increase exceeding 30% for all vehicles/HGVs or 10% for all vehicles/HGVs on sensitive road sections).

All road sections have the residual capacity to readily accommodate the expected additional traffic flow (cumulative construction traffic).

All road sections feature low existing traffic volumes and as such show a relatively large proportional increase which would represent a major effect.

Therefore, based upon professional judgement the significance of effect of driver delay for all road users on these road sections is considered to be minor and accordingly considered to be not significant in the context of the EPA Guidelines (2022).

17.7.2 Road Safety

Based on professional judgement and experience in the assessment of Road and Traffic impacts relation to major development projects, the impact to road safety is considered to be at worst minor and therefore not significant within the context of the EPA Guidelines (2022). Historic evidence has not revealed any evidence of a poor safety record for the study area road network and, considering the volume of additional traffic expected to be generated during the construction of the proposed development, it is unlikely that an associated road safety problem will manifest.

17.7.3 Community Effects (Severance, Pedestrian Delay, NMU Amenity, Fear and Intimidation)

Severance

Table 17.25 referenced theoretical capacities (AADT) for each of the roads in the study area and indicated that baseline traffic flows were well within the roads' theoretical capacity. Severance will not occur when there is such a notable level of residual road capacity and construction traffic generated by the proposed development and cumulative development will be relatively low.

Pedestrian Delay

For similar reasoning, pedestrian delay is not considered to be an existing problem on any of the route sections within proposed scheme study area, nor one that shall be created by the addition of proposed construction traffic (associated with the proposed development and cumulative development) to these routes.

NMU Amenity

Non-motorised user (NMU) amenity is broadly defined by the *IEMA Guidelines* as the 'relative pleasantness of a journey'. The *IEMA Guidelines* suggest that 'a tentative threshold for judging the significance of changes in pedestrian amenity would be where traffic flow~~s~~ (or its HGV component) is halved or doubled.

Construction traffic associated with the proposed development with the cumulative development is predicted to generate increased traffic flows (and HGV flows) on the roads within the study area.

As previously noted, the roads in the study area have relatively low traffic flows and as such show a relatively large proportional increase which would represent a major effect.

Traffic (including HGV) flows on all study area road sections of the L-1010 and HGV flows on all study area sections of the N67 and the N69 (between N67/N69 junction and Glin, and between Glin and Foynes) are predicted to double in 2027.

Based upon professional judgement unmitigated this effect would be assessed as major and therefore significant in terms of EIAR Guidelines.

Fear and Intimidation

Fear and intimidation have been assessed for construction traffic associated with the proposed development with the cumulative development. Table 17.26 shows the 2027 future baseline assessment and Table 17.27 shows the “with construction traffic (proposed development and cumulative development)” assessment with a reference to the fear and intimidation magnitude of impact.

Table 17.26: Fear and Intimidation Assessment – 2027 Future Baseline

Road Section	Average Traffic Flow (18 hours) – All Vehicles (Two-way Flow) [DEGREE OF HAZARD SCORE]	HGVs (24 hours) – (Two-way Flow) [DEGREE OF HAZARD SCORE]	Average Vehicle Speed [DEGREE OF HAZARD SCORE]	Total Degree of Hazard Score	Level of Fear and Intimidation
L-1010 between Kilcolgan Upper boundary and Ballylongford	226 [0]	18 [0]	>40mph [30]	30	Moderate
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	279 [0]	18 [0]	>40mph [30]	30	Moderate
L-1010 between R551 and Tarbert Comprehensive School	1263 [10]	55 [0]	30-40mph [20]	20	Moderate
N67 between Tarbert Ferry Terminal and N67/R551 junction	1163 [10]	120 [0]	>40mph [30]	30	Moderate
N67 between N67/R551 junction and N67/N69 junction	3330 [30]	217 [0]	30-40mph [20]	20	Great
N69 between N67/N69 junction and Ahalana	2986 [30]	217 [0]	>40mph [30]	30	Great
N69 between Ahalana and Listowel	4020 [30]	131 [0]	>40mph [30]	30	Great
N69 between N67/N69 junction and Glin	3132 [30]	243 [0]	>40mph [30]	30	Great
N69 between Glin and Foynes	3462 [30]	173 [0]	>40mph [30]	30	Great
N69 between Foynes and N18	6474 [30]	576 [0]	>40mph [30]	30	Great

Source: IEMA, Mott MacDonald, TII, NDC. Idaso

Table 17.27: Fear and Intimidation Assessment – 2027 "With Construction Traffic (Proposed Development and Cumulative Development)"

Road Section	Average Traffic Flow (18 hours) – All Vehicles (Two-way Flow) [DEGREE OF HAZARD SCORE]	HGVs (24 hours) – (Two-way Flow) [DEGREE OF HAZARD SCORE]	Average Vehicle Speed [DEGREE OF HAZARD SCORE]	Total Degree of Hazard Score	Level of Fear and Intimidation	Fear and Intimidation Magnitude of Impact
L-1010 between Kilcolgan Upper boundary and Ballylongford	2274 [30]	198 [0]	>40mph [30]	60	Great	Medium
L-1010 between Tarbert Comprehensive School and Kilcolgan Upper boundary	2503 [30]	342 [0]	>40mph [30]	60	Great	Medium
L-1010 between R551 and Tarbert Comprehensive School	3486 [30]	380 [0]	30-40mph [20]	50	Great	Medium
N67 between Tarbert Ferry Terminal and N67/R551 junction	1594 [30]	183 [0]	>40mph [30]	60	Great	Medium
N67 between N67/R551 junction and N67/N69 junction	5818 [30]	565 [0]	30-40mph [20]	50	Great	Negligible (No Change)
N69 between N67/N69 junction and Ahalana	3496[30]	342 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Ahalana and Listowel	4531 [30]	257 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between N67/N69 junction and Glin	5205 [30]	534 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Glin and Foynes	5536 [30]	465 [0]	>40mph [30]	60	Great	Negligible (No Change)
N69 between Foynes and N18	7026 [30]	729 [0]	>40mph [30]	60	Great	Negligible (No Change)

Source: IEMA, Mott MacDonald, TII, NDC. Idaso

As shown in Table 17.27 the magnitude of impact is “medium” for the L-1010 road sections and the N67 between Tarbert Ferry Terminal and N67/R551 junction. The remaining road sections would have a negligible (no change) with reference to IEMA Guidelines (2023).

Based upon professional judgement unmitigated this effect would be assessed as moderate and therefore significant in terms of EIAR Guidelines.

17.7.4 Summary of Cumulative Effects

A summary of the assessment the construction effects are shown in Table 17.28.

Table 17.28: Summary of Effects

Effect	Significance
Driver Delay	Minor (Not Significant)
Road Safety	Minor (Not Significant)
Community Effects	Moderate (Significant)

Source: Mott MacDonald, IEMA Guidelines, EIAR Guidelines

17.8 Mitigation and Monitoring

17.8.1 Construction Phase

The temporary effects of construction, regardless of the assessed level of significance, will be mitigated through adoption of a regulated and approved Construction Traffic Management Plan (CTMP).

The general purpose of a CTMP is optimise the efficiency and safety of all traffic activities generated by the proposed development and thus maintain suitable amenity and safety for local communities and other roads users.

A summary of key CTMP mitigation elements follow and the CTMP is provided in full form in the CEMP which is included in the application documentation:

- The appointed contractor will agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with Kerry County Council, the appointed contractor, TII and/or their Agents and An Garda Síochána as appropriate.
- The CTMP has been developed for the purposes of this assessment and will be further developed as necessary in consultation with Kerry County Council and the Gardai prior to construction commencing. The CTMP will document measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption which might impact negatively on local communities or general traffic and in particular the emergency services. The CTMP is a ‘live’ document and will be developed accordingly, within the parameters assessed in this EIAR.
- During the construction phase, signage will be installed to warn road and recreational route users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic.
- Construction traffic timing will be agreed with KCC in advance to avoid coinciding with the peak time associated with Tarbert Comprehensive School.
- Car sharing will be promoted to construction personnel by the contractor during the induction process.
- The appointed contractor will employ a number of sub-contractors, and all will fall under the umbrella of the CTMP and will have an obligation to adhere to the Plan; this obligation will form part of the procurement process and will be written into any contract of employment.

- Compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures set out in the CTMP and recording of any complaints. The appointed contractor will be required to stipulate that all contractors disseminate these rules to their sub-contractors.
- In liaison with ESBN, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This will include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic.
- The appointed contractor will nominate a person to be responsible for the co-ordination of all elements of Roads and Traffic during the construction process (Liaison Officer). This person will liaise with the local community so that the community has a direct point of contact within the developer organisation who they could contact for information purposes or to discuss matters pertaining to traffic management or site operation.
- If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.
- Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on traffic are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in this EIAR.

17.9 Residual Effects

The assessment of post-mitigation effects has been undertaken on the assumption that key measures set out in the CTMP will be developed as appropriate by the appointed contractor and be implemented during the proposed development construction phase.

In the context of the IEMA Guidelines and EPA Guidelines (2022) there are no significant residual Roads and Traffic impacts predicted during the construction phase following incorporation of measures described within the CTMP; see Appendix A of the CEMP which accompanies the EIAR.

A summary of the residual effects are shown in Table 17.29.

Table 17.29: Summary of Residual Effects

	Significance	
Effect	**Before Mitigation**	**Post Mitigation**
Proposed Development		
Driver Delay	Minor (Not Significant)	Minor (Not Significant)
Road Safety	Minor (Not Significant)	Minor (Not Significant)
Community Effects	Minor (Not Significant)	Minor (Not Significant)
Proposed Development + Cumulative Development		
Driver Delay	Minor (Not Significant)	Minor (Not Significant)
Road Safety	Minor (Not Significant)	Minor (Not Significant)
Community Effects	Moderate (Significant)	Minor (Not Significant)

Source: Mott MacDonald, IEMA Guidelines, EPA Guidelines(2022)

17.10 References

Guidelines on the Information to be Contained in Environmental Impact Reports, Environmental Protection Agency (EPA) (2022);

The Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement, The Institute of Environmental Management and Assessment (IEMA) (2023);

Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, Transport Infrastructure Ireland (TII) (2021);

Road Traffic (Construction and Use of Vehicles) Regulations 2003, S.I. 5 of 2003;

Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008, S.I.366 of 2008;

Rural Road Link Design, (DN-GEO-03031), TII Publications, TII (2017);

Traffic and Transport Assessment Guidelines, TII (2014),

Traffic Data, TII;

Shannon Technology and Energy Park (STEP) 220kV Grid Connection - Environmental Impact Assessment Report

Chapter 18 - Major Accidents and Disasters

July 2024

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18 Major Accidents and Disasters

18.1 Introduction

This chapter considers the potential for significant adverse effects of the proposed development on the environment deriving from the vulnerability of the proposed development to risks of relevant major accidents and / or disasters.

18.2 Methodology and Limitations

18.2.1 Legislation

EIA Directive 2014/52/EC requires:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters…

In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council (13) and Council Directive 2009/71/Euratom (14), or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met".

The proposed development is not a COMAH establishment under the EU SEVESO III Directive (2012/18/EU) and implemented in Ireland through the Chemicals Act (Control of Major Hazards involving Dangerous Substances), S.I. No. 209/2015 (the COMAH Regulations).

Health and Safety legislation includes:

- Act No.10/2005 - Safety, Health and Welfare at Work Act (HSWA) (ISB, 2005). Including associated amendments:
- S.I. No. 231/2021 - Safety, Health and Welfare at Work (Chemical Agents) (Amendment) Regulations (ISB, 2021).
- S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations (ISB, 2021).
- ▪ S.I. No. 255/2023 - Safety, Health and Welfare at Work (General Application) (Amendment) Regulations (ISB, 2023).
- Act No. 10/1972 (as amended by Act No. 21/1979) - Dangerous Substances Act (ISB, 1972).
- S.I. No. 272/2008 - European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances) Regulations (CLP) (ISB, 2008).

18.2.2 Guidance

For the purpose of this assessment the following definitions, defined in the Institute of Environmental Management and Assessment (IEMA) document *Major Accidents and Disasters in EIA: A Primer* (September 2020), are used:

- Major Accidents: Events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.

- Disaster: May be a natural hazard (e.g. earthquake) or a man-made / external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
- Risk: For a risk to arise there must be hazard that consists of a ‘source’ (e.g. high rainfall); a ‘receptor’ (e.g. people, property, environment); and a pathway between the source and the receptor (e.g. flood routes).
- Vulnerability: Describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to the ‘exposure and resilience’ of the development to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

18.2.3 Methodology for Assessment of Effects

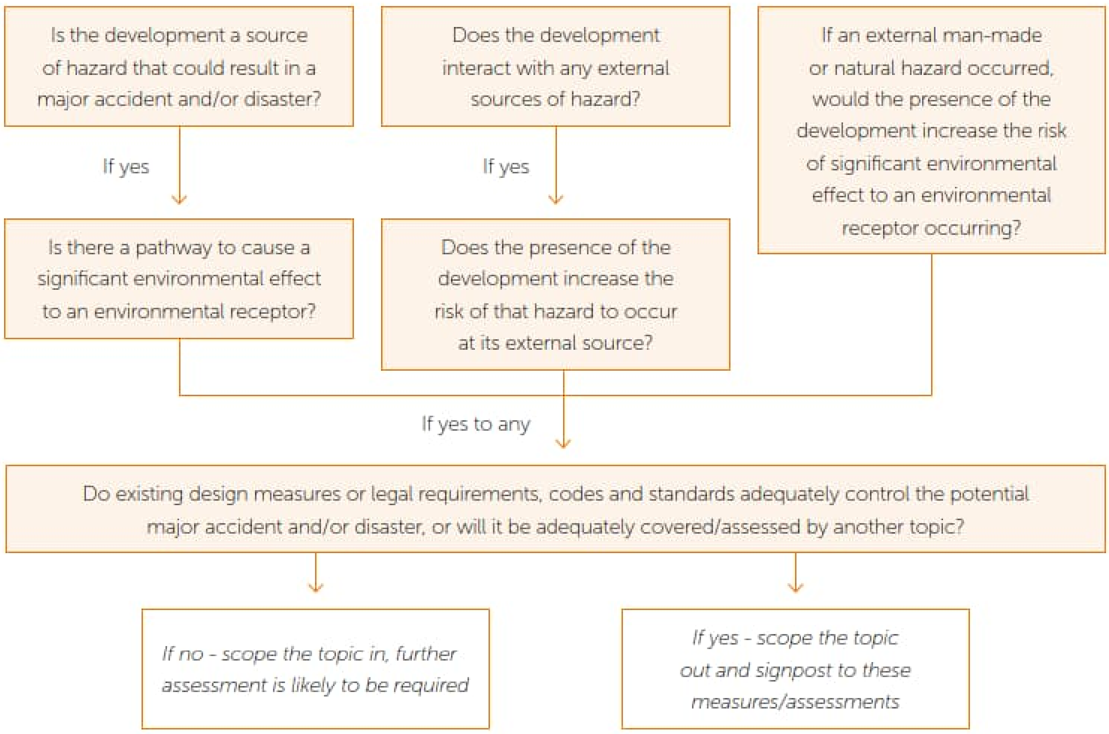
The methodology applied is based on the scoping decision process flow provided in Figure 18.1 *Scoping Decision Process Flow*.

The potential for source, pathway, receptor linkages is first established having regard to the location, type, context, existing and future constraints, and likely receptors relevant to the proposed development.

For established linkages, the risks of major accidents and / or disasters are low / unlikely where existing design measures or legal requirements, codes and standards adequately control the potential for major accident and / or disaster, or where such risks are adequately covered/assessed by another topic in this EIAR.

Where required, additional mitigation measures are proposed to manage the identified risks to the environment.

Figure 18.1: Scoping Decision Process Flow



Source: Major Accidents and Disasters in EIA: A Primer (IEMA, September 2020)

18.2.4 Limitations of this EIAR

There were no difficulties or limitations encountered gathering the information required to inform this Major Accidents and / or Disasters chapter of the EIAR.

18.3 Receiving Environment

The proposed development is located in County Kerry, south of the Shannon Estuary, west of Tarbert.

