Celtic Interconnector

Feasibility Study - Converter Station Site & Route Identification in Ireland



Co-financed by the European Union
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Executive Summary

The two national Transmission System Operators, EirGrid in Ireland and its French counterpart, RTE (Réseau de Transport d'Electricité), have signed a Memorandum of Understanding (MoU) to commission studies on the feasibility of building a high voltage direct current (HVDC) electricity interconnector between Ireland and France, known as the Celtic Interconnector.

The Celtic Interconnector, if developed, would involve the construction of approximately 600 km of underground and submarine cable with a capacity up to 700 Megawatts (MW), linking the electricity supply systems of the two countries.

The scope of this study is to perform a desktop appraisal to determine if there are technically feasible cable routes, converter site locations and options for connection to the transmission grid for the proposed project.

The route options and converter site locations identified in this report are not final and would be subject to a full environmental assessment and consultation process if the project was to proceed in the future. This feasibility study covers, at a strategic level, the aspects of the project onshore and at landfall in Ireland. The main components of the project would include:

- Submarine cables
- Cable landfall
- Underground HVDC cables
- Converter station
- Connection to AC Substation by AC underground cables or overhead lines

The report considers options for converter station locations, AC and DC land circuit routes and landfall suitability for two potential transmission connection points at nodes in East Cork and West Wexford. Feasibility is assessed against a range of criteria including technical, environmental and planning constraints within defined study areas.

The process has identified a number of viable general location area options within each study area for a potential converter station site.

A number of landfall areas have been identified as being feasible for a connection to either West Wexford or East Cork Connection Points.

The option of an underground cable connection from the shore landfall areas to a range of feasible converter station locations is possible for East Cork and West Wexford Connection Points. The converter station location would further influence the selection of a route corridor for a connection to the AC Transmission Grid.

This feasibility study has considered the indicative locations of the different project elements in the context of environmental constraints identified within the study

areas and has confirmed the following for both West Wexford and East Cork Connection Points:

- The availability of a range of feasible options for the various project elements in Ireland, some of which are less constrained, relative to others, with the identified constraints providing a basis from which to commence a further comprehensive and conclusive assessment.
- That feasible options for the routes, locations and sites which constitute the project elements, take into account the constraints identified in the study area.

The report concludes by determining that feasible options for each of the various project elements exist, noting that detailed environmental assessments and studies would still need to be carried out if the project proceeds.

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Glossary

AC	Alternating Current
DC	Direct Current
EIA	Environmental Impact Assessment
EWIC	East West Interconnector
GIS	Geographic Information System (GIS)
HDD	Horizontal Directional Drill
HVDC	High Voltage Direct Current
kV	Kilovolt
MW	Megawatt
NHA	National Heritage Area (NHA)
NPWS	National Park and Wildlife Service
OHL	Overhead Line
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
pNHA	Proposed National Heritage Area
RTE	Réseau de Transport d'Electricité (French Transmission System Operator)
SAC	Special Area of Conservation
SPA	Special Protection Area
TII	Transport Infrastructure Ireland
UAU	Underwater Archaeology Unit
UGC	Underground Cable

Chapter 1

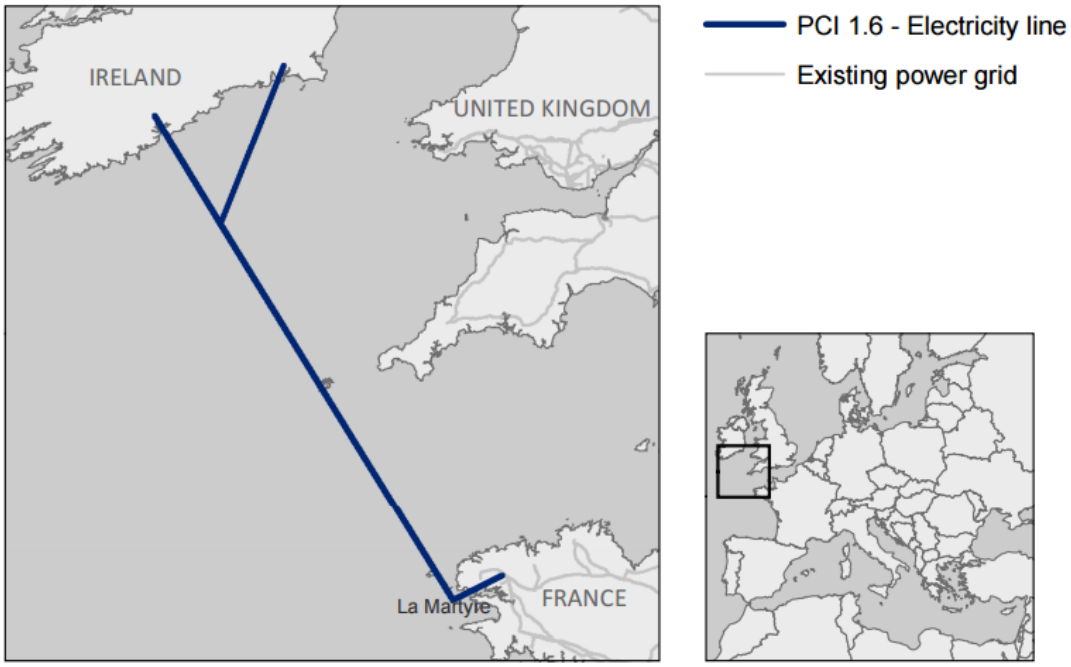
Introduction

1. Introduction

1.1 Project Background

The two national Transmission System Operators, EirGrid in Ireland and its French counterpart, RTE (Réseau de Transport d'Electricité), have signed a Memorandum of Understanding (MoU) to commission studies on the feasibility of building a high voltage direct current (HVDC) electricity interconnector between Ireland and France, known as the Celtic Interconnector.

The Celtic Interconnector would, if developed, run between the south coast of Ireland and the northwest coast of France, and would comprise a marine cable length of approximately 500 km. Figure 1-1 shows an indicative marine cable route corridor between a potential cable landing location in Brittany, in France and two potential landing locations in Ireland.



Source: PLATTS, GISCO, European Commission

Figure 1-1: Indicative Cable Route between Ireland & France

Based on high level analysis, EirGrid and RTE have identified that interconnection between the two countries could be beneficial for electricity customers in Ireland and France. Under the terms of their MoU, the two Transmission System Operators are jointly conducting further feasibility studies, including that of a marine survey, identification of constraints regarding marine route corridors and on aspects of the project on land in Ireland and in France.

EirGrid appointed ESB International to carry out this feasibility study on the approach, landfall and onshore aspects of the project in Ireland covering potential converter station locations, AC and DC circuit routes and shore landfall area locations.

The capacity of the Celtic Interconnector would be approximately 700 megawatts (MW). The Celtic Interconnector is listed as a Project of Common Interest under EU Regulation 347/2013.

Project of Common Interest/Cluster of PCIs	*Description of PCI/s relevant for the country concerned*	*Priority corridor*
1.6. PCI France – Ireland interconnection between La Martyre (FR) and East Cork or West Wexford (IE)	*A new 320 kV – 500 kV (depending on the technology, to be fixed at a later stage) HVDC subsea connection of approximately 600 km and with a capacity of around 700 MW between Ireland and France (offshore).*	*Electricity Northern Seas Offshore Grid (NSOG)*

1.2 Study Overview

EirGrid has carried out high level assessments and identified existing nodes in East Cork and in West Wexford as potential connection points (shown in Figure 1-2) to the electricity transmission system. A HVDC converter station would be located between the submarine cable landing point and the connection point to enable connection to the transmission system.



Figure 1-2: Existing East Cork & West Wexford Substation Locations

The scope of this study is to perform a desktop appraisal to determine if there are technically feasible cable routes, converter site locations and options for connection to the transmission grid for the proposed project.

The route options and converter site locations identified in this report are not final and would be subject to a full environmental assessment and public consultation process if the project was to proceed in the future.

The main components of the Celtic Interconnector in Ireland (including the foreshore) would include:

- Submarine cables
- Cable landfall
- Underground HVDC cables
- Converter station
- Connection to AC Substation by AC underground cables or overhead lines

These elements are schematically illustrated in Figure 1-3.

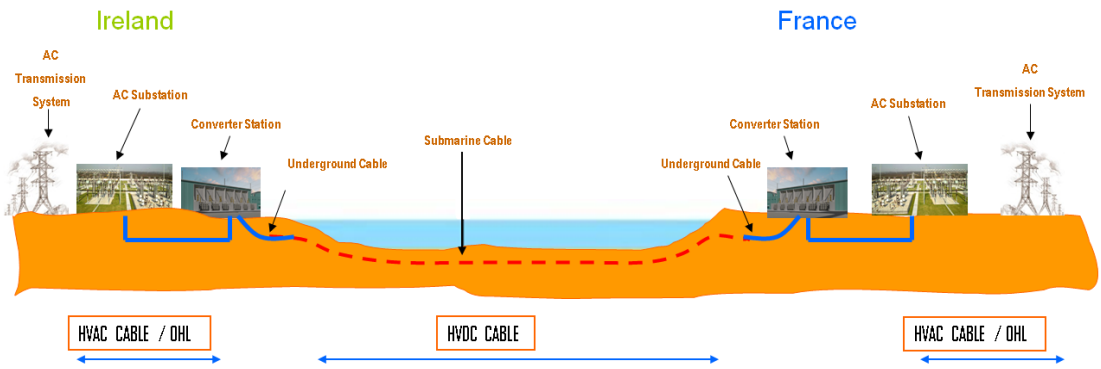


Figure 1-3: Celtic Interconnector Elements

Submarine cables

Submarine HVDC cables would be routed between a landfall on the south coast of Ireland and a landfall in north western France. On the basis that the Celtic Interconnector would be a point to point interconnection and would be arranged as a symmetrical monopole as per the East West Interconnector (EWIC), it is envisaged that two separate submarine cables up to approximately 16 centimetres in diameter, plus a third fibre-optic cable for control and communication purposes would be required. The cables would be placed on or within the seabed between Ireland and France. It is assumed that the cables would be laid close together in a narrow trench to reduce disruption during the construction phase. The length of submarine cable would be approximately 500 km.

Cable landfall
At the landfall, the submarine cables would reach shore and would be connected to onshore HVDC underground cables. Submarine and underground cables would be connected at or near the shore landing area in an underground joint bay.

Underground HVDC cables
An underground HVDC cable would be required to connect the submarine cable at the landfall to the converter station. The exact configuration of the onshore cable would be subject to detailed design analysis.

Converter Station
Transmission grids, including the Irish grid, generally use high-voltage three-phase alternating current (AC). High-voltage direct-current (HVDC) technology is used to transmit power over very long distances of typically hundreds of kilometres. DC circuits transmit power more efficiently over long distances using fewer cables than equivalent AC circuits. The use of DC transmission makes an Ireland – France subsea cable link technically possible.

There would be a requirement to convert the electricity from AC to DC in order to transmit power over the long distance through the submarine cable. The power conversion from AC to DC and vice versa is carried out in a converter station, with high power, high voltage electronic semiconductor valves.

At the converter station, electricity is converted from AC to DC (or vice versa) allowing electricity to be transmitted in bulk from point to point. A converter station comprises of a number of industrial type buildings along with both outdoor and indoor electrical equipment. The main components of the converter stations typically are:

Valve Halls: These contain specialist electrical equipment to convert electricity from AC to DC (or vice versa). The buildings are generally the tallest on site and can typically range from 20 to 25 metres in height. This height may be less for newer converter station designs.

Converter Transformers: These change the voltage of incoming electricity to an appropriate level for conversion within the valve hall. The transformers are normally located outdoors immediately adjacent to the valve halls.

Control Building: This is typically located between the valve halls and includes local control equipment and office and welfare facilities.

Electrical Equipment: This connects the converter station to the AC transmission system and is normally located outdoors.