The substations associated with the proposed development will be located adjacent to the proposed power plant facility, approximately 4.5 km to the west of Tarbert and approximately 3.5 km to the east of Ballylongford. The proposed development occupies part of the following townlands; Ralappane, Kilcolgan Lower, Kilcolgan Upper, Carhoonakineely, Carhoonakilla, Cockhill, Carhoona, Coolnanoonagh, Farranawana and Kilpaddoge.

At the westerly point of the proposed development, the Lower River Shannon Special Area of Conservation (SAC) is approximately 150m to the north and west of the proposed substation/cable route. The River Shannon and River Fergus Estuaries Special Protection Area (SPA) is approximately 500m to the north and west, Ballylongford Bay proposed Natural Heritage Area (pNHA) is approximately 400m to the west. At the easterly point of the proposed development, where the connection to the existing network is proposed, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are approximately 400m from the proposed development.

The proposed substations are to be located in agricultural pastural lands which comprise primarily of improved agricultural grassland, dry calcareous and neutral grassland, scrub, hedgerows and drainage ditches and depositing/lowland rivers immediately to the southwest and northwest of the proposed substation site.

The proposed underground cable route will cross the Ralappane Stream which discharges into the Shannon Estuary and is fed by smaller drainage ditches along its course. The Ralappane Stream drains directly to the Shannon Estuary via a tidal wetland area to the west of the STEP Power Plant site.

The topography of the land along the proposed development cable route is generally undulating and there are some occupied properties, along and adjacent to the L-1010 carriageway. Tarbert Comprehensive School is located along the L-1010. There is a ferry which runs from Tarbert to Killimer in Co. Clare, this is located to the east of the proposed development.

18.4 Characteristics of the Development

Detail of the receiving environment is contained within Chapter 5.

The following presents an overview of the proposed development having regard to whether or not the proposals present a source of hazard that could result in major accident and / or disaster and / or interacts with external sources of hazard.

The Irish transmission network and the proposed development will be designed, constructed, operated and maintained in accordance with the highest safety standards complying with the provisions of guidelines published by the World Health Organisation (WHO) and the International Commission of Non-ionizing Radiation Protection (ICNIRP).

In summary, the main elements of the proposed Shannon Technology and Energy Park (STEP) 220kV Grid Connection project for consideration of the proposed EIAR are:

- Construction of two new GIS substations;

- The installation of two new 220 kV cable circuits, in new ducting along access roads and agricultural lands. Kerry County Council are upgrading the L-1010 local road and will install the ducting and joint bays at the same time prior to the installation of the cabling;
- Creation of joint bays allowing for the connection of cable lengths;
- Crossings of rivers, drains and existing utilities;
- There will be an area of Horizontal Directional Drilling (HDD) underneath the Kilpaddoge access road, under existing cabling;
- There will be a crossing of the Ralappane Stream on the approach road to the two new substations, the crossing will be by open cut crossing.;
- Associated ancillary works associated with substation construction and underground cabling.

18.5 Likely Significant Effects of the Development

Table 18.1 considers the potential for significant adverse effects of the proposed substations and grid connection on the environment deriving from its vulnerability to risks of relevant major accidents and / or disasters.

Where sources / interactions and pathways have been established, an assessment is carried out as to whether or not embedded design measures, or legal requirements, codes and standards adequately control the potential major accident and / or disaster. Reference is made to other technical chapters of the EIAR as appropriate where further studies have been carried out, for example in the case of flood risk assessments.

Further detailed hazard and risk analysis studies will be carried out throughout the project lifecycle. The engineering design of the project will be subject to formal process safety risk assessments, such as Hazard Identification (HAZID), Hazard and Operability (HAZOP) and Layers of Protection Analysis (LOPA) at the appropriate project / design stage(s). The purpose of these studies is to subject the design to a rigorous, structured assessment by suitably qualified, experienced people, to identify potential hazards. These hazards can then be subject to analysis to identify measures to manage the hazards and to reduce the level of risk.

Table 18.1: Likely Significant Effects

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Flooding						
Substation	Flooding could cause failure to electrical components	The proposed development site is located in proximity to the Lower River Shannon, approximately 250m from the shore. From review of the latest OPW flood mapping, the proposed substation site is not located within an area considered to be at risk of flooding.	The substations are at 20m O.D. and not at risk of flooding. Construction Mitigation is provided within the Chapter 8 and the appended Flood Risk Assessment and included within the CEMP.	No. The proposed development is outside the area vulnerable to flooding.	Yes	None. Flood risk is discussed in Chapter 8. There is no flood risk to the site, with runoff considered as part of the drainage design which will attenuate flow so as not to increase runoff and potentially increase flood risk elsewhere.
Access road cabling	A new precast concrete bridge across the Ralappane Stream on the access road on the approach to the substations.	Flooding of the access road means the facility may become inaccessible.	The access road levels will be profiled to drain road runoff to an engineered swale adjacent to the road, which will drain to the engineered storm drainage system at the Power Plant site and discharge to the shared constructed outfall to the Shannon Estuary.	No. The proposed development is outside the area vulnerable to flooding.	Yes	The Proposed Development is not predicted to be at risk from fluvial flooding from Ralappane Stream as identified within Chapter 8.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Underground cabling	There are three river crossings along the underground cable route but no significant risks of flooding identified on the OPW Flood map.	Given the nature of the proposal's major accidents and / or disasters are unlikely.	A flood Risk Assessment has been undertaken. The watercourses are minor and flood risk will be managed so as not to increase flood risk elsewhere. Works are of short duration and managed so that excavations would not occur during high flows/rainfall events.	No	Yes	Flood Risk is discussed in detail in Chapter 8 Surface Water and Flooding. The Proposed Development is not predicted to be at risk from fluvial flooding from Ralappane Stream and Farranawana Stream nor to increase flood risk elsewhere.
Fire						
Substation	Risk of fire at substation where electrical equipment and materials are contained.	Fire ignites within the substation compound causing damage to electrical equipment and disruption to electricity supply.	Substations will be designed to follow all safety specifications and standards. Mitigation measures include fire protection systems such as passive and active fire suppression systems.	No	Not applicable	No likely significant adverse effects.
Underground cabling	The cable and associated equipment are buried below ground and are therefore protected from fire. In	None. Major accidents disasters are unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
	the case of a cable fault, any combustion will be inherently suppressed.					
Extreme temperature (heat wave, cold snap)/ high winds/storm						
Substation	Design standards mitigate against extreme temperature.	None. Major accidents disasters are unlikely.	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.
Underground cabling	Design standards mitigate against extreme temperature.	None. Major accidents disasters are unlikely.	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.
Electro-magnetic Fields (EMF)						
Underground cabling	Independent and authoritative international panels of scientific experts have reviewed studies on possible health effects from EMFs. These have concluded, based on the weight of the evidence available, that the power frequency electric and magnetic fields encountered in normal living and working conditions do not cause adverse health effects in humans when properly designed and	None. Major accidents disasters to cables are unlikely	Not applicable	Not applicable	Not applicable	EMF is discussed in Chapter 6 Population and Human Health. No likely significant adverse effects.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
	constructed. These form the basis for guidelines published by the International Council on Non-Ionising Radiation Protection (ICNIRP) with regard to EMF, to which ESB Networks will comply in the design and operation of the underground cables					
Electricity failure						
Substation	Electricity failure can be caused by several factors such as extreme weather conditions.	Loss of power supply resulting in disruption to the operation of the plant.	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.
Underground cabling	Electricity failure can be caused by several factors such as extreme weather conditions, failure at the sub-stations or damage to the underground cable along the route.	Loss of power supply could result in disruption to the electrical supply.	Management Plans providing backup and alternative electricity supply routing would be required in the event of electrical failure Repair of damaged cables by ESB.	No	Yes	No likely significant adverse effects. Loss of functionality to the proposed development or disturbance of supply to local residential/commercial customers, however, there are no perceived environmental impacts.
Exposure to High Voltage						
Substation	Construction workers and maintenance staff coming in contact with exposed live conductors.	Risk of damage or harm	All equipment to be designed in compliance with latest safety in design	No	Yes	No likely significant adverse effects.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
			requirements. Access will be carefully controlled and allowed only for trained and competent persons.			
Underground cabling	For cabling within agricultural lands, farmers may come in contact with live cables while excavating.	Risk of damage or harm	Cables will be insulated and buried approximately 1.575m . underground in agricultural lands and 1.25 m in roadways, encased in concrete duct banks. Warning tape will be laid in the trench over the ducts as a visual aid to those excavating in the area.	No	Yes	No likely significant adverse effects.
Ground collapse/instability /subsidence/landslide						
Substation	Substation design on area of cut and fill	There is an area of Moderately High landslide susceptibility located 110m north of the substation compound. Intrusive works during the substation construction, particularly foundation	Geotechnical testing during the ground investigation phase will include slope stability testing, which will inform landslide risks and the requirement of mitigation measures.	No	Yes	Negligible (neutral) significant effects are identified with Chapter 7 and are considered temporary during the construction phase. Mitigation measures are proposed to manage this risk. . Land, Soils and Hydrogeology is discussed in detail in Chapter 7

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
		works, have the potential to trigger a landslide in this area, which could cause potential accidents and pollution damage.	A Geotechnical Risk Register will be created to ensure any landslide and slope stability risks are systematically captured.			
Underground cabling	Due to the fact that the cables will be installed in a concrete duct bank with suitable compacted backfill and permanent reinstatement then subsidence is unlikely.	There are areas where the proposed cable trench is located 60-100m from a Moderately High susceptibility landslide zone at its closest point, and the proposed HDD crossing in this area is located 260m from this landslide risk zone.	Where groundwater seepage poses a risk to trench or substation excavation stability, additional measures (such as dewatering) will be used to mitigate these risks. A suitably designed drainage system will be installed to divert water away from the landslide risk zones.	Yes	Yes	
Major road traffic accident						
Substation	Movement of construction vehicles debris striking traffic /member of public.	Death and or injury to a member of the public. Delays and congestion in surrounding area.	Controls to be implemented through traffic management, construction planning and method statements.	Yes	Yes	Road and Traffic are discussed in Chapter 17. A CTMP included as within the EIAR Submission.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Access road cabling	Movement of construction and site vehicles striking traffic /member of public.	Death and or injury to a member of the public. Delays and congestion in surrounding area.	Controls to be implemented through traffic management, construction planning and method statements. Once operational there will be limited traffic on access road.	Yes	Yes	Road and Traffic are discussed in Chapter 17. A CTMP included as within the EIAR Submission.
Underground cabling	Working on or adjacent to agricultural lands and public roads. Movement of construction vehicles to/from substation site and off road section. Debris striking traffic / member of public.	Death and / or injury to a member of the public. Delays and congestion in surrounding area	Controls to be implemented through traffic management plan, construction planning, and method statements if required. Agricultural land will be reinstated to original state in line with best practice. Construction traffic to be avoided during school drop off hours as discussed in the Traffic chapter (Chapter 7 Roads and Traffic) and the	No	Yes	Roads and Traffic are discussed in Chapter 17

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
			CTMP which is appended to the CEMP			
Industrial Accidents						
Substation	The area is located in private lands in an agricultural/rural area, industrial accidents are unlikely.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Underground cabling	The cables will be buried underground at a depth of approximately 1.575 m in agricultural lands and 1.25 m in roadways. They are also encased in concrete duct banks. The underground cables do not pass along roads that are within industrialised areas.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Biological hazard – epidemic, pandemic						

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Substation Access road cabling Underground cabling	Apart from construction workers and maintenance staff the proposed development does not generate human interaction. The proposed development also does not generate interaction with animals. Construction phase activities will be carried out in accordance with Government guidelines.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.
Malicious attacks/cyber-attack						
Substation	The proposed development will feed into Ireland's electrical transmission grid and could be subject to malicious physical or cyberattack.	Damage would likely be limited to disruption of the substation's ability to operate until the damage was repaired.	The site is secured by high fences with security gates, operated by security personal.	No	Yes	No likely significant adverse effects. Loss of functionality to the proposed development or disturbance of supply to local residential/commercial customers, there are no perceived environmental impacts.
Underground cabling	The proposed development will be part of Ireland's electrical grid and could be subject to malicious physical or cyber-attacks.	Damage would likely be limited to disruption of the proposed development's ability to operate until the damage was repaired.	The new infrastructure will be designed to protect against malicious attack and will be in line with the latest standards for new grid infrastructure.	No	Yes	No likely significant adverse effects
Spillage or seepage of pollutants into watercourse/ground						

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Substation	There is potential for Construction Compound/Laydown areas to accidentally release pollutants, which potentially could leak into water courses or ground. Water courses are hydrologically linked to downstream protected areas. During operations, there is potential for accidental release of oil/diesel	Pollution of downstream areas	The CEMP will provide robust mitigation to remove the risk of any potential pollutants entering water courses. Where there is linkage between a compound location and drains leading to rivers, bunding and silt fencing must be installed to prevent run off from entering downstream watercourses. During operations the petrol interceptor will prevent any leaks of diesel/oils from entering the stormwater system.	No	Yes	Land, Soils and Hydrogeology is discussed in detail in Chapter 7. Surface Water and Flooding is discussed in Chapter 8 and the Flood Risk Assessment is included in Appendix 8.1.
Access road cabling	There is potential for accidental release of pollutants during construction, which potentially could leak into water courses or ground. Water courses are hydrologically linked	Pollution of downstream areas	The CEMP will provide robust mitigation to remove the risk of any potential pollutants entering water courses. Operational access spillages unlikely. Access	No	Yes	Land, Soils and Hydrogeology is discussed in detail in Chapter 7. Surface Water and Flooding is discussed in Chapter 8

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
	to downstream protected areas.		road has sufficient drainage design to mitigate any operational spillages.			
Underground cabling	During construction there is potential for spillages of pollutants in the absence of mitigation. Once operational, as the cables are buried, they will not offer a pathway to any receptors.	Accidental spillage. Major accident / disaster unlikely	A suite of mitigation measures to protect watercourses are detailed in Chapters 7 and 8 and within the CEMP.	No	Yes	No likely significant adverse effects.

18.6 Cumulative Impacts

The most relevant cumulative impacts is that which could arise at the STEP Power Plant site, adjacent to the 220kV substations. Potential disaster or major accidents which could act cumulatively include fire/explosion and the release of pollutants to the environment. The mitigation measures detailed in Table 18.1 and the mitigation measures included in Chapter 14 of the STEP Power Plant application will minimise the potential for environmental effects. An Environment Management System will be in place for the STEP Power Plant and will set out procedures such as:

- Hazardous and polluting liquids such as transformer oils will be stored in tanks located in bunds.
- The surface water drainage system will route to the STEP Power Plant firewater retention pond.
- Distillate oil unloading bays will be designed to contain spillages.
- Storage tank level indicators and oil detection sensors in bunds will be provided with alarms.
- Class 1 hydrocarbon interceptors will be provided in the surface water drainage system.
- Measures to isolate the surface water drainage system will be provided to prevent discharge of contaminated water.

An emergency shutdown system can be initiated by a number of systems, including automatic fire and gas detection and manual activation. Major electrical equipment has been designed to incorporate a separation distance to prevent major accidents such as fires and explosions originating in one area from spreading to another area or escalating via domino effects. Substations will be designed to follow all safety specifications and standards. Mitigation measures include fire protection systems such as passive and active fire suppression systems.

The potential for significant cumulative effects is therefore low and detailed safety studies will be prepared as the detailed design of the proposed development progresses to identify where risks can be further reduced.

18.7 Residual Effects

Following the implementation of mitigation measures, no significant adverse environmental effects are likely to occur.

Shannon Technology and Energy Park (STEP) 220kV Grid Connection Environmental Impact Assessment Report

Chapter 19 - Interactions of the Forgoing

July 2024

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Contents

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19 Interactions of the Foregoing

19.1 Introduction

This chapter outlines the interactions between the impacts of the proposed development identified in this EIAR. The EPA Guidelines 2022 state the following with regards to 'Interactions Between Effects On Different Factors'.

Aspects of the existing environment likely to be affected by the proposed development, during both the construction and operational phases, have been considered in detail in the relevant chapters of this EIAR.

"*The interactions between effects on different environmental factors should be addressed as relevant throughout the EIAR. For example, where it is established in the Hydrology section that there will be an increase in suspended solids in discharged surface waters during construction, then the Biodiversity section should assess the effect of that on sensitive aquatic receptors. Close coordination and management within the EIA team is needed to ensure that interactions are adequately addressed throughout an EIAR.*"

The matrix presented in Table 19.1 has been developed to identify interactions and indirect impacts between environmental topics. Each environmental topic is listed in the first column and the first row of the matrix. In the matrix, a grey or a white square indicates no interaction, while a turquoise square indicates that a key interaction exists between environmental topics for either or all phases (construction, operation and decommissioning phases). The nature of the environment is such that interactions between all environmental topics are potentially possible and / or may occur to a certain extent for most projects. The purpose of the matrix is therefore to highlight key interactions that are recognised to be specific to this proposed development and warranting special consideration.

Key environmental interactions that have been identified in turquoise squares are discussed further in Table 19.2. Each interaction is described in the order of chapters as presented in the EIAR. Cross-references to respective chapters are included for further information.

Table 19.1: Interaction of Effects

	Population and Human Health	Land, Soils and Hydrogeology	Surface Water and Flooding	Biodiversity	Air	Climate Resilience	Climate - Carbon	Noise and Vibration	The Landscape	Archaeology, Architectural and Cultural Heritage	Material Assets	Roads and Traffic	Major Accidents and Disasters
Population and Human Health													
Land, Soils and Hydrogeology													
Surface Water and Flooding													
Biodiversity													
Air													
Climate Resilience													
Climate - Carbon													
Noise and Vibration													
The Landscape													
Archaeology, Architectural and Cultural Heritage													
Material Assets													
Roads and Traffic													
Major Accidents and Disasters													

Table 19.2: Interactions between Disciplines

Interaction	Description
Population and Human Health interactions with: Land, Soils and Hydrogeology, Surface Water and Flooding, Air, Climate Resilience, Climate - Carbon, Noise and Vibration, The Landscape, Archaeology, Architectural and Cultural Heritage, Material Assets, Roads and Traffic, Major Accidents and Disasters.	**Land, Soils and Hydrogeology.** The main interaction between Population and Human Health and Land, Soils and Hydrogeology relates to the potential impact of loss of agricultural land, landslide susceptibility and presence of radon risk areas. There will be a loss of agricultural land around the substation from the L-1010 to the LCIM. A moderately high landslide susceptibility risk is identified to the north of the substation compound, however suitable mitigation reduces the significance of effect to imperceptible. Areas of high radon risk are located within the study area, however suitable mitigation reduces the significance of effect to imperceptible during construction and operational phases. In some areas where the underground cabling goes off road, through agricultural lands the significance of land use effects is imperceptible, as detailed within Chapter 7 Land, Soils & Hydrogeology.
	Surface Water and Flooding. The main interaction between Population & Human Health and Surface Water and Flooding relates to the potential impact of the proposed development on the surface water quality (from sediment runoff, spillages and dischargers to receiving surface waters) and flooding. During construction, stormwater from the substation area will pass through silt traps and hydrocarbon interceptors, as a result, the effect of any discharge will be imperceptible. An open cut crossing of the Ralappane Stream is proposed as part of the construction works which is expected to result in moderate-significant impacts on the stream prior to mitigation. The residual effect will be imperceptible following appropriate mitigation as outlined in Chapter 8 and the CEMP. Along the access track to the substation area, following the implementation of mitigation measures and embedded mitigation built into the design for the operational phase, residual effects in terms of water quality will be imperceptible in the Lower Shannon estuary. During operation, the significance of effect on water supply is assessed as imperceptible due to low demand of water. There will be no discharge of wastewater during operation, and the stormwater will pass through hydrocarbon interceptors as per standard design. Therefore, the significance of effect is assessed as imperceptible. The proposed development is considered not at risk of flooding and will not increase flood risk elsewhere.
	Air. There are interactions between Population and Human Health and air quality impacts associated with proposed development. As discussed in Chapter 10 Air, the dust soiling effects will be low to high and PM_{10} effects will be negligible to low during the construction phase. Dust soiling effects due to trackout are high, due to earthworks are medium, and due to construction works are low. When appropriate mitigation is implemented, the air quality impacts associated with dust and particulates are predicted to be not significant. No exceedances of the AQS for the protection of human health are predicted as a result of the proposed development. The background concentrations for NO_2, PM_{10} and $PM_{2.5}$ are all well below their relevant objectives. The predicted additional road contributions for all pollutants are also small. Therefore, the cumulative effects on the worst-case human health receptors are considered not significant.
	Climate Resilience. The assessment of the resilience of the proposed development to present-day and future extreme weather, and climate change have interactions with Population and Human Health. As discussed in Chapter 11 Climate Resilience, construction phase is not considered as part of the assessment as the climate will not have notably changed from present day to the anticipated construction period in 2026-2028. During operation, effects are considered to be negligible to moderate (as per IEMA guidance, 2020) without mitigation. Heavy rainfall and rising temperatures may affect the substation area, however appropriate mitigation and drainage design during the detailed design stage will reduce the effects to minor and not significant. The effects to the underground cabling are negligible and not significant as the cable has a certain degree of protection as it is buried.
	Climate - Carbon. There are interactions between Population and Human Health and carbon emissions due to proposed development. As discussed in Chapter 12 Climate Carbon, there will be embodied emissions from the production of construction materials associated with the underground cabling and the substation and the transport of these materials and workers to site. There will be vehicle and machinery usage (electricity, fuel, and water consumption), including for site clearance and temporary construction compounds. There is also waste material generation and excavated

Interaction	Description
	material management. There is a land use change associated with the substation location. The residual effect of minor adverse with mitigation is anticipated with no significant effects expected. In line with the IEMA Guidance, minor adverse means that the project's emissions are in-line with good practice design standards and are also in-line with national net zero pathways.
	Noise and Vibration. It is considered that there will be a minor increase in noise and vibration levels with the effects on sensitive receptors and the local community from construction activities. As discussed in Chapter 13 Noise and Vibration, these impacts are considered not significant. The predicted operational noise levels of the proposed development are significantly below the night-time criterion at all Noise Sensetive Locations (NSLs). Therefore, the impact due to operational noise of the proposed development is also not significant.
	The Landscape. The significance of landscape effect due to underground cable works and proposed GIS substations is anticipated to be slight to moderate during construction phase and slight-imperceptible to moderate during operation phase. The location of the GIS Substations is at +18 m OD and adjacent to the main turbine halls of the adjacent STEP Power Plant. This low position was deliberately selected during the design phase to avail of the screening effect of the elevated terrain (+25 m OD) between the residences along Coast Road L-1010. This mitigates the visual impact of the GIS Substations on these residences. Additionally, the proposed colour scheme of the façade of the GIS Substations has been selected to match that of the adjacent STEP Power Plant so that the two developments are visually coherent. The visual impacts during operational phase will range from imperceptible to moderate-slight.
	Archaeology, Architectural and Cultural Heritage. There are interactions between Population and Human Health and Cultural Heritage due to the importance of archaeology, architectural and cultural heritage in communities. In the off-road sections, during construction, there is the potential for impacts on previously unrecorded archaeology to be uncovered during excavation works. Any disturbance of ground and drainage patterns can also impact unrecorded archaeology and cultural heritage. Where the construction works are undertaken in roadways, no impacts are envisaged. Mitigation measures are detailed within Chapter 15 of this EIAR and the Construction Environmental Management Plan which will ensure that such impacts are minimised. The residual impacts range from imperceptible to slight significance.
	Material Assets. The main interaction between Population & Human Health and Material Assets relates to the potential impact of the generation and removal of C&D waste from site during construction activities, and potential for services disruptions. As outlined in Chapter 16 Material Assets, there will be imperceptible effects on built services during construction phase and no significant effects on built services during operational phase. The waste management during construction phase will result in slight significance of effects. Following the implementation of mitigation measures these effects will be not significant.
	Roads and Traffic. Driver delay, road safety and community effects (such as pedestrian delay, severance, Non-motorised user amenity, fear and intimidation) due to proposed development works are considered to be non-significant. For cumulative impacts, the community effects are considered to be moderate significant. These effects have potential to be caused due to an increased volume of traffic on the construction vehicle routes, however as these vehicle movements will occur during construction operations only, they are categorised to be short term effects. Following the implementation of mitigation measures these effects will be not significant.
	Major Accidents and Disasters. Chapter 18 Major Accidents and Disasters presents an assessment of whether or not embedded design measures, or legal requirements, codes and standards adequately control the potential major accident and / or disaster like flooding, fire, extreme temperature, EMF, electricity failure, exposure to high voltage, subsidence, road traffic accident, industrial accident, biological hazard, cyber attack and watercourse/ground spillage. Potential disaster or major accidents which could act cumulatively at the STEP Power Plant site, adjacent to the 220kV substations, include fire/explosion and the release of pollutants to the environment. Following the implementation of mitigation measures, no likely significant adverse environmental effects are likely to occur.

Interaction	Description
Land, Soils and Hydrogeology interactions with: Population and Human Health (discussed above), Surface Water and Flooding, Biodiversity, The Landscape, and Archaeology, Architectural and Cultural Heritage.	**Surface Water and Flooding.** The excavation of soils (at the substation compound and along the cable route) and bedrock (at the substation compound) for the proposed development, poses a potential risk to nearby watercourses as a result of sediment run off. There is potential for small amounts of groundwater intercepted in trenches to be discharged to local streams or watercourses. An open cut crossing of the Ralappane Stream is proposed as part of the construction works. Open cut crossings have the potential to generate slit and suspended solids which could discharge to surface water bodies and/or leach into groundwater. Best practice techniques, mitigation measures and guidelines have been outlined in Chapter 7 Land, Soils and Hydrogeology and Chapter 8 Surface Water and Flooding and within the Construction Environmental Management Plan of this EIAR and reduce the effects to imperceptible.
	Biodiversity. The construction works at water crossings have the potential to impact on downstream protected areas, should an accidental release of sediment may occur. There is potential for deposition of spoil on hedgerows, trees and scrub/woodland vegetation, during site works like excavation and site preparation. Elevated levels of sediment could impact on spawning fish, through issues including the sedimentation of spawning gravels, clogging of fish gills and reduction in dissolved oxygen. A suite of best practice techniques, mitigation measures and guidelines have been outlined in Chapter 8 Land, Soils & Hydrogeology and Chapter 9 Biodiversity to reduce significance of effects on biodiversity to imperceptible to moderate.
	The Landscape. Views of the construction area of the substations and associated earthworks will be partly restricted due to the undulating nature of the topography within County Kerry and the study area. There will be areas of the site dedicated to the storage of excavated earth and building materials. The significance of landscape effect due to underground cable works and proposed GIS substations is anticipated to be slight to moderate during construction phase.
	Archaeology, Architectural and Cultural Heritage. As with any civil construction works of this nature, there is potential for previously unrecorded archaeology to be encountered during excavation works. The disturbance of soil during the construction phase of the proposed development across the agricultural lands, has the potential to undercover archaeological finds. Mitigation measures are detailed within Chapter 15 of this EIAR and the Construction Environmental Management Plan which will ensure that such impacts are minimised..
Surface Water and Flooding interactions with: Population and Human Health (discussed above), Land, Soils and Hydrogeology (discussed above), Biodiversity, Climate Resilience and Roads and Traffic.	**Biodiversity.** During the construction phase of the substations and underground cabling, there is the risk that contaminants could be accidentally released into watercourses which could potentially have impacts for local communities in terms of poor water quality, especially with the linkage to sensitive areas located downstream in the Lower Shannon SAC and the River Shannon and River Fergus SPA, appropriate mitigation measures reduce the significance of effects to imperceptible. Chapter 9 Biodiversity and the Construction Environmental Management Plan set out measures to prevent the runoff of contaminants during construction.
	Climate Resilience. Key climate trends across Ireland show rising temperatures, with wetter winters and drier summers and more frequent extreme weather events. These trends during the operational lifespan of substation area and underground cabling, have the potential to lead to risks including exceedance of flooding, surface erosion, ground shrinkage and asphalt/concrete cracking. During the operational phase, the impact on flood risk is negligible due to the cables being buried, no new obstruction to watercourses and so not influencing flood waters. Therefore, an imperceptible effect is assessed on flood risk during operational phase. During operational phase, increased heavy rainfall events causing flooding may result in exceeding drainage capacity and thus damaging assets located within the substation. A moderate (significant) effect as per the IEMA (2020) Guidance is assessed. To further mitigate against the potential significant residual effects, Chapter 11 Climate Resilience provides a list of further embedded mitigation measures which will be investigated and implemented as necessary during detailed design.
	Roads and Traffic. There is a chance that construction traffic could accidentally release fuel/oil which could cause a pollution incident if it reaches a watercourse. The magnitude of adverse surface water quality impacts in the absence of additional mitigation is expected to be moderate resulting in moderate to significant adverse impacts of temporary duration on the Ralappane Stream and potentially downstream in the Lower Shannon estuary. Appropriate mitigation as outlined within Chapter 8 Surface Water and Flooding and within the Construction Environmental Management Plan would

Interaction	Description
	reduce the significance of effect on surface water quality to imperceptible.
Biodiversity interactions with: Land, Soils and Hydrogeology (discussed above), Surface Water and Flooding (discussed above), Air and Noise and Vibration, Landscape and Visual	**Air.** There is potential for interactions between biodiversity and air quality. There are no ecological designated sites within 50m of potential dust sources of the proposed development or from roads to be used by construction traffic, therefore ecological designations are not considered in the construction dust assessment in Chapter 10 Air. Air quality changes such as dust during construction may affect flora and fauna in vicinity of proposed development. Across the different construction activities, the level of risk of dust creating nuisance (without mitigation) is predicted to range from ‘negligible’ to ‘high risk’ as per the IAQM (2024) Guidance. Following the appropriate implementation of the mitigation measures, the air quality impacts associated with dust are predicted to be not significant. The NOx concentrations at the worst-case receptor, Lower River Shannon SAC / E1, is within the standard of $30µg/m^3$, and therefore not significant. Similarly, the ammonia concentrations at E1 are below the critical level of $3µg/m^3$, and therefore not significant.
	Noise and Vibration. Noise and vibration can cause disturbance of protected species from noise and vibration generated from construction activities. There is potential for noise disturbance to otter and ex situ curlew during construction. Disturbance to protected species could occur from noise associated with human use of the operational site. There is potential for cumulative effects on the Lower River Shannon SAC and the River Shannon and Fergus Estuaries SPA through noise effects. Mitigation is included in Chapter 9 Biodiversity and the Construction Environmental Management Plan. The residual effects due to noise disturbance impacts on designated sites are assessed as imperceptible.
	Landscape and Visual. The proposed planting reinstatement for the proposed development will consist of native species, which is a positive effect on biodiversity. The planting of native hedgerows to the north and south of the substations will provide visual screening in addition to the positive biodiversity effect. The temporary compound will be reseeded with native species post construction.
Air interactions with: Population and Human Health (discussed above), Biodiversity (discussed above), Climate - Carbon, Archaeology, Architectural and Cultural Heritage, and Roads and Traffic.	**Climate - Carbon.** The proposed development has the potential for negative impacts on climate. However, air impacts associated with the proposed development are not considered to be significant and ambient pollutant concentrations are well below the relevant air quality standards, no exceedances of air quality standards are anticipated.
	Archaeology, Architectural and Cultural Heritage. Dust arising during construction phase may temporarily and indirectly impact monuments within ca. 50m of the works, resulting in slight effects and effects. There is also potential for dust to affect built heritage (Ralappane House) – this effect would be not significant.
	Roads and Traffic. Air quality impacts associated with road vehicle traffic and construction plant during construction and operation of the proposed development are anticipated to be not significant, as discussed in Chapter 10 Air.
Climate Resilience interactions with: Population and Human Health (discussed above), Surface Water and Flooding (discussed above), and Climate - Carbon	**Climate - Carbon.** Carbon emissions are associated with embodied emissions from the production of construction materials, and transport of those materials and workers to site. Vehicle and machinery usage (electricity, fuel, and water consumption), including for site clearance and temporary construction compounds will result in carbon emissions. The residual effect of minor adverse with mitigation is anticipated with no significant effects expected. In line with the IEMA Guidance, minor adverse means that the project’s emissions are in-line with good practice design standards and are also in-line with national net zero pathways.
Climate - Carbon interactions with: Population and Human Health (discussed above), Air	**Roads and Traffic.** There exists a link between construction traffic and carbon assessment. Transport of construction materials to site is one of the sources for construction-related GHG emissions.