A converter station requires an industrial type building and outdoor compound with typical approximate dimensions of 300m x 150m and an approximate height of up to 25m.

Substation
The Celtic Interconnector would connect into the existing AC transmission grid. The substation would link into the existing transmission network in Ireland via overhead lines or cables. The substation would contain transformers, switchgear and

associated equipment. The substation into which the Celtic Interconnector would connect could potentially be an extension to an existing substation at 220 kV. This would be subject to further more detailed studies.

1.3 Scope of Report

This report is a feasibility assessment at a strategic level, of the elements of the Celtic Interconnector that would be located onshore in Ireland. The report also considers options for the converter station location for either potential transmission connection points, in East Cork or West Wexford, AC and DC land circuit routes and landfall suitability. Feasibility is assessed against a range of criteria including technical, environmental and planning constraints.

If the project progresses beyond this stage, more detailed studies focusing on environmental and engineering aspects of the project would be required.

This report addresses the following engineering and environmental considerations:

Engineering Considerations

- Strategic project scoping and methodology
- Identification of the main technical and system constraints affecting option selection for the key project elements
- Identification of feasible locations for the HVDC converter station, feasible land routes for the AC and DC circuits and feasible landfalls for the transition to the marine cable.

Environmental Considerations

- High level environmental consideration of the feasible locations for converter station, circuit and landfall options under the following headings:
    - Ecology
    - Cultural Heritage
    - Hydrology and Hydrogeology
    - Soils and Geology
    - Human Beings
    - Landscape and Visual Impact
    - Infrastructure and Utilities

Chapter 2
Scoping & Methodology

2. Scoping & Methodology

2.1. Introduction

The Celtic Interconnector would be a major strategic infrastructure initiative, which would involve the construction of a High Voltage Direct Current (HVDC) interconnector approximately 600 km in length with capacity up to 700 Megawatt (MW) between Ireland and France, linking the electricity supply systems of the two countries. This would be the first such interconnector between Ireland and continental Europe. Based on a high level assessment, two separate study areas have been identified encompassing connection points in East Cork and West Wexford as potential areas for connecting an interconnector from France to the Irish transmission grid, due to their geographical location along the south coast and their relative level of connectivity within the Irish electricity transmission grid.

The report outlines the approach and methodology employed in identifying the study area, constraints and subsequent routes and sites. The identified constraints are shown on the following maps and drawings accompanying this report:

West Wexford Connection Point

High Level Study Area Map	PE424-D8019-001-001-001
Cultural Heritage Map	PE424-D8019-001-002-001
Biodiversity Map	PE424-D8019-001-003-001
Infrastructure and Utilities Map	PE424-D8019-001-004-001
Population Settlement Map	PE424-D8019-001-005-001
Land Use Map	PE424-D8019-001-006-001
Soil and Geology Map	PE424-D8019-001-007-001
Water Map	PE424-D8019-001-008-001

East Cork Connection Point

High Level Study Area Map	PE424-D8019-001-012-001
Cultural Heritage Map	PE424-D8019-001-013-001
Biodiversity Map	PE424-D8019-001-014-001
Infrastructure and Utilities	PE424-D8019-001-015-001
Population Settlement Map	PE424-D8019-001-016-001
Land Use Map	PE424-D8019-001-017-001
Soil and Geology Map	PE424-D8019-001-018-001
Water Map	PE424-D8019-001-019-001

2.2. Overall Project Study Area

Two separate study areas have been considered for connection points in East Cork and West Wexford. The study areas were defined to enable identification of key constraints and feasible options in each case. The study areas were decided upon by considering the locations of the existing substation connection points in East Cork and West Wexford, the extent of coastline which could be considered for feasible landfall area locations for the submarine cable and the directions of approach of cables or lines to feasible converter station sites. The study areas defined for both East Cork and West Wexford Connection Points are shown on the following drawings:

- West Wexford Connection Point High Level Study Area Map PE424-D8019-001-001-001
- East Cork Connection Point High Level Study Area Map PE424-D8019-001-012-001

West Wexford Connection Point

The West Wexford Connection Point study area incorporates parts of Counties Wexford, Waterford and Kilkenny. The study area extends from west of Waterford City to east of Wellingtonbridge in County Wexford. To the north, the study area extends approximately 6 km north of the existing transmission node and extends south to include Brownstown Head and Hook Head.

The western boundary of the study area was essentially determined by the fact that it was deemed appropriate to include the city of Waterford and the seaside town of Tramore in the study area in view of their proximity to the transmission node. The eastern boundary was essentially determined by the need to include a broad range of feasible shore landfall areas for the submarine cable along the stretch of coastline on the eastern side of the Waterford Harbour Estuary.

East Cork Connection Point

The East Cork Connection Point study area extends from west of Cork City to a point to the east of Youghal. To the north, the study area extends approximately 7 km north of the existing transmission node. To the south, the study area extends west to Kinsale and along the coast from Cork Harbour to Youghal. The western boundary of the study area was essentially determined by the fact that it was deemed appropriate to include the city of Cork in the study area in view of its proximity to the transmission node. The eastern boundary was essentially determined by the need to include a broad range of feasible shore landfall areas for the submarine cable along the stretch of coastline on the eastern side of the Cork Harbour.

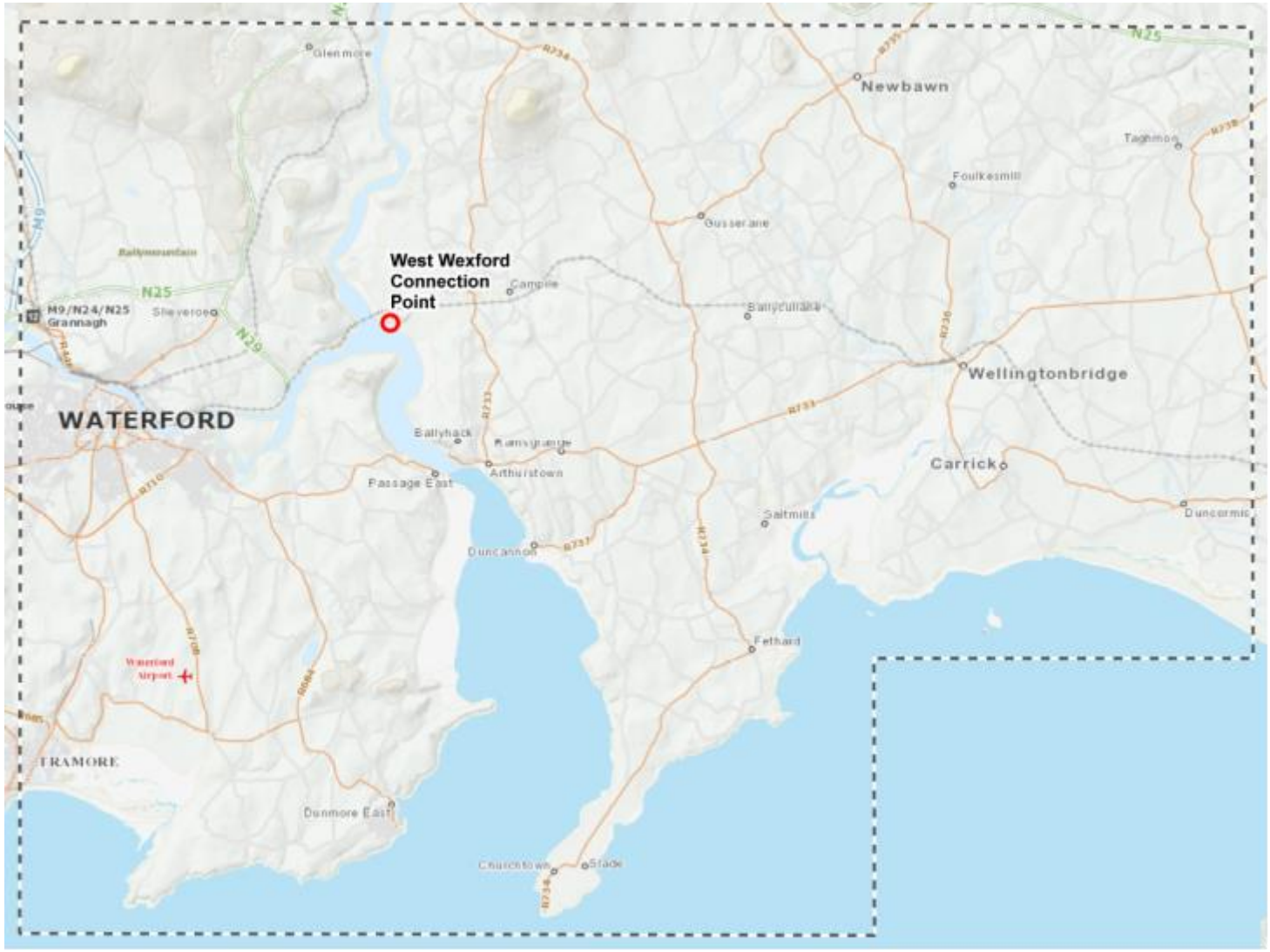


Figure 2-1: West Wexford Connection Point Study Area

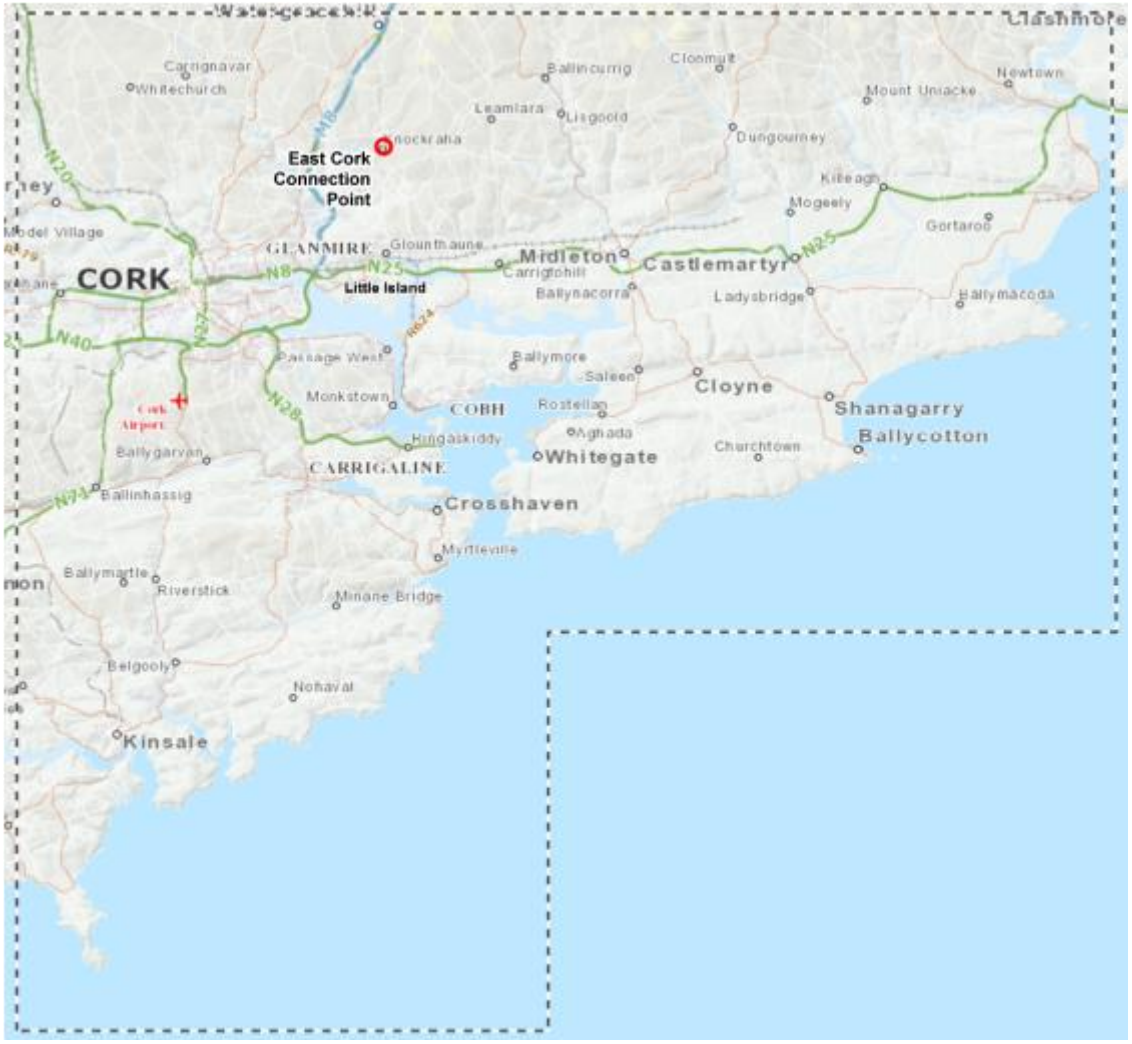


Figure 2-2: East Cork Connection Point Study Area

2.3. Project Concept Options

Different options are available regarding the relative locations of the converter station, AC connection point and shore landing. Two alternative project concepts are set out in Figure 2-3 along with the key options to be considered within the various project elements. The two concepts considered are:

Concept No. 1 Converter Station near or adjacent to Connection Point

Concept No. 2 Converter Station located at a site between Landfall area and Connection Point

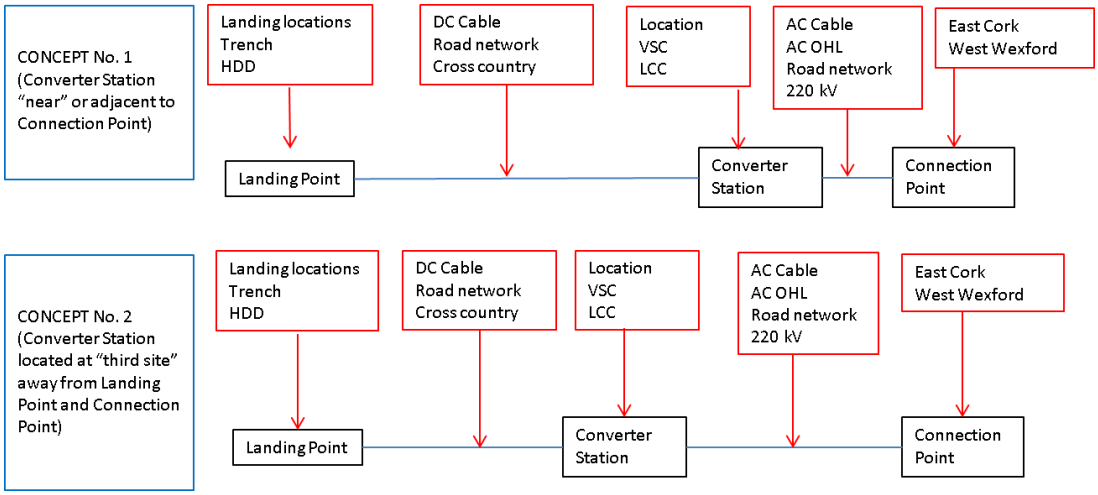


Figure 2-3: Alternative Project Concepts

An evaluation of the alternative project concepts is provided in Table 2-1.

Concept No.	Description	Pros	Cons
1	Converter Station near or adjacent to Connection Point	- Likely to enable co-location of AC connection point and converter station, providing opportunity of development near other established electrical transmission infrastructure - Short AC circuit connections from Converter Station	Suitable sites may not be available
2	Converter Station located at third site away from Landfall area and Connection Point	- If Concept 1 is not feasible, this is likely to provide a range of feasible alternative site options. These are considered in Section 4 of this report. - Suitable site may be available	- Converter station location may have to be in area remote from established infrastructure - Moderately long AC connections from converter station. Reactive compensation may be required due to length of connection, if an underground cable option is brought forward. - More costly AC connection than Concept 1

Table 2-1: Evaluation of Alternative Project Concepts

Although all the project concepts would be considered feasible at this early stage, from a conceptual viewpoint, there would be a technological advantage to locating the converter station closer to the connection point rather than at a point closer to the landfall area. This would enable shorter AC connections between the converter station and the connection point. Additionally, the overall cost of cable from the shore landfall area to the AC connection point (via the converter station) would be lower as only 2 cable cores are required for longer DC section whereas 3 cable cores are required for the AC section.

Consideration has been given to the possibility of using the existing 220 kV network to link possible Converter Station locations to the AC Transmission Grid at the West Wexford and East Cork Connection Points. If it is feasible to connect the Celtic Interconnector into one of these lines, it may avoid the need to construct a new overhead line or underground cable for the AC connection. From a system security perspective however, it is not considered feasible at present to use existing 220 kV overhead lines for the AC connection from the Converter Station to the AC Transmission Grid. Further studies may be undertaken as the project progresses to look at this option again.

2.4. Technical Parameters

The following parameters for the proposed Ireland – France HVDC link have been utilised for the purposes of this study:

Power rating:	700 MW
AC Voltage:	220 kV
DC Voltage:	320 kV
Number of interconnector circuits:	1
DC Configuration (e.g. monopole/bipole):	Symmetrical Monopole
Number of DC submarine cables:	2
Number of DC underground cables:	2
Number of fibre optic cables:	1

2.5. Project Element Options

Submarine cables

The choice of submarine cable technology is outside the scope of this report, but it is currently assumed for this study that it would be similar to that used on the recently completed East West Interconnector (EWIC) project. The findings of this report are not considered sensitive to any significant degree to the type of submarine cable technology chosen. On that project, a 200 kV HVDC XLPE insulated cable was used with separate main and return conductors. Higher voltage levels in the voltage range of 250-320 kV are now possible based on current technology capability and even higher voltage levels for DC cables are likely to be become available in the coming years. The DC voltage defined for the Celtic Interconnector project is 320 kV.

Cable landfall

Location

- Provided a landfall area is acceptable from a technical, social and environmental point of view, in general the cable landfall location is chosen so that the necessary connections to the converter station and the onward connection to the AC transmission grid are kept as short as possible.

Open Trench, Ducted or Horizontal Directional Drill

- At the shore landing, the submarine cable can either be installed in excavated open trenches or pulled into pre-installed ducts on the beach.

Such ducts would be installed either directly by excavation or by horizontal directional drill. Choosing landfall areas that are suitable for any of these installation techniques would be advantageous.

DC connection from Landfall area to Converter Station

DC cable or DC overhead line (OHL)

- The DC connection from the shore landfall area to the converter station can be implemented either by underground cable or overhead line. Underground cables and DC overhead lines would both have their own planning complexities. Planning permission is likely to be required for both OHL and UGC options.
- Unlike AC cables, DC cables can be installed over long distances, so there is no technical necessity to make the DC connection from the landfall area to the converter station by overhead line. DC overhead lines have no length restrictions.
- It is possible to install the DC cables in a compact trench which can be accommodated along a route which generally follows public roads.
- This feasibility study will only consider DC underground cables for the connection from the landfall area to the converter station. DC overhead lines will not be considered for this element of the project.

For DC Cable - Road network or Cross country?

- Current standard practice would be to place the cables in the roadway for the following reasons:
    - Due to the weight of the large cable drums, laying cables in agricultural land would likely result in an increased environmental and agricultural impact.
    - Laying the cables in the road would likely provide for easier installation and maintenance, or repair in the event of a fault.
- On land, the cables would be laid underground in hard plastic ducts placed into specially constructed trenches, typically 0.7 metres wide and 1.2 metres deep. The route of the cables would seek to follow the existing public road network, whilst avoiding urban areas to the greatest extent possible. By pre-installing the cable ducting, traffic disruption would be minimised during the construction stage. Only short lengths of road would therefore be affected by trench digging for the ducts at any one time. A typical ducted cable trench is shown in Figure 2-4, noting that exact dimensions may vary.
- The road can be reinstated once the ducts are installed and connected. The cables would then be pulled through the ducts. Individual sections of cable would be jointed along the route at distances of approximately 750 to 1000m in underground joint pit locations.

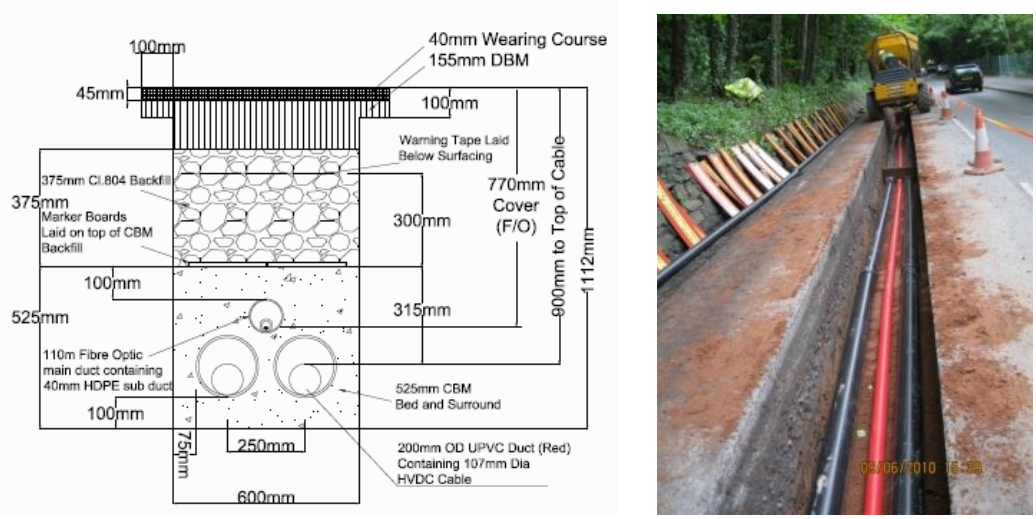


Figure 2-4: Typical Trench for HVDC Underground Cable

Converter station

- At the converter station, electricity is converted from AC to DC (or vice versa) allowing electricity to be transmitted in bulk from point to point. A converter station comprises of a number of industrial type buildings along with outdoor and indoor electrical equipment.
- Voltage Source Converter (VSC) technology was used for the East West Interconnector (EWIC). Initial technological assessments indicate that VSC would be the favoured technology for the converter station given the strength of the network in each area.
- In order to allow sufficient space for the converter station and to allow space for possible landscaping requirements, the following approximate footprint for the converter station compound is assumed, based on other similar projects of this type such as EWIC:
    - 300 m x 150 m
- The converter station would include a building to house the converter valves, switchgear and cooling equipment, ancillary buildings to accommodate a control room, store room, workshop, office and meeting rooms, outdoor high voltage switchgear and ancillary equipment. The maximum height of any new building on site is estimated to be up to approximately 25 metres. The site would also include associated cable bays, with related electrical equipment, to connect the new converter station to the Irish transmission grid.



Figure 2-5: HVDC Converter Station (source: ABB)



Figure 2-6: Outdoor HV Equipment at HVDC Converter Station (source: ABB)



Figure 2-7: Aerial View of EWIC Converter Station adjacent to Woodland (*Source: Google Maps)*

AC connection from Converter Station to AC Transmission Grid Connection Point

AC cable or OHL

- If the converter station is located a long distance from the AC transmission grid connection point, the use of an AC underground cable to transmit the required power may not be technically feasible or may require the installation of reactive compensation due to losses. This would require more detailed investigation at a later stage in the project.
- If the converter station site and the AC transmission grid connection point are close together, then either cable or overhead line could be considered.
- In the case of EWIC, the AC and DC circuits were implemented by underground cables of approximate length 0.5 km in Ireland and 3.2 km in the UK.
- This feasibility study will only consider AC underground cables for the connection from the converter station to the AC Transmission Grid Connection Point and the potential use of the existing overhead grid.

Additional new AC overhead lines will not be considered at this stage for this element of the project, however, a comprehensive study of all connection options would need to be carried out at a later stage in the project.

Road network / Rail network / Cross country

- Cable routes are generally chosen with potential traffic management in mind. Every effort is made to ensure that the knock on effect of construction on traffic flow is minimised. Current Transport Infrastructure Ireland (TII) practice (*Specification for the Reinstatement of Openings in National Roads*, 2013) states that for works to be carried out on motorways, rural dual carriageways and rural 2+1 dual carriageways are to be located in the verge and are not permitted in the carriageway or hard shoulder. For this reason it is considered less feasible to install a cable circuit in roads of this nature.
- The proposed use of disused railways such as Waterford – Rosslare or Cork – Youghal is not considered feasible. The ownership of the disused railways is believed to be still with Iarnród Éireann. The consent of Iarnród Éireann would therefore be required for any route along a disused railway. The installation of a cable route along a railway line would present numerous construction issues such as access for construction vehicles, steep embankments, bridge crossings, road crossings and height restrictions. The ability to monitor and maintain the circuit would be difficult due to the restricted access to a railway line with regards to maintenance vehicles and equipment should a fault arise. The long term operation of the circuit could be compromised if the railway line is reopened or redeveloped.

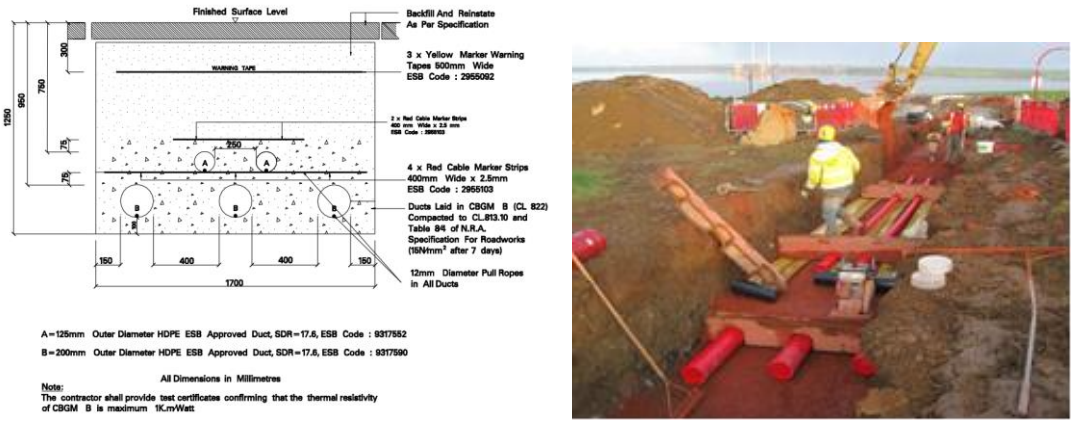


Figure 2-8: Typical Trench for HVAC Underground Cable

Chapter 3

Technical Assessment - Identification of Feasible Cable Landfall areas

3. Identification of Feasible Cable Landfall Areas

3.1. Introduction

A desktop study was undertaken of the feasible landfall areas for the Celtic Interconnector cable with the aim of identifying the least constrained landfall areas for the East Cork and West Wexford Connection Point study areas.

The study utilised Geographic Information Software to compile the following spatial datasets.

- 1:50,000 OSi Discovery mapping
- Major roads/railways
- Environmental designations identified by NPWS - NHA, SAC, SPA, national parks, nature reserves
- National monuments (National Monuments Service)
- Existing high voltage electricity transmission network
- Existing high pressure gas transmission network
- Office of Public Works (OPW) Irish Coast Oblique Imagery
- Digital Elevation Model of Coastline
- Property Registration Authority (PRA) Online Web Service www.landdirect.ie

The spatial datasets were then compiled together within the GIS to assist in the identification of landfall areas. A site visit was then undertaken to investigate the landfall areas identified in the desktop study.

3.2. Requirements for Suitable Cable Landfall areas

The selection of a landfall area for the submarine cable would need to take the following issues into account, not listed in any particular order:

- Offshore conditions (water depth, currents, tide, presence of rock etc.)
- A flat area leading to the water to enable the flotation and burial of the submarine cable is required. Beaches are particularly suitable; cliffs or steep inclines would not be preferable
- Access to beaches by shore-end marine installation equipment
- Availability of a viable land cable route to the landfall area
- Availability of a suitable location near the landfall area to locate a joint bay to connect the land cable to the submarine cable
- Statutory permits and consents including Foreshore Licence

- Environmental considerations
- Construction impact
- Effect on public amenity
- Feasibility of using horizontal directional drilling techniques

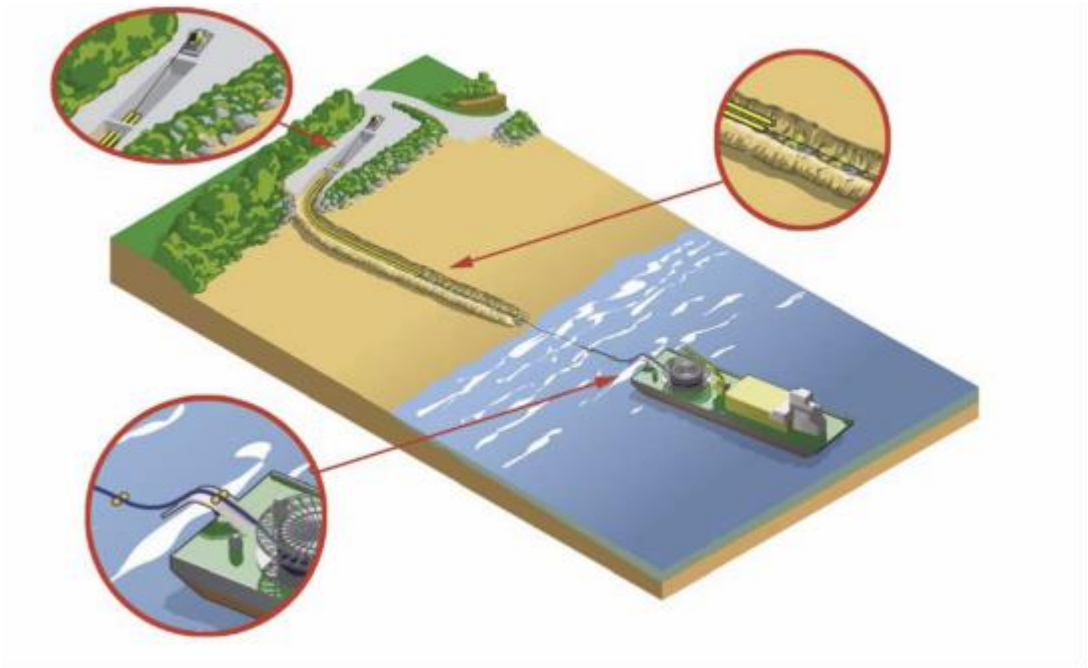


Figure 3-1: Typical Shore Landing Area Arrangement

The typical process to bring the submarine cable ashore would be as follows:

- A transition joint bay to connect the submarine and land cables would be constructed at suitable location above the High Water Mark (HWM). The construction of the transition joint bay would involve an excavation of circa 8m x 2.5m to provide the necessary working area for the joint between submarine and land cable.
- A cable trench, ducts or horizontal directional drill would be excavated from the transition joint bay towards or beyond the Low Water Mark.
- The submarine cable would be fed from the cable laying vessel onto floats and pulled to shore. The cable end would then be connected to a shore based pull-in winch on land, which would pull the cable end ashore as far as the transition joint bay. Any cable trenches would then be backfilled and the beach would be returned to its original condition.
- The submarine cable would be jointed with land cable.

Consideration of offshore issues would also be required in the assessment of the shore landing areas, and such issues should be considered by marine experts.

Among the public bodies and stakeholders that would need to be consulted in relation to the shore landfall area are:

- Local Authorities (i.e. Cork County Council, Waterford County Council and Wexford County Council including their Environment Departments)
- Department of Communications, Climate Action and Environment (DCCAE)
- Sea Fisheries Protection Authority (regulatory), Bord Iascaigh Mhara (promotion of fisheries), Inland Fisheries Ireland, Petroleum Affairs Division, Department of Agriculture, NPWS (National Parks and Wildlife Service), local fishing communities, local marine survey offices, UAU (Underwater Archaeology Unit)

A general consultation with the public and local fishing communities would also be undertaken.

A Foreshore Licence would be required for the landing area.

3.3. Landfall Options - West Wexford Connection Point

A desktop study was undertaken of the West Wexford Connection Point study area to identify feasible landfall areas based on the above considerations. During the evaluation of the West Wexford Connection Point study area, five potential landfall options were identified based on the requirements listed in section 3.2. A site visit was then undertaken to visually inspect each feasible landfall area. The Waterford coastline extending from Tramore to Dunmore East is generally rocky with steep cliffs over a significant portion of the coastline which is not suitable for bringing the submarine cable ashore. The rocky coastline significantly limited the number of feasible landfall areas as the presence of rock is considered a significant constraint with submarine cable landfall.



Figure 3-2: Feasible Landfalls West Wexford Connection Point Study Area

3.3.1. Landfall Option 1 - Rathmoylan Cove



Figure 3-3: Rathmoylan Cove

Rathmoylan Cove is located between Tramore and Dunmore East, approximately 19 km south west of the existing substation. The narrow marine entry to this cove could hamper the pulling ashore of the submarine cable. On the land side, there is road access via a local road to the beach. During construction, a one way traffic system would be required. There is limited space for a transition joint bay and access for heavy construction vehicles is not ideal. Rathmoylan Cove is not located within any environmentally designated sites, however, offshore Hook Head SAC would potentially have to be crossed to access the landing area depending on marine routing options. In conclusion, Rathmoylan Cove is a more constrained landfall area due to the following:

- One way road access for shore end marine installation equipment
- Limited space for transition joint bay
- Construction impact on adjoining landowner
- No non - construction traffic access would be possible to Rathmoylan Cove during construction activities

3.3.2. Landfall Option 2 – Baginbun Beach



Figure 3-4: Baginbun Beach

Baginbun Beach is located approximately 24 km to the south east of the existing substation. The beach area is in private ownership. It is a sandy beach accessed via a steep narrow pathway from a local road. Access to the beach is difficult due to the height difference between the local road and the beach. Significant civil works would be necessary to enable beach access. Baginbun Beach is located within Hook Head Special Area of Conservation (SAC) which would add greatly to the planning complexity. The routing of the marine section of the cable circuit through Hook Head SAC would also have to be assessed for any potential impacts on the conservation interests of the site. Baginbun Beach is a more constrained landfall area due to the following reasons:

- Steep narrow pathway to shore, with limited access for shore-end marine installation equipment. This would have to be upgraded to facilitate the shore end marine installation equipment.
- Horizontal Directional Drill (HDD) would be very challenging due to the difference in ground levels between the road and the beach
- Location within Hook Head SAC

3.3.3. Landfall Option 3 – Fethard Beach



Figure 3-5: Fethard Beach

Fethard Beach is located to the north of the village of Fethard, approximately 22 km to the south east of the existing substation. The beach area is in private ownership. There is a gently sloping beach from the land which would allow a HDD installation. There is an adjoining field which would provide a location to launch a HDD. The adjoining road to the field would provide access for any construction traffic. Although Fethard Beach is an otherwise suitable landfall area, it is located within Bannow Bay SAC and Bannow Bay Special Protection Area (SPA) which would add greatly to the planning complexity. The landing area is also immediately adjacent to Hook Head SAC and any impact to this SAC from the project would have to be assessed at a later stage. Fethard Beach is therefore considered a more constrained landfall area due to the following reasons:

- Location within a Special Protection Area. The Bannow Bay SPA (Site Code 004033) is of international importance for Brent Geese and supports a further twelve species in numbers of national importance. Two species, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the EU Birds Directive 2009/147/EC. More detailed ecological surveys would be required at a later stage if this landing area were to be considered further.
- The approach to the beach appears to be rocky and a marine based survey would be required to verify if a suitable channel exists for the submarine cable. The submarine cable route would also travel through the Hook Head SAC and any potential impacts on the qualifying features of the SAC would have to be assessed at a later stage.