Interaction	Description
(discussed above), Climate Resilience (discussed above), and Roads and Traffic	
Noise and Vibration interactions with: Population and Human Health (discussed above), Biodiversity (discussed above), and Roads and Traffic	**Roads and Traffic.** Traffic noise is likely to arise from movement of construction traffic during the substation construction and the underground cabling works, along with the delivery of materials to construction compounds. As concluded in Chapter 13 Noise & Vibration, given the predicted absolute noise levels are relatively low and that the impacts are temporary, the noise impacts due to the changes in road traffic noise due to additional construction traffic are not significant. Chapter 13 Noise and Vibration and the Construction Environmental Management Plan of this EIAR set out measures to reduce the effect of noise from HGV movements on sensitive noise receptors.
Archaeology, Architectural and Cultural Heritage interactions with: Population and Human Health (discussed above), Land, Soils and Hydrogeology (discussed above), Air (discussed above), and Material Assets	**Material Assets.** As with any works of this nature, there is potential for previously unrecorded archaeology to be encountered during excavation works and waste generation. Disturbance of ground within newly acquired lands may impact unrecorded archaeology and cultural heritage. The implementation of the measures described in Chapter 15 Archaeology Architectural and Cultural Heritage and the CEMP will ensure that such impacts are minimised. All physical archaeological, architectural and cultural heritage effect issues will be resolved at the pre-construction and construction stage of the development and the residual effects range from imperceptible to moderate. There are no potential residual effects envisioned at the operational stage and maintenance stage of the proposed development.
Material Assets interactions with: Population and Human Health (discussed above), Archaeology, Architectural and Cultural Heritage (discussed above), and Roads and Traffic	**Roads and traffic.** There is an interaction between resource and waste management and traffic and transport effects during the construction phase of the proposed development. The transportation of resources and waste to and from the substation and the cable route has the potential to affect local traffic and transport patterns during the construction phase. Materials will be transported from the construction compound areas, to the various sections of the proposed development and there will also be material requiring transport for disposal, following the excavation of the trenches. A Construction Traffic Management Plan has been produced and will be updated by the appointed contractor. The residual effects on roads and traffic are assessed as minor (not significant).

Shannon Technology and Energy Park (STEP) 220kV Grid Connection

Chapter 20 - Mitigation and Monitoring

July 2024

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20 Summary of Mitigation and Monitoring

20.1 Introduction

The EIAR takes into account the available results of relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments. The assessments contained in the EIAR have also been co-ordinated with the assessment under Council Directive 92/43/EEC of 21 May 1997 (The Habitats Directive) and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 (Birds Directive) as transposed in the Planning and Development Act 2000 (as amended) and the NIS which has been prepared for this application.

The following summary sets out the mitigation controls and other best practice measures identified in relation to the proposed development and identifies the means by which those controls and measures will be secured, as laid out in Annex IV(7) of Directive 2014/52/EU. The following are provided: a unique reference number for each item; the section of the EIAR where the mitigation measure is referenced; and the monitoring and mitigation measures, as set out in the EIAR.

A contractual obligation will be included within the tendering processes and implemented on appointment of the Contractor to ensure that the proposed works are developed in compliance with the requirements of the CEMP, and the methods, monitoring and mitigation included in this EIAR.

A summary of the mitigation and monitoring is included within the following table.

Table 20.1: Summary of Mitigation and Monitoring Measures

Reference	Phase	Mitigation and Monitoring
Chapter 6 Population and Human Health		
6.1	**Construction**	No HGV traffic will be allowed pass the existing school on the Coast Road at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure the continued safe delivery and collection of children at the school' regarding the control of noise and traffic.
6.2		Construction phase works will take place between the hours of 07:30 to 18:00 (Monday to Friday) and 08:00 to 14:00 (Saturday). No works will take place on Sundays or Bank Holidays.
6.3		The start and end times of construction shifts will be staggered within the construction complex (for example civil employees 07:30 – 18:00, or 07:45 – 17:45). This small stagger in shift start and ending times could lessen the impact of traffic peaking, refer to Chapter 17 (Roads and Traffic). Construction works outside these hours will only take place in exceptional circumstances (i.e., for specific engineering works e.g., concrete pours etc.). It is likely that a number of continuous construction phase works will also be required outside these hours on a limited number of occasions. These works will be agreed in advance with Kerry County Council. Work conducted outside of core hours, will comply with any restrictions agreed with the planning authorities.
6.4		To address risks of exposure to radon, workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019. Radon barriers are also to be installed in areas where a high radon risks have been identified.
6.5		Water quality testing will be undertaken pre-construction, during construction and post-construction for any identified drinking water abstraction sources which may be impacted by construction activities.
6.6		The CEMP includes best practice mitigation to minimise air quality and noise impacts associated with construction vehicles and the construction and operation of the plant.
6.7		Where land is used temporarily, it will be reinstated to its previous state after construction.
6.8		Land clearance works will take place on a phased basis and with consideration of seasonal restrictions e.g. lambing season, harvest seasons, etc., if applicable.
6.9		Construction haul roads will be maintained and dust control measures implemented in accordance with best practice set out in Chapter 10 (Air).
6.10	**Operational**	No specific mitigations relevant to the population and human health assessment are proposed during the operation and maintenance phase. In accordance with best practice (as set out in Chapter 10 (Air) and Chapter 13 (Noise) respectively), air and noise emissions will be minimised at source to reduce exposure of effects on operational personnel.
Chapter 7 Land, Soils and Hydrogeology		
	Construction	The following will be implented:
7.1		• Fuel storage – bunded tanks to prevent spillages and designated fuelling areas with spillage control;
7.2		• Chemical storage – all potentially polluting chemicals will be stored in secure weatherproof enclosures with spill kits;

Reference	Phase	Mitigation and Monitoring
7.3		• Concrete to be brought to site by covered truck, with wet concrete operations adjacent to watercourses avoided;
7.4		• Concrete truck wash watering/cleaning will be undertaken off-site if possible;
7.5		• Concrete wash water will be collected;
7.6		• A concrete washout management plan will be developed prior to construction by the appointed contractor
7.7		• The site will be kept secure to prevent vandalism which can lead to pollution from stored liquids escaping and entering drains;
7.8		• Any spillages will be cleared immediately by excavating and disposing of affected soils in accordance with the Waste Management Act 1996, and associated regulations;
7.9		• Silt control measures will be used to control silt generated from activities on site and prevent it from gaining access to nearby waterbodies; and,
7.10		• Should dewatering be required any discharges will be treated to remove contaminants and silt and disposed of in accordance with EPA requirements.
7.11		• A dewatering management plan will be developed prior to construction by the appointed contractor
7.12		• Adherence to best practice procedures during the construction of the HDD crossing. A HDD Procedure will be developed prior to any works commencing.
7.13		• A dewatering management plan will be developed by the contractor before construction work commences. All construction activities, including construction traffic, will be managed through the site Construction Environmental Management Plan (CEMP), which will set out key mitigation measures for, and monitoring of, potential impacts from traffic.
7.14		• Bentonite Breakout procedure will be developed.
7.15		• An appropriately qualified person will be present on site during construction to identify visual and olfactory evidence of contamination during excavation.
7.16		• Any contaminated ground will be characterised according to Waste Acceptance Criteria and dealt with via a bespoke remediation strategy or a materials management plan. Any waste arising will be managed in accordance with the Waste Management Act 1996 (as amended) and associated Regulations.
7.17		In addition to the above, a pre-construction confirmatory survey of wells and groundwater abstractions will be undertaken.
7.18	**Construction**	Should dewatering be required, water level monitoring will be undertaken pre-construction, during construction and post-construction for groundwater abstractions which may be impacted by dewatering. A dewatering license will also be obtained for any dewatering operations over 25m^3/d, in line with EPA regulations and EU law (Environmental Protection Agency, 2024b).
7.19		Water quality testing should also be undertaken pre-construction, during construction and post-construction for any identified drinking water abstraction sources which may be impacted by construction activities.
7.20		To address risks of exposure to radon, workplace radon tests will be carried out in areas of high risk, as required by S.I. Regulation 66 of S.I. No. 30 of 2019. Radon barriers are also to be installed in areas where a high radon risks have been identified.

Reference	Phase	Mitigation and Monitoring
		The following mitigation measures will be implemented to address residual landslide risk and risk of contaminant migration through the cable trench (as summarised in Section 7.8):
7.21		• Geotechnical testing during the ground investigation phase will include slope stability testing, which will inform landslide risks and the requirement of additional mitigation measures (such as dewatering).
7.22		• A Geotechnical Risk Register will be created to ensure any landslide and slope stability risks are systematically captured.
7.23		• Where groundwater seepage poses a risk to trench or substation excavation stability, additional measures (such as dewatering) will be used to mitigate these risks.
7.24		• A suitably designed drainage system will be installed to divert water away from the landslide risk zones.
7.25		• A phase of ground investigation prior to construction of the cable trench is to include an assessment of shallow groundwater quality within the superficial deposits (if present). This will identify any existing contamination and inform the requirement of remediation (as outlined in the CEMP detailed above).
7.26		• Installation of clay barriers along the trench to minimise groundwater flows along the cable route.
Chapter 8 Surface Water		
	Construction	The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works. These measures will also be incorporated into the Construction and Environmental Management Plan (CEMP), which the Contractor will develop based on the CEMP which accompanies this application:
8.1		• A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.
8.2		• Confirmatory pre-construction surveys will be carried out and seasonal constraints will be confirmed in agreement with IFI and National Parks and Wildlife Service (NPWS) and Kerry County Council, as appropriate.
8.3		• Works will be carried out in accordance with the guidelines set out by IFI in *'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters'* (IFI, 2016) including the programming of instream works within the period July to September or as otherwise agreed with IFI.
8.4	**Construction**	• The IFI Biosecurity Protocol for Field Survey Works[1] will be complied with.
8.5		• In the case of a warning of a flood event, plant and materials vulnerable to flooding in 'at risk' construction compounds will be relocated to parts of the compound that are considered to be not at risk of flooding.
		The following mitigation measures will be implemented prior to commencement and throughout the duration of the works:

[1] file.html (fisheriesireland.ie)

Reference	Phase	Mitigation and Monitoring
8.6		• Activities will be planned in advance and machinery will be managed to ensure that the number of trips is limited to the minimum required at each location i.e. the more times a piece of ground is tracked, the more likely it is that vegetative cover will be removed and ruts will be created that will act as miniature rivers where dirty water will flow.
8.7		• Tracking beside streams will be avoided to avoid damage to the bankside.
8.8		• Mitigation for the crossing of the Ralappane stream is detailed in Chapter 5 Description of the Proposed Development.
8.9		• Geotextile or timber matting will be used on soft ground, and in all protected areas
8.10		• A buffer zone of 10m will be maintained between storage and working areas and watercourses, taking account of the minimum working area required to facilitate the works.
8.11		• The time period over which areas of clearance are left open will be reduced insofar as is reasonably practicable.
8.12		• Re-instatement method statements will be subject to approval by the EnCoW.
8.13		• Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided.
8.14		• The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote from watercourses.
		In order to reduce the risk of contamination arising as a result of spills or leakages, measures including, but not limited to, the following will be employed:
8.15		– All collected waste will be managed in accordance with the Waste Management Act 1996, and associated Regulations:
8.16		– Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces;
8.17		– Refuelling of plant, equipment and vehicles will be carried out on impermeable surfaces;
8.18		– All tanks and drums will be bunded in accordance with established best practice guidelines; and
8.19		– Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.
8.20		• Works will not be carried out during extreme rainfall or high flow events. An early flood warning system will be set up to allow the removal of plant and material from construction areas located in Flood Zones A and B in the event of a flood warning.
8.21		• Temporary works will be designed so as not to increase flood risk elsewhere from overland flow, by limiting excavated lengths and providing suitable drainage provision.
8.22	**Construction**	• Silt fences (to Hy-Tex Premium specification or similar) and silt traps will be installed prior to commencement of works and will be inspected daily to inform adaptive management as required. The locations of same will be determined by the EnCoW.
8.23		• Any instream works will be conducted during the period July – September to avoid effects on fisheries, or otherwise agreed with IFI.
		Silt Control Measures
8.24		• Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to larger streams and watercourses.

Reference	Phase	Mitigation and Monitoring
8.25		• Silt control measures include silt traps which can be located in small drains where flow is small and silt fences where runoff from large areas needs to be controlled.
8.26		• Silt fences must be installed in the working areas and not at the watercourse.
8.28		• Access routes will be delineated such that an appropriate set back distance from watercourses is maintained. Where works are to be undertaken adjacent to watercourses the setback distance will be delineated by the EnCoW on site.
8.29		• Where distances between the works and watercourse allow, a minimum setback distance of 30m from the watercourse will be maintained.
8.30		• Where the site is constrained, the best available set back distance will be employed taking account of the minimum working area required to facilitate the works.
		Silt Fences
8.31		• Silt fences will be installed downslope of the area where silt is being generated on disturbed ground.
8.32		• To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse).
8.33		• Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh.
8.34		• The base of the silt fence will be bedded at least 15-30 cm into the ground at 2 metre intervals.
8.35		• Once installed the silt fence will be inspected by the Environmental Clerk of Works regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains.
8.36		• The integrity of the silt fencing will be checked daily by the EnCoW and after poor weather conditions (rain or wind) and any failures rectified immediately.
8.37		• Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW.
8.38		• Any build-up of sediment along the fence boundary will be removed daily.
8.39		• Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW.
8.40		• The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment).
8.41	**Construction**	• Silt fences will not be removed during heavy rainfall.
8.42		• The silt fence will not be pulled from the ground but cutaway at ground level and posts removed.
8.43		• A record of when it was installed, inspected and removed will be maintained by the EnCoW.
		Silt Traps

Reference	Phase	Mitigation and Monitoring
		The purpose of the trap is to reduce the level of solids in the slowly flowing water. The silt trap works by allowing a build-up of water behind it slowing flow and allowing solids to settle out. The following requirements will apply:
8.44		● Silt traps will only be placed in drains downstream of working areas where the volume of water flow is expected to be low.
8.45		● Silt traps will be made of terram or similar material, not mesh.
8.46		● The trap will be staked into the banks of the drain / watercourse such that no water can flow around the sides.
8.47		● The material will be bedded into the drain bed/watercourse to prevent water flowing beneath it.
8.48		● The height of the trap will be lower than the bank heights. The upper edge will be fixed to a timber cross piece. This will allow water to overtop the silt trap and not burst through or around it.
8.49		● Inspections will be carried out daily; during the proposed works, weekly on completion of the works for at least one month, and after heavy rains, and monthly thereafter until bare areas have developed new growth.
8.50		● Any build-up of solids will be carefully removed without removing any vegetation growing on the bottom.
8.51		● In sensitive areas a series of silt traps will be placed in the drain.
8.52		● The silt trap will not be pulled from the ground but cutaway at ground level and posts removed.
8.53		● A record of when it was installed, inspected and removed will be maintained by the EnCoW.
8.54	**Operation**	Mitigation for stormwater is embedded in the design, described in section 8.4.3 and includes that surface water runoff will flow through a petrol interceptor and conveyed to the STEP Power Plant fire water retention tank before discharging to the Shannon Estuary.
Chapter 9 Biodiversity		
9.1	**Construction**	An Ecological Clerk of Works (ECoW) will be employed by the Contractor to oversee implementation of mitigation. This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented. The Contractor's ECoW will also ensure any disturbance licenses are arranged, prior to construction works following completion of pre-construction confirmatory surveys for invasive species, badgers, otters, bats, amphibians and other terrestrial mammal species such as red squirrel, Irish hare and European hedgehog, based on relevant details outlined in this EIAR and any significant findings of further confirmatory pre-construction surveys outlined above. The Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated, and impacts are minimised. An independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the monitoring and compliance reports generated by the Contractor's ECoW.
9.2	**Construction**	The ECoW will also ensure works areas are minimised in relation to so impacts to woody vegetation (hedgerow, treeline, and scrub) are minimised as far as possible and disturbance risks to badger setts are avoided if possible. Pre-construction confirmatory surveys will be conducted by the EcOW to demarcate protected mammal breeding sites and confirm disturbance license requirements. Prior to enabling and construction works the site ECoW will review and confirm proposed access routes, demarcate sensitive habitats, and confirm works areas in these locations.
		Mitigation and Retention of Habitats

Reference	Phase	Mitigation and Monitoring		
9.3		The following summarises the potential for retention of key habitat features, such as scrub and hedgerow, and replanting of woody vegetation species to mitigate for the loss of scrub, hedgerow, and treeline.		
9.4		As outlined under Section 9.7.1of the Biodiversity chapter, the ECoW will monitor works and demarcate areas to ensure that the required mitigation for Habitat KER Loss and requirements for site clearance are kept to a minimum.		
		Mitigation for Habitat KER Loss		
9.5		Habitat	Estimate of Area Which May Be Lost	Mitigation
		Treelines (WL2)	A total length of 0.65ha of treeline. This incorporates areas for both permanent and temporary works	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
		Hedgerows (WL1)	A total length of 0.79ha of hedgerow. This incorporates areas for both permanent and temporary works.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
		Scrub (WS1)	A total of 1.22ha of scrub is within the RLB. This incorporates areas for both permanent and temporary works.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
		GS2 Dry Calcareous and Neutral Grassland	A total area of 5.52ha of Dry Calcareous Grassland habitat is within the RLB.	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.
		GM1 Marsh	A total area of 0.11ha of marsh habitat is within the RLB.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be fully reinstated.
		GS4 Wet Grassland	A total area of 1.90ha of wet grassland habitat is within the RLB. This is on the edges of the proposed development and outside of any permanent works.	Any areas cleared outside of the permanent works will be reinstated.