3.3.4. Landfall Option 4 – Bannow Beach



Figure 3-6: Bannow Beach

Bannow Beach is located on the eastern side of Bannow Bay, approximately 30.7 km to the south east of the existing substation. The beach area is in private ownership. Bannow Beach is a sandy beach bounded by rocky outcrops on both sides providing a suitable channel for the submarine cable to come ashore. There appears to be adequate space for a transition joint bay either just off the beach or in an adjoining field. The local road to the beach allows access for shore end marine installation equipment. The local road also provides access to a house approximately 100 m away from the beach; this may necessitate the location of the transition joint bay within the adjoining field. This landfall area is located approximately 0.3 km from Hook Head SAC and the adjoining Bannow Bay SAC and SPA. Any potential impact to the adjoining environmental sites would have to be assessed at a later stage. The possible routing of the submarine cable close to the Keeragh Islands SPA/NHA and any potential impacts would have to be assessed at detailed design stage. Bannow Beach is considered a less constrained landfall area for the following reasons:

- The sandy beach is suitable for bringing the submarine cable ashore
- There is a feasible cable route between rocky outcrops on either side of the beach, subject to confirmation by marine survey
- Road access to the beach is suitable for marine installation equipment
- The site is generally suitable for HDD.

3.3.5. Landfall Option 5 – Cullenstown Beach



Figure 3-7: Cullenstown Beach

Cullenstown Beach is located approximately 30.1 km to the south east of the existing substation. The beach area is in private ownership. Cullenstown is a sandy beach with sufficient space for the location of a transition joint bay and a HDD cable installation. The local road leading to the beach provides good access for shore-end marine installation equipment. The beach has a public amenity value for the local community and tourists. An 'off- season' cable installation would diminish the impact on the use of the beach as a public amenity. As Cullenstown Beach is located near to the Ballyteigue Burrow SAC and SPA, potential impacts to the SAC and SPA would have to be assessed at a later stage. The marine routing will have to consider the Keeragh Islands SPA/NHA and the Saltee Islands SAC and SPA and any potential impacts which may arise. Cullenstown Beach is considered a less constrained landfall area for the following reasons:

- Sufficient space for transition joint bay
- Sufficient space for HDD cable installation
- Access for shore-end marine installation equipment

3.4. Landfall Options – East Cork Connection Point

A desktop study was undertaken of the East Cork Connection Point study area to identify feasible landfall area locations. During this study, five potential landfall options were identified based on the requirements listed in section 3.2. A site visit was then undertaken to visually inspect each landfall area identified.

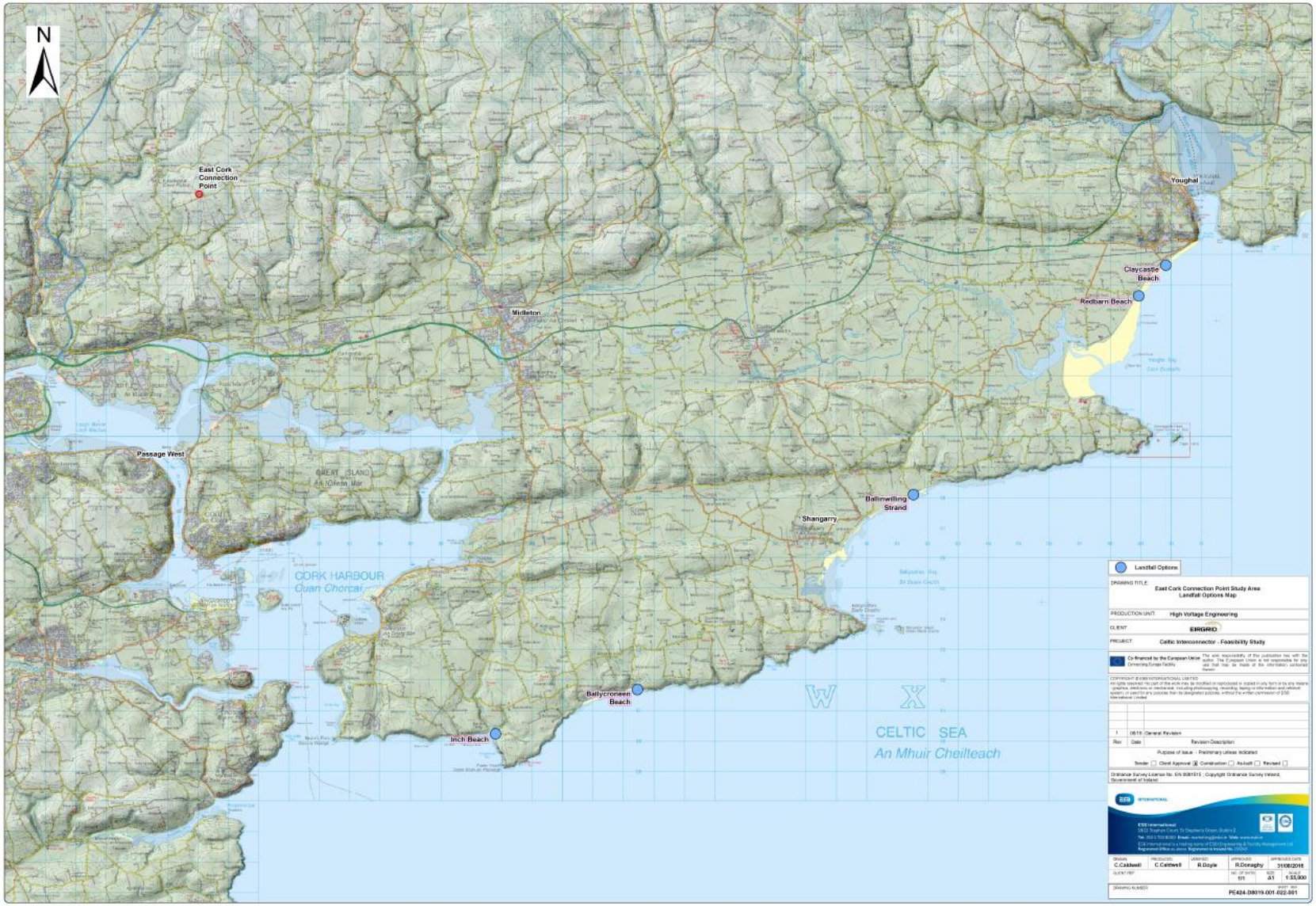


Figure 3-8: Feasible Landfalls East Cork Connection Point Study Area

3.4.1. Landfall Option 1 – Inch Beach



Figure 3-9: Inch Beach

Inch Beach is located close to Power Head, approximately 36 km to the south east of the existing substation. The beach area is in private ownership. Inch beach is a wide sandy beach which can be accessed from the local roads on two sides. An existing gas pipeline comes ashore at Inch beach; however the beach is wide and could accommodate a submarine cable landing also. The exact location of the existing gas pipeline would have to be verified and agreement reached with the gas pipeline owner with regard to proximity issues. The beach is considered to have a high public amenity value for the local community and tourists and for activities such as surfing. The presence of the gas pipeline has not affected this. Inch Beach is not located within any environmentally designated sites. Inch Beach is a less constrained landfall area for the following reasons:

- Wide sandy beach with road access from both sides
- Previous installation of gas pipeline which indicates suitable marine conditions are present

3.4.2. Landfall Option 2 – Ballycroneen Beach



Figure 3-10: Ballycroneen Beach

Ballycroneen Beach is located approximately 31.7 km to the south east of the existing substation. The ownership of the beach area could not be ascertained from the PRA's online portal service. Ballycroneen is a wide sandy beach bounded by a rocky coastline on either side. The beach is reached via a local road of sufficient width for shore-end marine installation equipment. The car park adjacent to the beach provides sufficient space for a transition joint bay and HDD if required. Construction works in the vicinity of houses along the local road and mobile home park may cause short term construction impact during cable installation. The beach is considered to have some public amenity value for recreational angling and line fishing activities. Ballycroneen Beach is not located within any environmentally designated sites and is considered a less constrained landfall area for the following reasons:

- Sufficient space for transition joint bay
- Sufficient space for HDD cable installation
- Access for shore-end marine installation equipment

3.4.3. Landfall Option 3 – Ballinwilling Strand

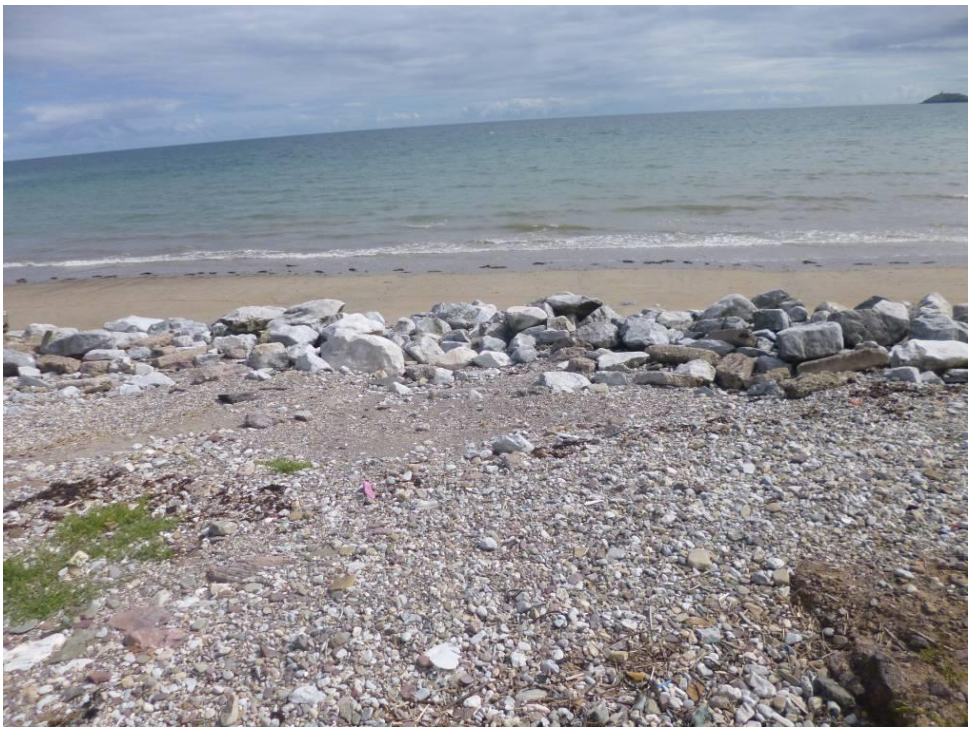


Figure 3-11: Ballinwilling Strand

Ballinwilling Strand is located to the north of the coastal village of Shanagarry, approximately 32.8 km to the south east of the existing substation. The beach area is in private ownership. It is a wide sandy beach with an adjacent cark park of significant size to allow for a transition joint bay and HDD if required. The car park adjacent to the beach is in the ownership of Cork County Council. It would be possible to route the land cable directly from the car park to the public road without crossing private land. Ballinwilling Strand has some public amenity value owing to its sandy beach. It is located approximately 1.2 km from Ballycotton SPA and the adjoining Ballycotton, Ballynamona and Shanagarry pNHA. Any potential impact to the SPA and pNHA would have to be assessed at a later stage. Some additional flood defences have recently been installed at Ballinwilling Strand. The ground level between the beach and the car park appears to have been raised as part of the flood defence work. In the event of this landing point being chosen, due consideration should be given to long term protection against coastal erosion and storm surges. Ballinwilling Strand is considered a less constrained landfall area for the following reasons:

- Sufficient space for transition joint bay
- Sufficient space for HDD cable installation
- Access for shore-end marine installation equipment
- Access to local road
- Wide sandy beach

3.4.4. Landfall Option 4 – Redbarn Beach



Figure 3-12: Redbarn Beach

Redbarn Beach is located to the south of Youghal, approximately 38.5 km to the south east of the existing substation. The beach area is in private ownership. It is a wide sandy beach which extends for considerable distance east and west of the access point from the local road. Space for a transition joint bay and HDD is somewhat limited and access may be difficult. It has a high public amenity value due to the sandy beach and adjoining hotel which provides easy access to the beach. Redbarn beach is located in close proximity to Ballymacoda Bay SPA, Ballymacoda SAC and Ballybegan Marsh pNHA. Any potential impacts to the above mentioned environmental designated sites would have to be assessed at a later stage. Redbarn is a more constrained landfall area for the following reasons:

- Close proximity to local hotel
- High public amenity value of beach

The installation of the cable could be scheduled to be undertaken during the 'off-season' to lessen disruption during construction. A new mobile home park is planned in the vicinity of Redbarn Beach and any potential impact to this development would have to be assessed at a later stage.