Reference	Phase	Mitigation and Monitoring		
		FW2 Lowland Depositing Stream	A total area of 0.03ha of Lowland Depositing Stream habitat is within the RLB. This is where the single Ralappane Stream crossing occurs along the proposed cable route	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
		FW4 Drainage Ditch	A total of 0.01ha of Drainage Ditch habitat is within the RLB	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
		GS2 Dry Meadows and Grassy Verge	A total area of 0.38ha of Dry Meadows and Grassy Verge habitat is within the RLB.	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.
		WN6 Wet Willow-Ash-Alder Woodland	A total of 0.02ha of Wet Willow-Ash-Alder Woodland habitat is within the RLB.	The ECoW will seek to minimise habitat loss and minimise works areas. Any areas cleared to accommodate works will be fully reinstated.
		WL2WS1 Treeline/Scrub	A total of 0.01ha of Treeline/Scrub habitat is within the RLB	Any areas cleared where permanent works are not incorporated (i.e., at construction compounds and temporary works areas) will be reinstated.
		Reinstatement		
9.6		Particular care will be taken at the boundary between the proposed development and the SAC, SPA and pNHA so that construction activities do not cause damage to habitats in this area. These habitats will be securely fenced off early in the construction phase. The fencing will be clearly visible to machine operators. The Ralappane Stream runs from the proposed development through the SAC and pNHA to the estuary, it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to Chapter 8 (Surface Water and Flooding) and Section 9.7.3 for further details on mitigation and monitoring measures for water.		
9.7		To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub/woodland vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The ECoW will specify appropriate protective fencing where required.		
9.8		Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.		
9.9	**Construction**	Native woodland and shrub planting will include Scot's Pine, Willow, Oak, Alder, Rowan, Hazel, Blackthorn and Holly. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Natural regeneration of vegetation will also occur.		
9.10		There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats. Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air		

Reference	Phase	Mitigation and Monitoring
		and water circulating to the roots. No materials will be stored within the root protection area / dripline of trees earmarked for retention. The ECoW will specify appropriate protective fencing where required.
9.11		Details of the landscaping plan for the proposed development are included in Appendix 9.7. This includes detailed areas of native woodland and native scrub habitat as well as native wildflower planting. The woodland planting mix will be dominated by native species including Scots Pine (*Pinus sylvestris*), Willow (*Salix sp.*), Pedunculate Oak (*Quercus robur*) and Sessile Oak (*Quercus petraea*), Alder (*Alnus glutinosa*), Rowan (*Sorbus spp*). and Crab Apple (*Malus spp.*). The woodland edge planting mix will include Hazel (*Corylus spp.*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Elder (*Sambucus spp.*) and Holly (*Ilex spp.*). The objective of these elements is to create natural, multi-layered woodland habitat which will be of local ecological value and has the potential to support native flora and fauna. A linear strip of woodland along the southern boundary will help to maintain connectivity (east to west) between habitats in the wider landscape. Additional native specimen trees (Willow, Wild Cherry (*Prunus avium*), Rowan, Whitebeam (*Sorbus subg. Aria*) and Silver Birch (*Betula pendula*)) will be planted on peripheral areas such as the road edge and administration area.
9.12		A native wildflower mixes (of 100% Irish provenance) will be utilised to provide a more diverse sward which is of higher ecological value for invertebrates and birds. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Perennial Rye Grass or other vigorous amenity/ agricultural grass species will not be utilised as they tend to over-dominate the sward and reduce overall biodiversity. The final wildflower mix will be specified by the ECoW based on final ground conditions including alkalinity, fertility and moisture levels.
9.13		Based on the seed mix utilised and on prevailing ground conditions, the ECoW will specify the management regime, including weed control and mowing regime, necessary to maximise biodiversity and habitat value.
9.14		Reinstatement of linear features such as fencing, hedgerows or treelines from temporary works areas will be carried out in agreement with the landowners and SLNG's Agricultural Liaison officer. Unless otherwise agreed with the Employer's Representative, the Contractor will re-instate hedgerows, treelines, and scrub (to within 3m of the proposed cable route) to a species-rich condition (i.e. five woody species per 30 m), comprising only native species suited to the locality.
9.15		Where hedgerows are removed due to the works or works areas these areas will be planted with a double staggered hedgerows with native species –As per TII/NRA guidelines:
9.16		• Height of Plants: In general, taller species such as Hawthorn (*Crataegus monogyna)* should be in the order of 900 to 1000mm in height while lower growing and trailing species may be between 300 to 450mm in height/length. Where trees are included and, depending on the growth rate of individual species, the majority of plants should be between 900 and 1200mm in height. Occasionally taller trees, up to and including 'standard-sized' plants, may be provided at random or irregular intervals along the hedgerow.
9.17	**Construction**	• A wide variety of native tree species may also be included in the hedgerow for increased species diversity, local character and aesthetics, density and horizontal and vertical structural differentiation. Again, species selected should reflect the composition of existing hedgerows in the surrounding landscape. Where tree species are included in rural hedgerows, they should be randomly dispersed, thereby avoiding potential for development of simple repeating patterns and formal avenues. Depending on local conditions and set-back and safety requirements.
9.18		• Spacing of Plants: Hedgerows are best planted as double rows, particularly for the establishment of strong diverse plantings. Double rows will be set approximately 300 to 400mm apart, with plants at between 400 to 500mm centres, in staggered rows.

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9.19		• Staking: Normal hedgerow plants will not require staking. Appropriate staking and ties will be provided for stability and establishment purposes where trees exceeding 1.5m in height are included.
9.20		• The principal maintenance required in the early years of establishment is controlling development of competing vegetation along the base of the hedgerow. This will ensure better overall establishment and allow for the development of lower branches giving a more desirable dense base.
9.21		• Particular care is needed in the use of herbicides in more mature hedgerows as base growth is desirable and, newly established, desirable species may have naturally recolonized the base of the hedgerow. Control will be be focused on undesirable, vigorous or competitive species, e.g. Ragwort or Sycamore. Application of a minimum 50mm deep layer of mulch (bark chipping, etc), will reduce potential for weed growth and hence control weeds.
9.22		• Cutting back Hawthorn (*Crataegus monogyna*) at least once within the first three years after planting will encourage dense growth.
9.23		• In vulnerable areas, fencing will initially be required to protect plants from browsing by rabbits or hares. Rabbit guards will also be used in limited circumstances where protection is considered appropriate for more expensive plants (especially taller trees) and sensitive species.
9.24		• Replacement of plants which fail to grow is necessary at the earliest opportunity so as to maintain the integrity of the establishing hedgerow. Occasional plant failure within densely planted features is not a particular concern – and may lead to development of a more natural hedgerow appearance. In time, particularly wide spreading or leaning trees and shrubs may have to be pruned or removed for safety reasons.
9.25		• Long-term coppicing or 'laying' of hedgerows at 20-to-30-year intervals will retain hedgerow biodiversity, density and structure.
9.26		Where areas of broad-leaved habitat types are removed due to the works or works areas generate new linear boundaries, this will be planted with high canopy broad leaved habitat with native species – as per TII/NRA guidelines:
9.27		• Plant age and size: Trees will be in the order of 750 to 1200mm in height and will have been transplanted at least once, while taller shrubs may be 600 to 750mm on average. Lower growing shrubs will only be 300 to 450mm in height at planting.
9.28		• Spacing: High-canopy woodlands should be diverse and include areas for the development of glades. Such sites should be divided up into planting areas and retained open areas. In addition, planting areas should be further divided to incorporate small, randomly located, individual groups (3 to 5 trees) of dominant tree species such as Oak and Ash.
9.29		• Trees: These will be planted at varying distances between 1.5 x 1.5m to 3.0m x 3.0m spacings, while mixed arrangements of shrubs are best planted at between 900 and 1500mm centres depending on species.
9.30	**Construction**	• Staking: In general, trees should not require staking. However, appropriate staking and ties will be provided if plants in excess of 1.5m in height are included.
9.31		• Specification: As the planting is proposed for ecological and environmental aesthetic reasons (i.e. not for a commercial forest), forked or leaning woody plants, can be incorporated within tree and shrub treatments within the roadside landscape.
9.32		• The principal maintenance requirement for the establishment of successful high-canopy woodland treatments is control of competing vegetation at the base of individual trees or shrubs. This will ensure better overall establishment and allow for the development of a

Reference	Phase	Mitigation and Monitoring
		varied branching structure. Importantly weed control is not required over the entire site as individual plants may be well-spaced and semi-natural grassland treatments may be present in open areas and between individual trees.
9.33		• The application of a minimum 50mm deep layer of mulch (bark chipping, etc.) to a 400mm radius circle around the plant will reduce the potential for weed growth and hence the need for weed control. Otherwise, pulling or spot treatment of noxious and invasive weeds will be required on a regular basis.
9.34		• Initially, fencing may be required to protect plants from browsing by rabbits or hares. It may be possible to utilise rabbit proof fencing around a plot. Rabbit guards may also be used on individual plants. However, it is recommended that, where guards are used, stakes should be provided for plant support if the measure is to prove effective.
9.35		• The replacement of failed plants will be undertaken at the earliest opportunity so as to maintain the integrity of treatments. Particularly large areas of woodland treatments, with low failures rates, may not require replacement planting as occasional losses will provide for some random windows in the canopy and a more natural appearance to the woodland.
9.36		• In time, particularly wide-spreading or leaning trees which pose a hazard to road safety may have to be pruned or removed for safety reasons.
9.37		• Leaving cuttings from tree and shrub thinnings at the site will promote nutrient cycling and restore nutrients to the soil, while, at the same time, providing a substrate for many plant species and providing suitable conditions for use by birds, small mammals and many invertebrates.
9.38		All other sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, or similar verge seed mixes, under the supervision and direction of the ECoW. Plant species of native provenance will be used in all replanting of semi natural habitats.
9.39		The Contractor will commit to a after-care plan for hedging, grassland, and agricultural reinstatement, or as otherwise agreed with the local authority.
9.40		The Contractor’s agronomist will inspect, photograph and report in writing to the Employer’s Representative on the establishment-phase of all vegetation.
9.41		The Contractor’s agronomist will review and advise on any corrective measures required to ensure good condition, immediately after reinstatement.
		Mitigation for the Protection of Water Courses
		General
9.42	**Construction**	At a minimum, all pollution control measures will be designed, installed, and maintained in accordance with measures outlined below and under the supervision of the Contractor’s Environmental Clerk of Works (EnCoW).
		Concrete
9.43		The pouring of concrete will be required during the construction phase. To prevent the runoff of concrete into nearby watercourses, drains and drainage ditches, the following will be implemented.

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9.44		• No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck.
9.45		• Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the nearby watercourses, drains and drainage ditches.
9.46		• Concrete trucks will be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area.
9.47		• A concrete washout plan will be developed by the contractor
9.48		• Where concrete pours are to take place instream they will only take place within an isolated, dry, works area.
9.49		• Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until concrete has hardening negating a run-off risk.
9.50		• The Contractors EnCoW will ensure that covers are available for freshly poured concrete to avoid wash off in the event of rain.
9.51		• Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal.
9.52		• The Contractor will schedule concrete works during relatively dry weather conditions (i.e., when there are no active Met Eireann yellow, orange or red warnings) to reduce the elevated risk of runoff.
9.53		• The Contractor’s EnCoW will notify the Employer’s Representative Team, the NPWS and IFI immediately of any concrete spills into watercourses, drains and drainage ditches.
		Hydrocarbons
9.54		Where mobile equipment is required e.g., generators, these will be housed in a suitably sized bund / plant nappy such that any leaks / spills are intercepted. All mobile equipment used will be stored within a plant nappy. Operators will regularly inspect the plant nappy, at a minimum on a daily basis, and replace it where it has become contaminated.
9.55		Fuelling and lubrication of plant and equipment will be restricted to the construction compound sites, or laydown areas.
9.56		All waste fuels, oils, and other hazardous wastes will be disposed of in accordance with the requirements of waste legislation.
9.57		Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained during induction to site by the Contractor’s EnCoW in the use of this equipment.
9.58		Should use of a spill-kit be required it shall be immediately re-stocked by the Contractor.
9.59	**Construction**	All spill-kits shall be inspected on a weekly basis by the safety, health, environmental and quality SHEQ officer to ensure they are maintained as fit for purpose. Records relating to these inspections shall be kept.
9.60		Welfare / hygiene facilities will be located within the construction compounds.
9.61		Should one be required, any water from any wheel washes will be removed from site and disposed of in line with Waste Legislation. No wheel wash water will be discharged into any watercourses, drains or drainage ditches.

Reference	Phase	Mitigation and Monitoring
9.62		Prior to the works commencing, the measures prescribed in this section shall be installed to prevent the downstream transportation of surface water run off associated with vegetation clearance. This may be through the use of features like hay bales. Monitoring of these measures to ensure their continued effectiveness will take place on an on-going basis while the works are proceeding by the SHEQ officer.
9.63		Where watercourse crossings take place within the existing road curtilage, any drains or drainage ditches connecting into the relevant watercourse will be identified and protected through use of sandbags or similar to ensure flows of contaminant laden water do not enter into the watercourses, drains and drainage ditches. Temporary culverts will also be installed in areas where temporary roads/routes are required for regular use and crossing of drainage ditches.
9.64		The clearance of any riparian vegetation will be avoided / or kept to the minimum required for the facilitation of the works such that no unnecessary exposure of riverbanks occurs.
9.65		The Contractor's EnCoW shall direct the Contractor to take any corrective actions required. The Contractor will record all works authorisations, report these to the independent EnCoW within the Employers Representative Team and maintain on file for inspection as required.
9.66		Where the implementation of these measures fail, or are inadequate, the Contractor will implement adapted measures (for example replacement sediment treatment system) in agreement with the Contractor's EnCoW and the Employers Representative Team.
9.67		The IFI Biosecurity Protocol for Field Survey Works will be complied with.
		Open Cut Water Crossing
9.68		Works will be carried out within a dry works area or as otherwise agreed with IFI. The method statement for crossing the Ralappane stream will be agreed with IFI prior to any works commencing.
9.69		The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. Techniques include the use of inflatable dams, frame dams or, in smaller watercourses, sandbags (double-bagged and underfilled, containing only clean washed sand).
9.70		Prior to drying out of the works area, de-fishing will be undertaken under licence. This will include for the translocation of aquatic species including eels out of the works footprint, should they be found within the isolated works area.
9.71		Any pump used to dewater the works area will be fitted with an appropriate screen to prevent aquatic species from being sucked into the pump.
9.72		Water pumped from the dry works area will be treated using settlement tanks to remove sediment prior to discharge back to the watercourse. In consultation with Inland Fisheries Ireland (IFI), greater filtration of silt may be achieved prior to discharge, through proposed use of silt de-watering bags which trap silt and expel only clean water and can be left to biodegrade on riverbanks as a habitat enhancement measure.
9.73	**Construction**	Water will be conveyed over the isolated section of channel by pumping or the use of a temporary diversion. Where sufficient capacity is available, and there is no risk of excessive scour, the diversion will be within the footprint of the existing channel.
9.74		Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI and landowners. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.

Reference	Phase	Mitigation and Monitoring
9.75		Open cut trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie) and works will not take place at least during yellow, orange and red weather warnings. The Contractor's Environmental Clerk of Works (EnCOW) will monitor this daily and will provide reports for audit.
9.76		Unless otherwise agreed with IFI, any element of the works requiring instream works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive). Where trenching (instream) works are proposed, electrofishing may be required to remove fish under licence from IFI. Method statements will be developed in agreement with the Employer's Representative and with IFI for the works.
9.77		A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.
9.78		Silt fences will be installed downslope of the area where silt is being generated on disturbed ground as follows:
9.79		To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse).
9.80		Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh.
9.81		• The base of the silt fence will be bedded at least 15-30 cm into the ground at 2 metre intervals.
9.82		• Once installed the silt fence will be inspected regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains.
9.83		• The integrity of the silt fencing will be checked daily by the EnCoW and after poor weather conditions (rain or wind) and any failures rectified immediately.
9.84		• Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW.
9.85		• Any build-up of sediment along the fence boundary will be removed daily.
9.86		• Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW.
9.87		• The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment).
9.88		• Silt fences will not be removed during heavy rainfall.
9.89		• The silt fence will not be pulled from the ground but cutaway at ground level and posts removed.
9.90		All instream works, including silt control measures, biosecurity measures, and fish salvage operations will be monitored by an appropriately experienced ECoW.
		Mitigation for the Protection of Otter
9.91		In advance of enabling works, the Contractor's ECoW will conduct a pre-construction confirmatory otter survey in advance of the commencement of any works within 150m of the works areas (where access is available) as per Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. This will allow for the identification of any holts have been established prior to commencement of works. The confirmatory otter survey will be conducted no more than 10-12 months prior to construction commencing. Otter surveys will be carried out having regard to guidance of NRA (2006, 2009)

Reference	Phase	Mitigation and Monitoring
9.92	**Construction**	The results of pre-construction confirmatory surveys will inform the refinement of mitigation measures (if required) in Contractor method statements, and all results will be incorporated into Contractor's constraint mapping.
9.93		Survey reporting and mapping will also be provided to the Employer's Representative team, and to local authority or other parties where required by conditions.
9.94		Should holts be identified within 150m of the proposed development the following will, at a minimum, be employed, unless otherwise agreed with the NPWS:
9.95		• No works will be undertaken within 150m of holts where breeding females or cubs are present.
9.96		• Works within 150m of such a holt can only take place following consultation and in agreement with the NPWS
9.97		• No wheeled or tracked vehicles of any kind will be used within 20m of active but nonbreeding holts
9.98		• No light work such as digging by hand or scrub will take place within 15m of such holts except under license from NPWS
9.99		• The identified exclusion zones will be fenced and clearly marked on site prior to any invasive works.
9.100		• All contractors on site will be made fully aware or the procedures in relation to the holts by the ECoW.
9.101		• No excavations are to be left uncovered or without means of egress (a sloped plank for example) overnight, as wildlife may fall in or enter and become trapped.
9.102		• No buildings or storage units are to be left open overnight, as wildlife may enter and become trapped.
9.103		• No poisonous or potentially harmful substances or materials are to be left unsecured overnight.
9.104		• No vehicles or machinery are to be used if installing any wildlife fencing or exclusion gates.
9.105		Where works in proximity to a holt or couch cannot be avoided, a licence to disturb otter will be required from NPWS. The Contractor will be required to comply with any specific mitigation measures as stipulated under the licence.
		Mitigation for the Protection of Badger
9.106		Prior to any works commencing, a pre-construction confirmatory badger survey will be carried out. Surveys will be conducted having regard to Surveying Badgers (Harris et al.1989) and record signs of badgers, including tracks, hair, latrines and setts. The extent of survey area will be defined as 150m beyond all works areas within suitable habitat as set out in Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006).
9.107		Prior to works commencing, activity at all identified setts within 150m will be confirmed. This will be confirmed through the use of camera monitoring, setting of footprint traps, soft blocking of sett entrances, or similar. Any risk of disturbance to badger will be subject to disturbance license requirements.
9.108		A description of setts, i.e., main sett, annex sett, or outlier sett, will be provided by the ECoW, along with the level of activity at each. This will allow for an understanding of the importance of setts in the wider context of the local badger population.
9.109	**Construction**	As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006), where setts have been confirmed, no heavy machinery will be used within 30m (unless carried out under licence from the NPWS). Lighter machinery (generally

Reference	Phase	Mitigation and Monitoring
		wheeled vehicles) will not be used within 20m of a sett entrance and light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.
9.110		Unless otherwise agreed, and under licence from the NPWS, during the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts, neither will blasting or pile driving within 150m of active setts. An assumption that a sett is active will apply unless proven otherwise during the course of investigation.
9.111		All identified exclusion zones, as outlined above, will be clearly marked out on site and communicated to all site staff prior to works commencing.
9.112		Where works may interfere with a badger sett directly, exclusion will take place as per NRA (2006) guidelines.
9.113		During the construction phase management and protection measures should also include:
9.114		● No excavations are to be left uncovered or without a means of egress (a sloped plank for example) overnight, as badgers may fall in or enter in search of food and become trapped
9.115		● No buildings or storage units are to be left open overnight, as badgers may enter and become trapped
9.116		● No poisonous or potentially harmful substances or materials are to be left unsecured overnight
9.117		● No vehicles or machinery are to be used installing exclusion fencing or gates
9.118		If a badger is discovered or any activity suggesting badgers have been disturbed during construction, all work must cease immediately, and the ecologist should be notified as soon as possible to detail how best to proceed.
9.119		Badgers within the proposed development area are considered to also be susceptible to noise disturbances and as such mitigation outlined in section 9.7.8 for wintering birds will also apply to badger mitigation.
9.120		It is considered, however, that sett 2 identified by DixonBrosnan (see section 9.5.3.2 and Appendix 9.4) will require more specialised mitigation in the form of a permanent sett closure. The closure of the outlier/subsidiary sett 2 will need to be carried out prior to the construction works can begin and will require the creation of an artificial sett to replace the loss of sett 2.
9.121		Pre-construction surveys will be carried out on these setts in order to determine if there has been any change in badger sett usage or spread and to identify appropriate locations for the creation of an artificial sett. Before closure works can begin a suitable site for the new artificial sett should be identified within the current area used by the local badgers in order to aid in the process of the badgers locating the new sett. Once the artificial sett has been constructed and located by the badgers the closure of the original sett can begin.
9.122		The sett closure will be carried out initially by excluding the badgers from the current sett through the use of one-way badger gates which are installed at the sett entrances. A strong wire mesh is to be installed over the surface of the sett to prevent badgers from creating new tunnel entrances or re-entering the sett. The gets will only open outwards allowing badgers to exit but not re-enter the sett.
9.123		The sett exclusion process can only take place between the 1st of July and the 31st of November as this is outside of the badgers breeding season.
9.124		The exclusion mesh and gates will be installed by hand so as to minimise disturbance around the setts
		Exclusion Methodology

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9.125	**Construction**	• The exclusion process will be initiated by first installing the gates which are fitted in a two-way position to allow badgers to move in and out of the sett freely, thus becoming used to this new feature.
9.126		• After three days the gate will be set to a one-way operation so that badgers can only leave the sett and not re-enter.
9.127		• Wire fencing will also be fitted to cover the extent of the sett, preventing the creation of new tunnels or re-entry of the badger once they have been excluded.
9.128		• The movement of the badgers can then be monitored by placing sticks, sand or gravel immediately inside the gate and sett entrance and by erecting camera traps within the area and focused on the sett entrances. Once no movement has been recorded over a three-week period work can commence on closing the original badger sett permanently.
9.129		• The EcoW will supervise the installation and exclusion, regular monitoring and re-opening of the setts.
9.130		The above mitigation concerning the closure of sett 2 and artificial sett creation will be carried out at least one year before the commencement of works for the proposed development and following the completion of a pre-construction survey and development of a badger mitigation plan outlining details regarding the artificial sett location and structure and time scale for the original sett closure.
		Mitigation for the Protection of Bats
9.131		No bat roosts were identified within the RLB of the proposed development. However, there is potential for roosts to become established in the time prior to construction. As such, as a precaution, a preconstruction confirmatory survey of trees to be felled as part of the works will be undertaken.
9.132		The Design and Construction of any bat mitigation measures will be site specific, and comply with licensing requirements, having regard for relevant guidance including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes", and the NPWS Bat Mitigation Guidelines for Ireland.
		The following measures will, at a minimum, be undertaken:
9.133		• Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in agreement with the ECoW, and NPWS as relevant.
9.134		• Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per Bat Surveys for Professional Ecologists: Good Practice Guidelines.
9.135		• Trees identified with potential roost features will be thoroughly examined, under licence from the NPWS, to ascertain the presence or absence of roosting bats. This will be conducted by an experienced bat expert. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. NPWS (2022) guidance notes that emergence/re-entry surveys of trees are limited in terms of effectiveness. As such, inspections via endoscope will be carried out, including of features at height.
9.136	**Construction**	• Where felling does not occur within one day of the examination, the trees will be re-assessed.
9.137		• Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist, and any conditions under license. They will not be carried out during the breeding season, between the months of June to August inclusive, or during hibernation in the months of November to March inclusive, unless under license from the NPWS. Where the felling of trees found to be

Reference	Phase	Mitigation and Monitoring
		suitable as bat roosts cannot be avoided, appropriate mitigation will be agreed with the NPWS and put in place at least one month in advance of any felling or disturbance.
9.138		• If any bat roost sites are removed by the Works, appropriate replacement bat roost sites will be provided following consultation with the NPWS, and in consultation with the local authority.
9.139		• Any lighting (temporary flood lighting etc.) within compounds and construction area is to be turned off outside working hours to reduce impact on commuting and foraging bats species.
9.140		The Design and Construction of bat mitigation measures will be site specific, and comply with the requirements of the bat specialist, the Standards, the TII's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes", the National Parks and Wildlife Services Bat Mitigation Guidelines for Ireland, the National Parks and Wildlife Service Circular 2/07 Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997.
		Mitigation for the Protection of Breeding Birds
9.141		Minimisation of habitat and reinstatement of areas of habitat which may be used by breeding birds (i.e. scrub, hedgerows, and grassland habitats) is outlined previously in Section 9.7.2.
9.142		As outlined in the description of the development the clearance of all vegetation (except for improved grassland, recognising bare ground, or other vegetation with no nesting potential as determined by the ECoW), will be planned to take place outside of the breeding season for birds, or as determined by risk of disturbance to a nest site.
9.143		Should clearance within the breeding season be required, a suitably qualified ecologist / ECoW will conduct pre-construction confirmatory surveys to assess risk of disturbance to nesting birds to inform vegetation clearance activity. In the event where pre-construction surveys confirm or presume nesting birds are present, an exclusion zone will be established around the nesting bird (to include the risk of abandonment due to indirect disturbance), and no vegetation clearance may proceed until young are presumed to have fledged, or nesting has failed. Repeat surveys will be required if vegetation has not been cleared within 72 hours of the initial survey. This will prevent direct impact to nesting birds within the footprint of the works.
		Mitigation for the Protection of Wintering Birds
9.144		The principle likely disturbance from construction activities are temporary disturbance to very low numbers of SCI from works at the western end of the proposed development. Mitigation measures to minimise noise disturbance form works associated with the development are prescribed hereunder.
9.145		All plant used during the construction phase shall be the quietest of its type, practical for achieving the works, as demonstrated in writing by the Contractor to the local authority, with reference to other noisier models.
9.146		All plant shall be operated and maintained in accordance with the manufacturer ' s recommendations including the use and maintenance of the specific noise reduction measures in the next bullet.
	Construction	The following will be incorporated to reduce the impact further:
9.147		• The use of mufflers on pneumatic tools
9.148		• Effective exhaust silencers

Reference	Phase	Mitigation and Monitoring
9.149		• Sound reducing enclosures
9.150		• Machines in intermittent use shall be shut down during periods where they are not required
		Mitigation for the Protection of Other Terrestrial Mammals
9.151		Prior to works commencing in areas of suitable habitat for species such as hare and European hedgehog. A targeted pre-construction survey for each species will be carried out prior to any works taking place. Surveys may include observation surveys, camera traps or hair traps.
9.152		In consideration for red squirrels, should any dreys be identified on site belonging to grey squirrels, these will be removed under licence from the NPWS. These dreys will be replaced using artificial dreys. Any additional measures outlined by the NPWS under the terms of their license will also be incorporated. Mitigation concerning noise and habitats (Section 9.7.2) will also be adhered to and considered regarding other terrestrial mammal species. The implementation of mitigation for breeding birds as outlined in Section 9.7.8 will simultaneously avoid the majority of the main breeding season for species such as the European hedgehog which runs from April – October.
		Mitigation for the Protection of Amphibians
9.153		A pre-construction confirmatory survey for frog will be undertaken prior to works commencing during the breeding season (February and March) at potential suitable breeding habitat (ditches, drains, and standing water impacted).
9.154		When surveying for the species biosecurity measures will be followed to ensure that there is no incidental spread of vector borne diseases between waterbodies. This includes the cleaning, disinfection and drying of all equipment and will have regard to guidelines from IFI.
9.155		Should frog be recorded, translocation of the species to areas outside of the proposed development footprint will be undertaken, in consultation with the NPWS. Any translocation of these species will be under license by the NPWS.
9.156		Any spawn or adult frogs recorded will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat that will not be impacted.
Chapter 10 Air		
	Construction	**Construction dust emission**
10.1		Best practice mitigation measures adapted from the IAQM guidance are presented below. In line with IAQM construction dust guidance, providing adequate dust mitigation measures are implemented onsite, all of which are common practice on all well managed construction sites across the country, then impacts can be adequately controlled to the extent that any effect is Not Significant.
10.2	**Construction**	The potential dust risk of dust soiling effects is comparatively higher, therefore specific mitigation measures have been recommended. These measures will be presented as draft in the proposed development's CEMP. The dust and emission control methods presented below will be implemented as agreed with the local authority and implemented effectively throughout the construction period.
		Standard Mitigation applicable to all areas (for low to medium risk)
		Communication and Site Management

Reference	Phase	Mitigation and Monitoring
10.3		• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Information will be shared with the local community and how their feedback will be incorporated into the project's air quality management plans. This will include public meetings, regular updates, and accessible reporting of air quality data.
10.4		• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This will be the environment manager / engineer or the site manager.
10.5		• Display the head or regional office contact information.
10.6		• Develop and implement a dust management plan (DMP), which will include measures to control other emissions, approved by the Local Authority.
10.7		• Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken.
10.8		• Make a complaint log available to the planning authority, when requested.
10.9		• Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book.
		Monitoring
10.10		• Carry out regular site inspections, record inspection results and make an inspection log available to the planning authority, when requested.
10.11		• Increase frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
10.12		• Undertake daily onsite and offsite inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked.
10.13		• Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
		Preparing and maintaining the site
10.14		• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
10.15		• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
10.16		• Avoid site runoff of water or mud.
10.17	**Construction**	• Keep site fencing and barriers clean using wet methods.
10.18		• Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
10.19		• Cover, seed or fence stockpiles to prevent wind whipping.