3.4.5. Landfall Option 5 – Claycastle Beach



Figure 3-13: Claycastle Beach

Claycastle Beach is located to the south of Youghal, approximately 32 km to the east of the existing substation. The ownership of the beach area could not be ascertained from the PRA's online portal service. It is a wide sandy beach which extends for considerable distance east and west of the car park. There is sufficient space for a transition joint bay and HDD if required. Claycastle Beach is of a high public amenity value to Youghal and surrounding communities. The cable installation could be scheduled during the 'off-season' to lessen the temporary disruption to the beach users.

Claycastle Beach is located in close proximity to Blackwater River SAC, Ballyvergan Marsh pNHA and Blackwater River Estuary pNHA. Any potential impacts to the above mentioned environmental designated sites would have to be assessed at a later stage. It is considered a less constrained landfall area for the following reasons:

- Sufficient space for transition joint bay
- Sufficient space for HDD cable installation
- Access for shore-end marine installation equipment

3.5. Conclusions

At this stage of the project, feasible landfalls for both West Wexford and East Cork Connection Point study areas have been identified. These will be investigated further as the project progresses to establish the best technical, environmental and cost effective landfall location

The ultimate landfall chosen to bring the submarine cable ashore would be dependent on a number of factors including the following:

- Marine conditions
- Consultation with the following
    - Local Authorities (i.e. Cork County Council, Waterford County Council and Wexford County Council including their Environment Departments).
    - Department of Communications, Climate Action and Environment (DCCAE).
    - Sea Fisheries Protection Authority (regulatory), Bord Iascaigh Mhara (promotion of fisheries), Inland Fisheries Board, Petroleum Affairs Division, Department of Agriculture, NPWS, local fishing communities, local marine survey offices, UAU (Underwater Archaeology Unit).
    - Consultation with the public.
- Transmission substation location

The landing areas examined, and any others that may subsequently emerge will be subject to further detailed environmental, technical and social assessment following the confirmation of potential submarine cable routes between Ireland and France.

Chapter 4

Technical Assessment-Identification of Feasible Converter Station Location Areas

4. Feasible Converter Station Location Areas

4.1. Introduction

In this chapter, potential locations were identified within which a typical converter station similar to the infrastructure described in Section 2.4 could be located. Each location was considered to determine its overall suitability to accommodate a converter station not only during the operational phase but also the short term suitability of a location to facilitate the impacts associated with the construction phase.

4.2. Converter Station Location Constraints

Within each study area, constraints were identified which would limit or exclude the potential of an area to facilitate the siting of a converter station. A constraint is any physical, environmental or technical consideration that could limit, restrict or prevent the type of proposed development in a particular area.

The primary constraints within the study area were identified and mapped. This information was obtained from available open sources, mainly comprising of government departments and state agencies. The following list sets out the typical constraints identified:

- Ecology
- Cultural Heritage
- Existing man made infrastructure and utilities
- Water and flood plains
- Soil and Geology
- Population Settlement
- Development Plan designations

All of these constraints are included on a suite of maps included in Appendix 1.

4.3. General Area Location Opportunities - Selection Methodology and Criteria

The process to identify potential locations within which a converter station could be located followed the identification of potential landfall areas and underground cable route corridors to the transmission connection nodes as described in Section 1.2. Potential location areas were identified in relative close proximity to the route corridors, the transmission connection nodes or the landfall areas.

In identifying potentially suitable converter station location areas, potential impacts on population centres/settlements and areas of importance for environmental or cultural features were avoided where possible.

Each potential site was identified on the basis of its proximity to the potential route corridors (as set out in Section 5) with regard to the following environmental and social considerations:

- **Ecology** — The potential impact of the proposed development on the receiving natural environment and biodiversity with particular emphasis on Natura 2000 sites and other designated sites such as Natural Heritage Areas (NHAs and pNHAs).
- **Landscape** — The ability of the location area to absorb the proposed development based on its characterisation within various planning policy plans and documents.
- **Cultural Heritage** — The likely impact of the proposed development on the cultural heritage i.e. monuments, archaeological sites and landscape features.
- **Land Usage** — The current land use within the area which is primarily agricultural, industrial or residential in the case of this study.
- **Existing Infrastructure** — The proximity of the proposed location area to existing infrastructure such as railways, road network, gas and electricity transmission installations, harbours, etc.
- **Settlement** — Due to the scale of the proposed development, the avoidance of high density population areas is preferable.
- **Constructability** — The level of technical difficulty associated with constructing a site at a specific location.
- **Transport/access** — The ability of the existing road network to facilitate the increased volume of traffic during construction and the oversized loads associated with specialist electrical equipment.

4.4. Converter Station Location Area Options

The feasibility study permitted sufficient information gathering to be undertaken to identify potential areas within which a converter station could be located. The information is general and no site specific studies, investigation or consultation were undertaken. Each site area identified represents an area approximately 2 km in diameter. The areas identified refer to a general area or areas within which the potential converter station could be located. The location areas identified do not refer to any specific field or land holding and do not have specific site boundaries.

Each location identified requires further investigation to determine its suitability as a potential site and to assess the impacts of installing the proposed development at this location. A high level environmental overview is set out in Section 6.

4.5. West Wexford Connection Point Study Area – General Location Areas

A total of 7 feasible location areas have been considered within the study area identified in Section 2.2 of this report. These are shown on Drawing PE424-D8019-001-010-001 in Appendix A. Each location area was identified by taking into consideration the environmental and other constraint factors outlined within the sections above.

4.5.1. Converter Station Location Area 1

The location area is in the environs of Waterford Airport which is located to the south of Waterford City approximately 5 km from Tramore. Existing and future development in the area is detailed in the Waterford Regional Airport & Business Park Masterplan dated 2011. Areas around Waterford Airport are zoned to facilitate development of the airport and light industrial development. The area has some large buildings, housing typical airport developments. These types of buildings would be somewhat consistent with the nature of the development required to accommodate a converter station, but the development of a converter station at this location would have to be assessed further to check if it may impede the future development of the airport.

The existing road network can facilitate large vehicles with oversized loads. A site within the Waterford Airport area, subject to full assessment, would be considered unlikely to impact on the designated sites in the locality.

If the converter station was located in this area, it would give rise to a requirement for one or possibly two long and complex horizontal directional drills for the AC cable connection into the existing substation. Clarification would be required regarding height restrictions for buildings in proximity to the airport.

4.5.2. Converter Station Location Area 2

The location area is to the east/south east of Waterford City in the area of Ballygunner and Knockboy. The area is close to the outskirts of Waterford City and is close to residential rather than industrial areas. The existing road network is constructed to facilitate large vehicles with oversized loads. The location area is approximately 8 km from the existing substation.

If the converter station was located in this area, it would give rise to a requirement for one or possibly two long and complex horizontal directional drills for the AC cable connection into the existing substation.

4.5.3. Converter Station Location Area 3

The location area is approximately 2 km southwest of Campile village in the townland of Grange. The location area is approximately 6 km from the existing substation. The location area is served by the R733 regional road.

The existing land use is agriculture with numerous one-off housing developments and agricultural buildings. There is ample road frontage and large holdings to meet the requirements of the proposed development.

The landscape is characterised as being part of the *Barrow/Suir River Valley*[1]. The Slaney and Barrow River Valleys have similar characteristics to that of the *Lowlands*, but have a more scenic appearance due to the presence *of the rivers and their associated riparian and woodland habitats*. This landscape is classified as *very sensitive to development*. The area does not include any designated or protected sites.

4.5.4. Converter Station Location Areas 4 & 5

Both sites are located north east of the existing Great Island Power Station to the north of the Wexford – Waterford railway line. Site No. 4 is located in the townlands of Coolerin and Ballynamona and is approximately 4 km from the existing substation. Site No. 5 is located in the townlands of Ballynamona and Horeswood and is approximately 3 km from the existing substation.

The existing land use is agriculture with examples of one-off housing development and agricultural buildings. There is ample road frontage and large holdings to meet the requirements of the proposed development.

The landscape is characterised as being part of the *Barrow/Suir River Valley*[2]. There are also a significant number of overhead lines which traverse the area. These lines would restrict development in certain locations or may require alteration to accommodate development of a converter station.

The main access route through both areas is the R733. There are also a number of minor local roads. There are sections of mature hedgerows along these roads that would assist with screening any potential development. There have been no instances of flooding (OPW Flood Maps) recorded at these locations. The area is located adjacent to the River Barrow and River Nore SAC.

4.5.5. Converter Station Location Area 6

The location area encompasses the existing substation, power station and surrounding area including parts of the townlands of Great Island and Kilmannock. The existing land use is agriculture with limited one-off housing development and agricultural type buildings. There are existing warehouse type buildings within the

[1] Draft Wexford County Development Plan 2013-2019 Landscape Character Assessment

[2] Draft Wexford County Development Plan 2013-2019 Landscape Character Assessment

Great Island power station complex. The location area includes the immediate area around the existing substation.

The landscape is characterised as being part of the *Barrow/Suir River Valley*[3]. There are also a significant number of overhead lines which traverse the area. These lines would restrict development in certain locations or may require alteration to accommodate development of a converter station.

The existing station is located adjacent to a number of significant biodiversity designations. These include two Natura 2000 sites: the River Barrow and River Nore SAC; and the Lower River Suir SAC.

4.5.6. Converter Station Location Area 7

The location area is in Belview Port to the east of the N29 road and west of the River Barrow. The location area is approximately 3 km from the existing substation. Existing and future development in the area is detailed in the current Ferrybank Belview Local Area Plan[4]. A large part of Belview Port and its surrounding lands are zoned to facilitate the development and expansion of the port with an emphasis on marine activities. This local area plan is due for review in 2020. The area has a significant amount of large buildings housing typical port developments with an emphasis on pharmaceutical, industry and technology including specialist industrial activity. These types of buildings would be consistent with the nature of the development required to accommodate a converter station.

The existing road network is constructed to facilitate large vehicles with oversized loads. Residential dwellings in the port area are limited.

While the area is located adjacent to the River Barrow and River Nore, a site within the existing Belview Port area, subject to full assessment, would be considered unlikely to impact on the designated sites in the locality. If the converter station was located in this area, it would give rise to a requirement for two long and complex horizontal directional drills. One HDD would be required for the DC cable and one for the AC connection over to the existing substation.

4.6. East Cork Connection Point Study Area – General Location Areas

A total of 10 feasible location areas have been considered. These are shown on Drawing PE424-D8019-001-021-001, in Appendix A. These sites were identified taking account of the same constraint considerations as previously outlined.