Reference	Phase	Mitigation and Monitoring
		Operations vehicles / machinery and sustainable travel:
10.20		• Ensure all vehicles switch off engines when stationary – no idling vehicles.
10.21		• Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment, where practicable
		Operations
10.22		• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
10.23		• Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water, where possible and appropriate.
		Specific mitigation applicable to trackout (with high risk)
10.24		• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
10.25		• Avoid dry sweeping of large areas.
10.26		• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
Chapter 11 Climate Resilience		
11.1	**Operation**	The operational phase will include inspection and monitoring of the ground and foundations, taking a proactive approach to repair.
11.2		The operational phase of design will consider monitoring of asphalt surface during drought conditions to ensure a proactive approach to maintenance activities.
11.3		In order to ensure that there is no internal property flooding for a storm with a 1 in 100 year return period, a +20% allowance for climate change to be included in the detailed drainage design.
11.4		Application of a concrete sealer to be incorporated as required as part of the detailed design in order to protect the concrete surfaces from water penetration and reduce the risk of erosion.
11.5		Ground stability under future climate conditions to be addressed during detailed design to avoid effects on foundations.
11.6		The planting specification within detailed design to consider choosing native plant species that can withstand increasing temperatures and reduced rainfall conditions, so as to prevent species failure and enhance resilience.
11.7		Detailed design to consider utilisation of materials with higher temperature thresholds for key or critical assets.
11.8		Detailed design to include consideration of wind speeds to design structures resilient to wind loads that account for future climate change.
Chapter 12 Climate Carbon		
	Construction	
12.1		It is recommended that emissions reduction measures are put in place as part of the proposed development throughout the design stage and onwards, leveraging the ability to effect change to achieve GHG emissions reduction over time. GHG reduction is articulated within the

Reference	Phase	Mitigation and Monitoring
		Construction Environmental Management Plan, the Traffic Management Plan and the Construction Resource Waste Management Plan, as well as operational management plans as recommended below:
12.2		Develop construction works in accordance with the best practicable means, to reduce fumes or emissions that could result in additional GHG emissions. For example:
12.3		• Use of renewable electricity where practical, such as solar-power to construction lighting or construction cabins;
12.4	**Construction**	• Vehicles and plant with low exhaust emissions will be used and will be serviced regularly
12.5		• Substitute machinery fuels by low-carbon fuels when possible (for example use of alternative fuels such as HVO for construction vehicles);
12.6		• Implement regular maintenance of construction equipment to ensure it is running efficiently;
12.7		• Engines will not be left running unnecessarily;
12.8		• Vehicles will be monitored entering the site for noticeable exhaust emissions and site security personnel will have the power to ban offending vehicles from the site;
12.9		• Material transport associated with the project will be assessed in order to reduce associated carbon expenditure (i.e. choosing local suppliers or more sustainable transport options); and
12.10		• The Contractor will engage the supply chain to reduce the number of vehicle movements relating to site material.
12.11		Implementation of energy efficiency strategies. For example:
12.12		• Use of more efficient construction cabins (with insulation, renewable energy generation, low-energy lighting etc.); and
12.13		• Incorporate energy efficiency into the operation of the proposed development (using motion-activated low-energy lighting, building management systems where appropriate).
12.14		Introduce low-carbon technology and process in design, construction and maintenance of the proposed development. For example:
12.15		• Design with carbon footprint of construction materials in mind, using low-carbon concretes and stell with high recycled content where structurally appropriate;
12.16		• Consider maintenance processes within the design, for example choosing materials with longer durability or reduced maintenance requirements;
12.17		Minimise transport and travel demand during construction by having a travel management plan for site personnel to encourage car-sharing, active travel, use of buses, and prioritise electric vehicles;
12.18		Minimise waste generation and implement circular economy processes, avoiding landfilling and waste incineration;
12.19		Periodically monitor and control the GIS to avoid SF6 leaks; and
12.20		Seek eco-efficient alternatives to SF6 these may include dry air, or other products such as G3 (Green Gas for Grid), C4 gas, 3M Novec 4710.

Reference	Phase	Mitigation and Monitoring
13.1	**Construction**	The majority of construction activity that generates noise is expected to be undertaken within daytime working hours. Where it is required that noise-emitting activities are undertaken at night, prior notification should be given to the occupiers of nearby dwellings and approved by Local Authority. A Construction Environmental Management Plan (CEMP) that includes noise and vibration mitigation is recommended during the construction phase.
13.2		The impact of noise and vibration on nearby sensitive receptors within the vicinity of the proposed development will be controlled by implementation of the principal of Best Practicable Means (BPM). This can be achieved by undertaking construction activities in accordance with good practice set out in BS 5228 Parts 1 and 2. The preferred approach for controlling construction noise is to reduce noise levels at source where possible but with due regard to practicality.
		Typical means by which noise and vibration may be minimised include the following:
13.3		● prioritise the selection of quieter equipment and working methods;
13.4		● ensure equipment is maintained, in good working order, and is used in accordance with the manufacturer's instructions;
13.5		● members of the construction team will be advised during toolbox briefings on quiet working methods;
13.6		● equipment shall not be left running unnecessarily;
13.7		● equipment shall be fitted with silencers or mufflers where possible;
13.8		● the use of enclosures of temporary screens around static plant whenever feasible;
13.9		● materials shall be lowered instead of being dropped from height;
13.10		● inform nearby sensitive receptors in advance of construction activities and keep them up to date with progress and any changes;
13.11		● give nearby sensitive receptors a point of contact from the contractor; the contact will liaise with residents and maintain good communication between nearby residents and the contractor;
13.12		● manage deliveries to prevent queuing of site traffic at access points;
13.13		● use of adjustable or directional audible vehicle-reversing alarms and/or alternative warning systems (e.g. white noise alarms); and
13.14		● utilising low vibration working methods.
13.15		Good public relations are invaluable in securing public acceptance of construction noise. People are more tolerant of noise if they understand the reason behind it, the likely duration, start and completion dates, and mitigation measures used to minimise noise levels. Letter box drops explaining these will be undertaken. A dedicated site contact will be nominated to liaise with residents and establish good rapport. A complaint handling procedure will also be put in place.
13.16	**Operation**	No specific mitigation measures and monitoring measures are proposed for the mitigation of operational noise impacts at off-site sensitive receptors. However, noise levels within the site should be minimised (such as keeping access hatches closed and switching off equipment when not in use), to minimise the exposure site personnel to noise from operational plant.

Reference	Phase	Mitigation and Monitoring
13.17		Long-term monitoring will be undertaken for a period of at least 12 months from the commencement of site operations and again following any subsequent substantive change in site operations. After 12 months. the need for long-term monitoring will be reviewed with the relevant authority
13.18		Short-term attended noise measurements will be taken at or near to the NSLs identified in this chapter. Measurements will be taken and reported in accordance with the guidance provided in NG4. Short-term measurements will take place at the commencement of site operations and again following any subsequent substantive change in site operations. They will then be repeated no less than once a year.
Chapter 14 The landscape		
14.1	**General**	The location of the GIS Substations is at +20 m OD and adjacent to the main turbine halls of the adjacent STEP Power Plant. This low position was deliberately selected during the design phase to avail of the screening effect of the elevated terrain (+25 m OD) between the residences along Coast Road L-1010 (VP7, VP8, VP9, VP10 and VP13). This mitigates the visual impact of the GIS Substations on these residences. The benefit of this mitigation is clearly visible from (VP7, VP8, VP9, VP10 and VP13). Additionally, the proposed colour scheme of the façade of the GIS Substations has been selected to match that of the adjacent STEP Power Plant so that the two developments are visually coherent. The STEP Power Plant colour scheme was selected based on the constructed ESB substation near Kilmorna, Co. Kerry, which successfully helped the integration of the built structures into the surrounding landscape in close and distant views, including designated scenic views across the River Feale valley.
14.2		Additional embedded mitigation is indicated on the Landscape Plan in Appendix 14.3. It includes a proposed vegetation strip along the field boundary to the southeast of the proposed GIS Substations, and a proposed hedgerow to the southwest and northwest. No planting is proposed to the northeast as that would be the location of the adjoining BESS of the adjacent STEP Power Plant . The embedded mitigation will help the proposed GIS Substations to 'bed into' the receiving landscape. The proposed vegetation strip will be visible and noticeable from locations to the south of the proposed GIS Substations and will help screen the proposed GIS Substations (VP8).
Chapter 15 Archaeology, Architectural and Cultural Heritage		
15.1	**Construction**	SLNG will be responsible for the mitigation and monitoring of the proposed development, and all other mitigation relating to the overlapping cultural heritage assets will fall to the various agencies involved in the project design for each of these projects. It is beyond the scope of this study to propose mitigation for schemes where mitigation is already consented or included in 'live' planning application.
15.2		The mitigation proposed is in accordance with the Department's (1999) Framework and Principles for the Protection of the Archaeological Heritage, from which the Kerry County Council policies and objectives for the protection of archaeological heritage are derived.
	Construction	In terms of mitigation, general principles are proposed which include the following:
15.3		• A full archaeological mitigation strategy to be agreed in consultation with both the Kerry County Council Archaeologist and the NMS post-consent and in advance of any on-site works taking place. Sufficient time will be allowed in programme to undertake early advance works already agreed through consultation with NMS, and the results of any advance works will further inform archaeological mitigation required for the proposed development.

Reference	Phase	Mitigation and Monitoring			
15.4		• All/any greenfield portions of the proposed development where previously unidentified sites or potential archaeological sites have been noted will be subject to advance works geophysical survey (where suitable, and not precluded by the presence of overhead power lines, etc).			
15.5		• All/any greenfield/offline portions of the proposed development that have not been previously subject to archaeological testing will be tested by a suitably qualified archaeologist in consultation with the Kerry Co. Council Archaeologist and under licence from the NMS in compliance with the relevant legislation, policy and guidelines. The results of this work will inform further archaeological mitigation where/if required, the scope of which will be agreed in advance with the Kerry County Council Archaeologist and in consultation with the NMS.			
15.6		• Townland boundaries within the proposed development area to be subject to townland boundary surveys, including archaeological testing of same, under licence by a suitably qualified archaeologist, in consultation with the Kerry Co. Council Archaeologist and NMS. The results of this work will inform the requirement for further archaeological mitigation where necessary.			
15.7		• Architectural heritage surveys of all extant vernacular buildings/structures to be directly or potential directly impacted by the proposed development to be subject to Built Heritage Surveys in accordance with relevant guidance, and in consultation with the Kerry Co. Council Archaeologist.			
15.7		• That archaeological monitoring confined to areas where advance archaeological works were not feasible will be undertaken by a suitably qualified archaeologist during construction.			
15.8		• That the results of all archaeological works associated with the proposed development be disseminated both locally (through local lectures) and to the wider public through publications. These measures will be used to offset the overall Significance of Effect of the proposed development on cultural heritage.			
	Site specific mitigation measures:				
	CH Receptor No.	**Site Type**	**Townland**	**Mitigation Type**	**Mitigation Details**
15.9	CH001	2 Buildings - including 1 ruin (site of)	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing, depending on the nature of results of survey.
15.10	CH002	Building	Farranawana	Preservation by record	Geophysical Survey followed by archaeological testing, depending on the nature of results of survey.
15.11	CH048	Townland boundary	Kilpaddoge	Preservation by record	Once the construction area is cleared of vegetation in this area a full topographic survey and townland boundary survey will be undertaken to see if anything of a physical boundary survives, with advance works testing to ascertain same. Further mitigation may be required thereafter, depending on the results of surveys and inspection.
15.12	CH049	Townland boundary	Kilpaddoge	Preservation by record	Advance works townland boundary survey and archaeological testing to ascertain the nature and potential age of the boundary feature within the CPO extents.

Reference	Phase	Mitigation and Monitoring			
					Further archaeological works such as resolution and/or monitoring may also be required.
15.13	CH051	Parallel field boundaries	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of these boundaries survive in situ. Further archaeological works may be required pending the results of testing.
15.14	CH052	Limekiln disused	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything of the sub-surface remains of the kiln survive below present ground level. Depending on the results of that work, further archaeological mitigation may be required either to resolve, monitor during construction or preserve in situ.
15.15	CH053	Laneway entrance to limekiln	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of this laneway and early field boundary survive within the PAB boundary. Depending on the results of that work, further archaeological mitigation may be required to either resolve, monitor during construction or preserve in situ.
15.16	CH054	Lime kiln disused	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what - if anything, of the sub-surface remains of this kiln survive. Further archaeological works may be required pending the results of testing.
15.17	CH055	Quarry	Kilpaddoge	Preservation by record	Advance works archaeological testing to see what, if any evdence of archaeological activity associated with the quarry or earlier prehistoric features in this area survive sub-surface below present ground level. Further mitigation may be required pending the outcome of testing.
15.18	CH072	Laneway	Kilpaddoge	Preservation by record	Given the potential for this feature to be earlier than 19th century in date, or possibly earlier, a full written and photographic description will be made, followed by advance works archaeological testing to ascertain the nature and date of the feature and its flanking banks at the northern limit of the scheme. Further mitigation may be required pending the results of the advance works testing.
15.19	CH82	Curvilinear feature from aerial imagery	Kilpaddoge	Avoidance	Advance works geophysical survey of the field within which the anomaly occurs, followed by advance works archaeological testing to ascertain what, if any evidence of archaeological activity associated with the quarry or earlier prehistoric features in this area survive sub-surface below present ground level. Further mitigation may be required pending the outcome of testing
15.20	CH105	Ringfort - rath	Kilpaddoge	Avoidance and offsetting	As a precaution, the location of CH105 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact occurs during construction. The temporary impact on setting during construction may be offset by screening which should be reversible post-construction.

Reference	Phase		Mitigation and Monitoring		
12.3	CH106	Souterrain	Kilpaddoge	Avoidance	As a precaution, the location of CH106 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact occurs during construction. Consultation with NMS to discuss the engineering requirements for vibration monitoring at this Recorded Monument as management for indirect effects.
12.4	CH107	Ringfort - rath	Kilpaddoge	Avoidance and Offsetting	As a precaution, the location of CH107 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. The temporary impact on setting during construction can be offset via public presentations, lectures and dissemination of information on the cultural heritage aspects of this project post-construction.
12.5	CH108	Ringfort - rath	Kilpaddoge	Avoidance and Offsetting	As a precaution the location of CH108 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. Any potential temporary impact on setting during construction can be offset via public presentations, lectures and dissemination of information on the cultural heritage aspects of this project post-construction.
12.6	CH109	Souterrain	Kilpaddoge	Avoidance	As a precaution the location of CH109 should be noted in the CEMP to ensure that all construction workers are aware of the location and importance of this monument and to ensure that no impact (accidental or otherwise) occurs during construction. Consultation with NMS to discuss the conservation engineering requirements for vibration monitoring at this Recorded Monument as management for indirect effects.
12.7	CH133	Area of Archaeological Potential	Coolnanoonagh/Kilpaddoge	Preservation by record	Archaeological testing, depending on the nature of results of advance works further archaeological mitigation may be required in consultation and agreement with the NMS and Local Authority Archaeologist.
12.8	CH138	LiDAR anomaly	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing and/or excavation, depending on the nature of results of survey.
12.9	CH139	LiDAR anomaly	Kilpaddoge	Preservation by record	Geophysical Survey followed by archaeological testing and/or excavation, depending on the nature of results of survey.
12.10					
12.11					
12.12	**Construction**		**Built Services**		
12.13			Prior to construction, confirmatory surveys will be conducted to identify and reconfirm the location of all utility infrastructure within the works areas and if required, utilities will be relocated.		

Reference	Phase	Mitigation and Monitoring
12.14		**Utilities**
12.15		Although it has been determined that the effects identified during the assessment on the existing utilities network in the study area will likely be Not Significant or Imperceptible during the construction phase, the following best practice measures will be implemented by the Contractor during the construction phase:
12.16		• A CEMP has been prepared and is presented within the application documentation. This will be finalised by the Contractor prior to the start of construction.
12.17		• As with any excavations there is a potential to disrupt local underground services. A confirmatory survey of all existing services will be carried out prior to construction to identify the precise locations of any services.
12.18		• The Contractor will be obliged to put measures in place during the construction phase to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant service provider and local authority. When service suspensions are required during the construction phase, reasonable prior notice will be given to the residents in the area. The disruption to services or outages will be carefully planned so the duration is minimised. The timing of local domestic connections will be addressed between the Contractor and the local community at the detailed design stage.
12.19		• All potential temporary connections will be agreed in advance with the relevant service provider.
12.20		• All utilities work shall be carried out in accordance with the relevant requirements of the respective service providers / authorities (i.e., ESB, GNI, Eirgrid, Virgin Media and any others of relevance). These works will be carried out in a manner that is safe, and which avoids or minimises interruptions of service which might affect local residents and businesses and adjacent development.
12.21		• Works during the construction phase, including service diversions and realignment will be carried out in accordance with relevant guidance documents, including GNI's publication 'Safety advice for working in the vicinity of natural gas pipelines'; the ESB's 'Code of Practice for Avoiding Danger from Overhead Electricity Lines', and the Health and Safety Authorities (HSA) 'Code of Practice for Avoiding Danger from Underground Services'.
16.8		All new infrastructure will be installed in accordance with best practice, applicable standards, guidelines and codes of practice.
16.9		The Proposed Development will incorporate water efficiency measures such as collection of grey water to minimise water consumption as far as possible.
16.10		Prior to the operational phase of the proposed development, utilities infrastructure connections will be tested regularly by a suitably qualified person using an appropriate methodology, approved by the relevant service provider, and under the supervision of the local authority.
16.11		The water supply will be tested to the satisfaction of the local authority and Uisce Éireann prior to the connection to the public potable water.
16.12		Potable water during the operational phase will be regulated and monitored under the Industrial Emissions licence for the STEP Power Plant.
16.13		Routine maintenance will be carried out in accordance with the maintenance procedures provided by the Contractor and manufacturer.
		Waste Management
16.14		A Construction Resource Waste Management Plan (as part of the Construction and Environmental Management Plan (CEMP)) is included with the application documentation. Waste arisings will be handled, stored, managed and re-used or recycled as close as practicable to the

Reference	Phase	Mitigation and Monitoring
		point of origin. The closest landfill facility is located in Tralee, Co. Kerry (North Kerry Landfill Site). There is a waste and recycling centre at Ballyhahill, Co. Limerick.
16.15		All operations will be managed and programmed in such a manner as to prevent/minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery).
16.16		Wastes will be sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery / disposal in accordance with the Waste Management Act 1996 and associated amendments and regulations and in a manner which will not adversely affect the environment. All employees will be made aware of their obligations under the CEMP and CRWMP.
16.17		The CEMP and CRWMP will be available for inspection at all reasonable times for examination by the Local Authority.
16.18		The portable chemical toilets provided for the duration of construction works and all waste material will be removed from site and disposed of to an appropriately licensed facility.
16.19		Excavated material from ground preparation works will be either reused onsite if suitable or otherwise disposed of offsite at a suitably licenced facility.
16.20		Any excess spoil material will be removed from site by a dumper or suitable lorry and will be treated if required before being disposed of appropriately in a licensed facility.
16.21		All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the Waste Management Acts 1996, as amended.
16.22		Waste will be managed in accordance with the Waste Management Hierarchy and Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA, 2020) and the Waste Management Act 1996, as amended and associated Regulations.
16.23		Wastes sent offsite for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment.
16.24		The Contractor will be obliged to aim for an overall recycling rate of 70% of construction and demolition waste, in accordance with EU targets under the Waste Framework Directive (2008/98/EC).
16.25		All employees will be made aware of their obligations under the CEMP. The CEMP will be available for inspection at all reasonable times for examination by the Local Authorities.
	Operation	**Built Services**
16.26		Service disruptions will be kept to a minimum, only occurring where unavoidable. Should any works be required along the underground cable route, prior notification of disruptions will be given to all those affected. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions
		Waste Management
16.27		All waste generated during the operational phase will be managed in accordance with the relevant provisions of the Waste Management Act 1996 and associated amendments and regulations, particularly with regard to the use of appropriately permitted waste contractors and

Reference	Phase	Mitigation and Monitoring
		appropriately authorised destinations for waste materials. Waste generated by staff during the operational phase is considered to be minimal.
Chapter 17 Roads and Traffic		
17.1	**Construction**	The temporary effects of construction, regardless of the assessed level of significance, will be mitigated through adoption of a regulated and approved Construction Traffic Management Plan (CTMP).
17.2		The general purpose of a CTMP is optimise the efficiency and safety of all traffic activities generated by the proposed development and thus maintain suitable amenity and safety for local communities and other roads users.
17.3		A summary of key CTMP mitigation elements follow and the CTMP is provided in full form in the CEMP which is included in the application documentation:
17.4		• The appointed contractor will agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with Kerry County Council, the appointed contractor, TII and/or their Agents and An Garda Síochána as appropriate.
17.5		• The CTMP has been developed for the purposes of this assessment and will be further developed as necessary in consultation with Kerry County Council and the Gardai prior to construction commencing. The CTMP will document measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption which might impact negatively on local communities or general traffic and in particular the emergency services. The CTMP is a ‘live’ document and will be developed accordingly, within the parameters assessed in this EIAR.
17.6		• During the construction phase, signage will be installed to warn road and recreational route users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic.
17.7		• Construction traffic timing will be agreed with KCC in advance to avoid coinciding with the peak time associated with Tarbert Comprehensive School.
17.8		• Car sharing will be promoted to construction personnel by the contractor during the induction process.
17.9		• The appointed contractor will employ a number of sub-contractors, and all will fall under the umbrella of the CTMP and will have an obligation to adhere to the Plan; this obligation will form part of the procurement process and will be written into any contract of employment.
17.10		• Compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures set out in the CTMP and recording of any complaints. The appointed contractor will be required to stipulate that all contractors disseminate these rules to their sub-contractors.
17.11		• In liaison with ESBN, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This will include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic.
17.12		• The appointed contractor will nominate a person to be responsible for the co-ordination of all elements of Roads and Traffic during the construction process (Liaison Officer). This person will liaise with the local community so that the community has a direct point of

Reference	Phase	Mitigation and Monitoring
		contact within the developer organisation who they could contact for information purposes or to discuss matters pertaining to traffic management or site operation.
17.13		• If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.
17.14		• Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on traffic are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in this EIAR.
Construction Traffic Management Plan (CMTP)		
	Construction	**General**
17.15		Road sections in the study area have been reviewed with the principal aim being to minimise potential disruption to local communities, and general traffic. There are a range of traffic management measures proposed to minimise potentially disruptive impacts associated with construction works and construction traffic. These measures are hereafter described.
		Time Control
17.16		Construction working hours will be conditionally defined through planning agreement or road opening license. Normal working hours are expected to be Monday to Friday 07:30 to 18:00 and 08.00 to 14.00 on Saturday and no works will take place on Sundays or Bank Holidays Construction will occur during normal construction working hours.
17.17		Construction traffic times will be agreed with KCC in advance to avoid coinciding with the peak time associated with Tarbert Comprehensive School. i.e. Construction personnel traffic will be avoided between 08:30 and 09:15.
17.18		No HGV traffic will be allowed pass the existing school on the L-1010 at Tarbert for 20 minutes before and 10 minutes after the opening and closing times of the school. The elimination of passing HGV traffic during these time periods will ensure the continued safe delivery and collection of children at the school.
17.19		In instances where extended hours / days are required works will only be undertaken with prior agreement with the relevant statutory authority.
17.20		The appointed contractor will plan and manage construction works activities to minimise potential disruption on the surrounding road network and any other detrimental impact to the local community.
17.21		The appointed contractor will liaise with KCC upon finalisation of the construction programme to ensure (as far as is reasonably practicable) that no conflict with planned road works in the vicinity of any construction works occurs so as not to impact motorists further.
17.22		Deliveries will be scheduled, as far as is reasonably practicable, to avoid network peak hours and passing by schools around typical drop-off and pick-up times. Where practically achievable, diversion routes will not apply outside of the compound’s hours of operation.
17.23		Accordingly, the appointed contractor will discuss and agree with KCC on times to be avoided at schools and other community receptors at peak periods of the construction programme to minimise disruption.

Reference	Phase	Mitigation and Monitoring
17.24		The appointed contractor will liaise with KCC regarding local events dates and seek to avoid traversing affected route sections at agreed times.
		Transportation Protocol
17.25		All Contractors will adhere to the agreed CTMP and any relevant conditions of approval imposed by KCC.
17.26		All construction vehicles associated with the proposed development will:
17.27		● display a unique identification number shown on a plate clearly visible.
17.28		● be securely sealed.
17.29		● record origin, destination, and route of the vehicle.
17.30		● display and ensure vehicle identifications including registration plates are clearly visible.
17.31		Drivers of all construction vehicles will:
17.32		● access their destination worksite via an approved route; this is to be determined by the approved Contractor in conjunction with the administering local authority.
17.33		● observe speed limits.
17.34		● drive in a safe and courteous manner with due care and consideration for other road users both vehicular and pedestrians.
17.35		● adhere to the hours of operation detailed by the TMP.
17.36		● not deliberately wait or stack on any public road.
17.37		The appointed Contractor will maintain a management system whereby the following records are retained and made available on request to KCC:
17.38		● the number of vehicles arriving and leaving their destination.
17.39		● all complaints received regarding transport and resultant action taken.
17.40		● all instances where a protocol has been breached and resultant action taken.
17.41		The Client will supply the following information to KCC, which will be treated in confidence:
17.42		● action to be taken when a protocol is breached; and
17.43		● a log of vehicle movements.
		Road Cleaning/Sweeping
17.44		To reduce the potential for debris being deposited onto the local road network in the road sections/compound areas, the appointed contractor will ensure that public roads and footways are cleaned and swept during and after the works. This cleansing regime will minimise the amount of deleterious material deposited on the road surface. The appointed contractor will ensure that the nearest public road will be kept clear of debris by monitoring and then utilising a road sweeper where necessary.

Reference	Phase	Mitigation and Monitoring
		Speed Restrictions
17.45		All construction workers, including contractor managed HGV drivers, will be briefed on the absolute requirement to adhere to posted speed limits on public roads through induction sessions and through regular briefings (toolbox talks). Other parties responsible for site deliveries will also be instructed per the requirement for compliance with posted speed limits on all roads.
17.46		Speed limits posted within compounds will be considered mandatory and, therefore will be complied with.
		Temporary Signage
17.47		During the construction phase, signage will be installed to warn road users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic.
17.48		General information signage will be installed to inform road users and local communities of the nature and location of the works, including contact details should they require additional information.
17.49		Temporary signage arrangements will be formally agreed with KCC prior to installation and commencement of construction. All signing will also be provided in accordance with the Traffic Signs Manual.
17.50		Prior to installation, all signs and devices will be checked to confirm that they are in good condition and meet the following requirements:
17.51		● Items that are bent, broken or have surface damage shall not be used.
17.52		● Items will be free from accumulated dirt, road grime or other contamination.
17.53		● Fluorescent signs which colour has faded to a point where they have lost their daylight impact will be replaced.
17.54		● All sign faces are to be of retro-reflective material and the retro-reflectivity, colours, chromaticity, and luminance factors will be as specified in the Specification TS4 or any further amendments or replacement.
17.55		All signs will be positioned and erected such that:
17.56		● They are properly displayed and securely mounted.
17.57		● They are within the driver’s line of sight.
17.58		● They will not be obscured from view.
17.59		● They will not obscure other devices from the driver’s line of sight.
17.60		● They will not become a possible hazard to workers or vehicles.
17.61		● They will not deflect traffic into an undesirable path.
17.62		● Signs and devices that are erected before they are required shall be covered by a suitable opaque material
		Temporary Traffic Management
17.63		The construction worksite requirements in conjunction with existing road corridor geometry on the L-1010 necessitates that localised lane closures will be required.

Reference	Phase	Mitigation and Monitoring
17.64		Temporary traffic management may include:
17.65		• Single alternate lane operation controlled by temporary traffic signals on two lane single carriageway sections; or
17.66		• Single alternate lane operation manually controlled using stop/go signs.
		Public Transport
17.67		The appointed contractor will discuss with KCC and local bus operators regarding matters that could affect the flow of buses and, will implement reasonable and practically achievable measures to mitigate any disruption to bus services and inconvenience to service users.
		Pedestrian, Cyclist or Equestrian Routes
17.68		Appropriate signage advising of dates and hours of working will be installed on the pedestrian, cyclist, and recreational routes, among others, in advance of road crossing points to warn users of construction traffic.
17.69		The exact details and location of the signage would be agreed with KCC.
		Parking for Vehicles of Construction Workers, Operatives and Visitors
17.70		To avoid detriment associated with obstructive parking, adequate car parking space for permanent construction workers, visitors and deliveries will be provided within the site compound. Car parking will not be permitted on any public road network adjacent to the site to minimise the potential for obstruction and delay for other road users. The requirement for construction workers not to park their private vehicles on public roads will be a mandated and advised to all construction workers prior to commencement of works and reinforced via 'toolbox talks'.
17.71		Vehicle sharing will be promoted to construction workers by the contractor during the induction process.
		CTMP Implementation and Monitoring
		General
17.72		The implementation and monitoring of the CTMP will be the responsibility of the appointed Contractor. Further evolution of this CTMP will be required during the detailed proposed development planning stages and potentially during the construction phase.
17.73		The appointed Contractor may employ several sub-contractors, and in such circumstances sub-contractors' traffic related activities will fall under the requirements of the CTMP and therefore sub-contractor personnel and sub-contractor managed construction vehicle drivers will have an obligation to adhere to the CTMP. This obligation will form part of the procurement process and will be written into any relevant employment or commissioning contract.
17.74		Compliance will be monitored by the Contractor's Project Manager, to ensure that vehicles follow the measures set out in the CTMP and to record any complaints arising.
17.75		Non-compliance with the CTMP will constitute a breach of contract, and action will be taken against the Contractor should repeated non-compliance continue. Details of the proposed monitoring and enforcement regime will be supplied to KCC upon request.
		Responsibilities
17.76		The appointed Contractor will nominate a person responsible for the co-ordination of all elements of traffic and transport, except community liaison during the construction process, a nominated Liaison Officer.

Reference	Phase	Mitigation and Monitoring
17.77		The Client will appoint a Community Liaison Contact. The Community Liaison Contact will be the direct point of contact for the developer organisation with the local community. Accordingly, local residents and business holders can contact the Community Liaison Contact for general information purposes or to discuss specific matters pertaining to traffic management or site operation.
17.78		The Community Liaison Contact will regularly liaise with the nominated Liaison Officer. Contact details for the Liaison Officer and Community Liaison Contact will be made available to relevant parties and more generally to the local community prior to commencement of works on-site.
17.79		The appointed Contractor (or their appointed agent) will review the number of site personnel, traffic numbers, and the construction programme as the proposed development progresses. Any proposed or unplanned substantive changes will be discussed and agreed with KCC as far as is reasonably practicable.
17.80		As necessary, meetings will be held by the appointed Contractor with KCC to discuss the CTMP including any relevant issues raised by the local community.
		Transport Co-ordination
17.81		The appointed Contractor will be responsible for the co-ordination of all elements of HGV transport to and from the worksites. The appointed Contractor (or their appointed agents) will be responsible for co-ordination and liaison with sub-contractors, KCC, TII and emergency services. The Client will be responsible for co-ordination and liaison with the local community.
17.82		The Liaison Officer will inform KCC (or agents thereof) of any important matters that could affect traffic movement by means of reports issued at regular intervals or by day-to-day reports of any substantial, essential changes to transport plans necessitated by circumstances.
		Communication and Consultation
17.83		As set out in Section 4.2, the Client will nominate a Community Liaison Contact to act as a point of contact with the local community. The Community Liaison Contact will be responsible for keeping the local community informed of progress on the site and warning them of upcoming activities which could give rise to increased construction vehicle movements. The Community Liaison Contact will work in tandem with the appointed Contractor’s Liaison Officer.
17.84		The Community Liaison Contact will be able to attend community meetings to provide a report and to be on hand to answer any questions that the local community may have. Contact details will be provided for the Community Liaison Contact (telephone number and email address) and will be made available locally so that members of the public have an opportunity to ask questions and provide feedback.
17.85		The appointed Contractor will utilise local media channels to circulate information regarding traffic management where necessary.
17.86		Signs will be erected on fences surrounding the construction compound to provide contact details of the appointed Contractor’s Project Manager. These contact details will also be provided directly to the emergency services.
		Liaison with Other Developers/Contractors
17.87		It is recognised that the construction phase, associated with the proposed development, could coincide with the construction of other proposed developments, whereby construction related traffic will utilise sections of the same public roads.
17.88		If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed Contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.

Reference	Phase	Mitigation and Monitoring
17.89		Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments (including Transport Infrastructure Ireland, ESB, Eirgrid, Uisce Eireann and KCC) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in the EIAR.
		CTMP Review
17.90		The CTMP, as a ‘live document’, will be reviewed on a regular basis by the appointed Contractor prior to and during the construction phase of the proposed development and will be developed accordingly within the parameters assessed in the EIAR. The CTMP will be subject to change during the proposed development’s evolution which will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation, which in some cases changes may require approval by KCC.