[3] Draft Wexford County Development Plan 2013-2019 Landscape Character Assessment

[4] Ferrybank-Belview Local Area Plan, Kilkenny Co. Co., March 2009

4.6.1. Converter Station Location Area 1

This location is at the former Amgen site at Ballyadam which is located just off the N25 between Carrigtwohill and Midleton. The location area is approximately 11 km from the existing substation. The site is approximately 54 hectares in size. In October 2007, the biotechnology multinational company Amgen scrapped its partially constructed plant on this site. EirGrid also received planning permission to construct an indoor 110 kV GIS substation in the north eastern corner of the site in 2006. It was planned to loop in the proposed Ballyadam 110 kV substation into the Midleton – Whitegate 110 kV line. Cork County Council Planning No. 0613225 Amgen put its plans for the site on hold. Amgen subsequently decided that the project would not proceed and ownership reverted to Industrial Development Authority (IDA) in 2010.

No further development has taken place since and no information is currently available on any firm development plans for the site. Based on a desktop assessment and site visit, it is feasible to locate a converter station and an associated AC substation on this site. The site is constrained by the Cork – Midleton railway to the north and by the N25 dual carriageway to the south. If a major development of the site takes place in the future, it is likely that a new junction will be built on the N25. For this reason, it would be prudent to set back any developments associated with the Celtic Interconnector away from the N25. Identification of a suitable site location within the Ballyadam site would require site investigations and discussions with the IDA. It is known that some parts of the site contain karst features which could present some constraints on the site location. A karst survey is therefore recommended as part of the site investigations. The presence of karst geology is likely to present some engineering challenges, however it is considered unlikely to render the site unfeasible as a possible location for a converter station.

4.6.2. Converter Station Location Area 2

This location area is approximately 1 km west of Midleton town in the townlands of Knockgriffin and Baneshane. The site is approximately 10 km from the existing substation. The location area is located on the edge of the *city harbour and island complex landscape*[5] type. This landscape would be considered to have *a very high value and be sensitive to the certain types of development*. The part of the location area to the south of the N25 is considered to have a scenic landscape character.

The location is accessed via the local road network from Midleton. Outside Midleton, the typical land use is agriculture with a patchwork of fields. Closer to the outskirts of Midleton, there are some large warehouse type buildings which have the potential to provide partial screening of a converter station.

The area does not include any designated or protected sites. The Midleton area has a significant flooding history, but the townlands within which the location area is situated have not been prone to any such flooding problems (OPW Flood Maps).

[5] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

4.6.3. Converter Station Location Area 3

This location area is approximately 3 km north-west of Midleton town in the townlands of Curragh, Lysaghtstown and Ballyrichard Beg. The site is approximately 9 km from the existing substation. The location area is located on the edge of the *city harbour and island complex landscape*[6] type. This landscape would be considered to have *a very high value and be sensitive to the certain types of development*.

The location is accessed via the R628 and the local road network from Midleton. The typical land use is agriculture with a patchwork of fields. There is significant evidence of ribbon development within the location area. There are some farm out buildings and associated agricultural business premises. There is mature screening with opportunities to limit the view of a potential converter station site.

The area does not include any designated or protected sites. The Midleton area has a significant flooding history, but the townlands within which the location area is situated have not been prone to any such flooding problems (OPW Flood Maps).

4.6.4. Converter Station Location Area 4

This location area is in the area of the National Space Centre facility located at Elfordstown, approximately 4 km north of Midleton. The Cullenagh – Knockraha 220 kV line passes by the site less than 1 km to the north. The location is accessed via the local road network from Midleton. The extent of the development around the National Space centre would provide limited opportunities to screen the converter station. The site is already quite prominent and contains a high telecommunications mast.

The area does not include any designated or protected sites.

There are no recorded instances of flooding in the general area of the station location areas (OPW Flood Maps).

4.6.5. Converter Station Location Areas 5 & 10

Both these location areas are broadly similar. They are located approximately 3 km and 7 km from the existing substation respectively. These sites areas are located on the edge of the *city harbour and island complex landscape*[7] type. This landscape would be considered to have a *very high value and be sensitive to the certain types of development*.

There are no recorded instances of flooding in the general area of the station location areas (OPW Flood Maps).

[6] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

[7] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

4.6.6. Converter Station Location Areas 6, 7 & 8

Location areas 6, 7 and 8 are broadly similar. They are situated south east of Watergrasshill and north east of the existing substation at a distance of approximately 4-5 km. The sites are located in landscapes that are classified as *fertile middleground*[8] and although they are of *medium landscape value*[9] they are considered *sensitive to future development*.

Location area 6 is in the townlands of Ballyleagh, Corballybane and Ballynaskena. The area is accessed via a local road running west from the R626 connecting Midleton to Bartlemy. There are large field patterns, mature screening to the east with ribbon development evident.

Location area 7 is in the townland of Ballynaglogh and accessed via a local road running east from the M8 motorway at Watergrasshill. There are large field patterns, mature screening to the west and some one-off housing with large farm out buildings.

Location area 8 is in the townlands of Monatooreen, Clash and Meeleen. The area can be accessed via a local road running east from the M8 motorway at Watergrasshill. The location consists of a large field network pattern some one-off house development and small farm out buildings.

None of these sites identified are adjacent to any of the potential route corridors identified, however they are in close proximity.

The area does not include any designated or protected sites. There are no recorded instances of flooding in the general area of the station location areas (OPW Flood Maps).

4.6.7. Converter Station Location Area 9

The site is centred on the existing substation. The site area is located on the edge of the *city harbour and island complex landscape*[10] type. This landscape would be considered to have a *very high value and be sensitive to the certain types of development*.

The area is accessed using local roads east of the M8 motorway. These roads are suitable for such a development as evidenced by the existence of the existing substation. The typical land use is agriculture with a patchwork of large fields and landholdings. The existing station and associated overhead lines are examples of similar previous development. There is some one-off housing and farm out buildings.

The area does not include any designated or protected sites. There are no recorded instances of flooding in the general area of the station location areas (OPW Flood Maps).

[8] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

[9] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

[10] Cork County Draft Landscape Strategy 2009 – Planning Policy Unit

There are feasible sites in the immediate vicinity and adjoining the existing substation in order to locate a converter station. Several overhead lines converge on the existing station and by potentially undergrounding some of these overhead lines, it would be feasible to create space which could be used for the development of a converter station. This would enable a converter station to be located adjacent to an existing transmission connection point. This concept was used effectively on the recently completed EWIC project.

4.7. Conclusions

This high level, desktop process has identified a number of potential converter station location area options. The potential converter station sites identified and any others that may subsequently emerge will be subject to further detailed environmental and social assessment at a later stage.

Chapter 5

Identification of Feasible Routes for AC & DC Circuits

5. Identification of Feasible Routes for AC & DC Circuits

5.1. Introduction

This section outlines the approach taken in identification of potential AC and DC route options that would link the Celtic Interconnector submarine cable with a converter station and onwards to the Irish transmission grid in either the West Wexford or East Cork Connection Point study areas. The following steps were taken:

- Identification of proposed landfall areas
- Identification of feasible sites for the converter station
- Identification and mapping of technical and environmental constraints to enable investigation of AC and DC route options.

The broad corridors for the AC and DC routes were then developed using existing mapping and spatial datasets of the following:

- Major roads/railways
- Environmental designations identified by NPWS within the study area - SAC, SPA, NHA, pNHA , national parks, nature reserves
- National monuments (National Monuments Service)
- Existing high voltage electricity transmission network
- Existing high pressure gas transmission network
- Airports/Sea Ports
- Population Settlements
- Rivers
- Forestry

Once the key environmental and physical constraints were identified and mapped, broad corridors were chosen avoiding environmental and physical constraints where possible and focussing on the shortest route depending on the final chosen location for the converter station.

5.2. Overhead Line Route Options

As outlined in Section 2.5, this feasibility study has only considered AC underground cables for the connection from the converter station to the AC Transmission Grid Connection Point and the potential use of the existing overhead grid. Additional new AC overhead lines have not been considered at this stage for this element of the project, however, a comprehensive study of all connection options would need to be carried out at a later stage of the project.

5.3. Underground Cable Route Options

The feasibility study comprised a desktop study and a site visit to investigate feasible underground cable routes. The following steps were taken:

- Identification of potential landfall areas
- Identification of feasible sites for the converter station
- Identification and mapping of technical and environmental constraints to enable investigation of route options.

The broad corridors for the underground cables routes were then developed using existing mapping and spatial datasets of the following:

- Major roads/railways
- Environmental designations identified by NPWS within the study area - NHA, SAC, SPA, national parks, nature reserves
- National monuments(National Monuments Service)
- Existing high voltage electricity transmission network
- Existing high pressure gas transmission network
- Airports/Sea Ports
- Population Settlements
- Rivers
- Forestry

In developing the feasible route corridors for the AC or DC underground circuit, the following route selection criteria were considered:

- Route corridors were selected within the public domain e.g. roadways, public parks etc. which avoid private property. Cross country routes were not considered for the purpose of this report. Route corridors were investigated on the basis of maintaining suitable clearances from existing structures.
- Route corridors endeavour to avoid unnecessary crossings of major roads, railways and water ways.
- Cable route corridors are identified to minimise the need for full road closures during construction. The routes are identified to minimise impact on the community and to minimise traffic disruption during construction where possible.

- The proposed route corridors attempt to minimise sudden changes in direction, both horizontal and vertical.
- The proposed cable route corridors provide suitable locations for joint bays.
- Constructability of the cable route corridor is a critical factor.
- The cable route corridor was selected to avoid lakes and water features, where possible.
- Cable route corridors were selected that minimise the overall length in order to reduce costs.
- The cable route corridors were selected to minimise conflict with future development where known.
- Safe design clearances between existing underground high voltage cables and transmission gas pipelines must be maintained.
- The cable route corridors identified attempt to avoid areas of significant planting or forestry.
- Selecting routes within designated areas such as NHA's, SPA's and areas of archaeological importance are avoided where possible.
- Crossing points under SAC's (Special Areas of Conservation) are avoided or minimised where no other possible alternative exists.
- Access for future maintenance is critical when identifying the cable route corridor.
- Reference to policy outlined in the current county development plan.

5.4. AC and DC UGC Route Options – West Wexford Connection Point

The proposed underground cable route options were investigated for the West Wexford Connection Point study area using the approach outlined in Section 5.3. The proposed underground cable route options for the West Wexford Connection Point are shown in drawing PE424-D8019-001-009-001. The route options are described below.



Figure 5-1: Feasible underground cable route options in West Wexford Connection Point Study Area

5.4.1. Rathmoylan Cove Landfall Area

Rathmoylan Cove is located in Co. Waterford, to the south west of the existing substation. The proposed underground cable route follows local roads branching out in a northerly direction from Rathmoylan Cove. A number of crossings of rivers and streams would be required. The route would continue along local roads until a crossing of the River Suir would be necessary to reach the chosen converter station site.

A crossing of the River Suir would be required which would have to be assessed from a technical and environmental design point if chosen as the proposed route. The cable route from Rathmoylan Cove is a feasible cable route option subject to detailed design and environmental assessment.

5.4.2. Baginbun Beach/Fethard Beach

Baginbun Beach/Newtown is located in Co. Wexford, to the south east of the existing substation. The proposed underground cable route would follow a mixture of regional and local roads. A number of crossings of rivers and streams would be required. A crossing of the disused railway between Waterford and Wexford would be required.

The cable route from Baginbun Beach/Newtown is a feasible cable route option subject to detailed design and environmental assessment.

5.4.3. Bannow Beach/Cullenstown Beach

Bannow Beach/Cullenstown Beach is located in Co. Wexford, to the south east of the existing substation.

The cable route for either landfall area location would be installed in a mixture of regional and local roads in westerly direction towards Wellingtonbridge. The Owenduff River would have to be crossed twice in close vicinity to Wellingtonbridge.

The route would then continue along a mixture of regional and local roads in a westerly direction towards the existing substation. A crossing of the disused railway between Waterford and Wexford would be required. The cable route from Bannow Beach/Cullenstown Beach is a feasible cable route option subject to detailed design and environmental assessment.

5.5. AC and DC UGC Route Options – East Cork Connection Point

The proposed underground cable route options were investigated for the East Cork Connection Point study area using the approach outlined in Section 5.3. The proposed underground cable route options for the East Cork Connection Point are shown in drawing PE424-D8019-001-020-001. The route options are described below.

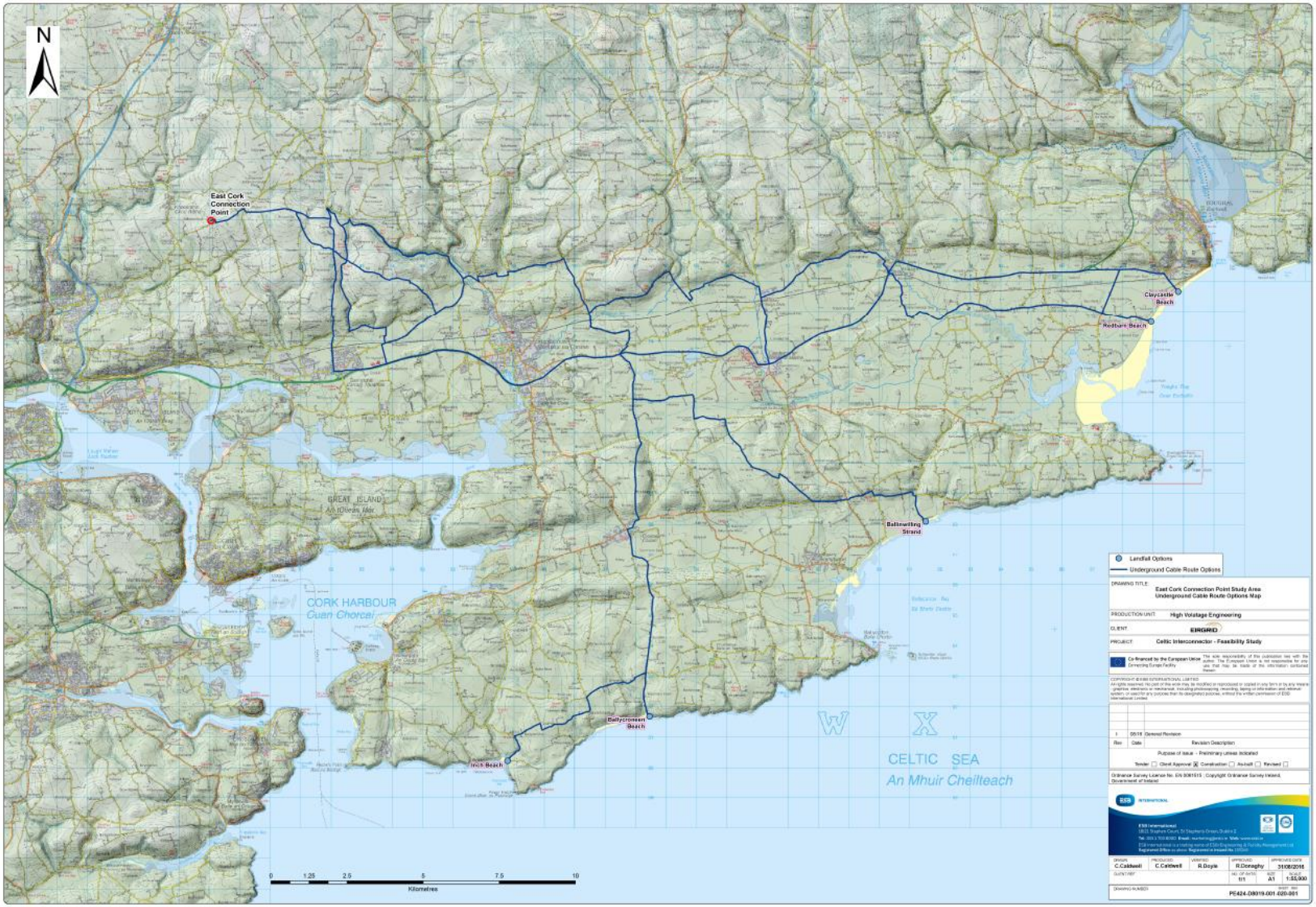


Figure 5-2: Feasible underground cable route options in East Cork Connection Point Study Area

5.5.1. Ballycroneen Beach/Inch Beach

Ballycroneen Beach/Inch Beach is located in Co. Cork, to the south east of the existing substation.

The route would travel along a mixture of regional and local roads to the town of Cloyne. The route through Cloyne would cause short term disruption to the local community during trenching and ducting works.

The route upon exiting Cloyne would travel in a northerly direction along local roads until reaching the N25. It would be feasible to install the cable route along the N25 but would require permission from Transport Infrastructure Ireland (TII). The alternative cable route to the N25 option would continue in a northerly direction along regional and local roads to the east of Midleton. These routes were chosen to avoid the population centre of Midleton.

The cable route from Ballycroneen Beach/Inch Beach is a feasible cable route option subject to detailed design and environmental assessment.

5.5.2. Ballinwilling Strand

Ballinwilling Strand is located in Co. Cork, to the south east of the existing substation.

The proposed cable route would travel in an easterly direction from the landfall area along regional and local roads. The N25 could be utilised as a cable route corridor but would require permission from the TII.

The cable route from Ballinwilling Strand is a feasible cable route option subject to detailed design and environmental assessment.

5.5.3. Redbarn Beach/Claycastle Beach

Redbarn Beach/Claycastle Beach is located in Co. Cork, to the south east of the existing substation.

The proposed cable routes would travel on a mixture of regional and local roads. A number of rivers and streams would have to be crossed. It may be possible to route the cable route along the N25 and diverge off depending on the chosen converter station location. TII permission would be required.

The cable route from Redbarn Beach/Claycastle Beach is a feasible cable route option subject to detailed design and environmental assessment.

5.6. Underground Cable Route Corridor Conclusion

A range of feasible route options for the underground cable have been identified from each landfall area.

The method chosen to connect the submarine cable to the converter station is dependent on a number of factors including the following:

- Landfall location
- Converter station location
- Transmission substation location
- Consultation with the relevant county councils
- Consultation with the public

Chapter 6
Environmental Screening

6. Environmental Considerations

6.1. Introduction

This chapter provides a high level environmental assessment of all the project elements described in Section 2.5 as follows:

- Potential feasible Cable landfalls
- Potential feasible Converter stations
- Potential feasible underground HVDC and HVAC cable (UGC) routes

This is not a detailed assessment of the landfalls, converter station sites or indicative circuit routes, as at this feasibility stage, the project elements have not been developed or designed to such a level which would permit such a level of analysis. A more detailed environmental appraisal would be undertaken at subsequent stages of the project when project elements have been further evolved, should the project progress beyond feasibility stage.

The purpose of the environmental assessment in this report seeks to confirm the following:

- The availability of feasible options for the project elements described in Section 2.5
- That the study has considered the indicative locations of the different project elements in the context of environmental constraints identified within the study area(s)
- That the routes, locations and sites which constitute the project elements do not conflict in a significant manner with identified constraints

6.2. Environmental Criteria Considered for the Assessment

The study area(s) referred to as the East Cork and West Wexford Connection Point study areas were assessed having regard to the following environmental criteria:

- Human Beings and Built Environment
- Ecology
- Soils and Geology
- Hydrology and Hydrogeology
- Landscape and Visual
- Cultural Heritage

The criteria used have been derived from Environmental Impact Assessment (EIA) Guidance documentation[11]. Collectively they represent the most important issues which need to be considered at this feasibility stage. These environmental criteria are utilised in this context with the awareness that should the project proceed beyond the feasibility stage and into the planning process that the project would be subject to EIA requirements based on similar criteria. Regard has been had to the contents of the statutory Development Plans for the areas – Cork County Development Plan 2014 -2020, Waterford County Development Plan, 2011-2017 and the Draft Wexford County Development Plan, 2013-2019.

6.3. Human Beings and Built Environment

This criterion relates, in this context, to the constraints arising from human occupation of the two study areas and in particular, the following constraints:

- Settlements such as large towns and villages and dispersed rural development
- Road, rail and other transport links
- Utility infrastructure

6.3.1. Landfall areas

Of the landfall areas in the East Cork Connection Point study area, all but the easternmost point are located remote from any significantly sized settlements (defined here as a settlement with a population in excess of 1,500 persons[12]) and are instead located in areas characterised by a dispersed rural settlement pattern.

The easternmost point at Claycastle Beach is south-west of the town of Youghal but is not located within the urban area. None of the landfall areas are in close proximity to significant transport links.

None of the landfall areas in the West Wexford Connection Point study area are located in close proximity to a significant sized settlement. Similarly, none of the landfall areas are in close proximity to significant transport links or utilities infrastructure.

All landfall areas in the two study areas are therefore feasible, having regard to the constraints identified under the human beings criteria.

[11] Guidelines on the information to be contained in an Environmental Impact Statement (EIS) (EPA, 2002); Advice Notes on Current Practice (EPA, 2003); Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development (DECLG, 2003); Guidance on EIA - Screening (EC, 2001); Guidance on EIA - Scoping (EC, 2001); Guidance on EIA - EIS Review (EC, 2001); and Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EU, 2013).

[12] Section 10(2C) of the Planning and Development Act, 2000 (as amended).

6.3.2. Route Options

The UGC route options outlined in this Feasibility Report, due to their location within the public road network for the majority of their length, are unlikely to be in conflict with the constraints. All UGC route options are therefore feasible having regard to the constraints identified under the Human Beings criteria.

6.3.3. Converter Station Site Areas

In the East Cork Connection Point study area, 10 no. converter station site areas have been identified. Of these, 2 no. sites are in close proximity to a significant settlement area as follows:

- Site No. 2 – adjacent to western edge of Midleton
- Site No. 3 – adjacent to northern edge of Midleton

In the West Wexford Connection Point study area, 7 no. converter station sites have been identified. Of these, 1 no. site is in close proximity to a significant settlement area as follows:

- Site No. 2 – near the south eastern suburbs of Waterford

All other sites are located within areas characterised by dispersed rural settlement pattern areas.

As none of the sites in close proximity to significantly sized settlements are proposed to be in the centre of the settlements, there is no reason at this feasibility stage to exclude these potential sites. Further detailed investigation may exclude these sites on grounds of potential conflict with the adjacent settlements or on other grounds but for the purposes of a feasibility study, none of the potential converter station site areas should be excluded on this basis.

Similarly, most of the potential converter station site areas in the two study areas encompass local transport networks in the form of public roads. This is a reflection of the size of the potential site areas identified for the purposes of this feasibility report. A conflict therefore does not exist where public roads are seen within the potential converter station site areas.

Having regard to utility infrastructure, there does not appear to be any conflict between the potential site areas indicated on the options mapped and existing or planned infrastructure.

6.3.4. Summary

In summary, therefore, none of the identified constraints identified under the Human Beings criterion exclude any of the landfall areas, route options or potential converter station locations. All options are considered feasible.

6.4. Ecology

This high level assessment for the purpose of a feasibility study, focuses on areas of known ecological significance namely designated sites such as those part of the Natura 2000 network (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), NHAs and proposed Natural Heritage Areas (pNHAs).

Natura 2000 sites are protected by the provisions of the EU Habitats Directive and implemented in Ireland through the European communities (birds and natural habitats) Regulation 2011 while NHAs are protected through the Wildlife (Amendments) Acts 2000. Other sites of local biodiversity value may be identified by local designations in County Development Plans.

Development within or adjacent to Natura 2000 sites would be subject to Appropriate Assessment if the potential for significant effects on the conservation objectives of those sites cannot be excluded.

In terms of this Feasibility Report, designated sites within the study area are identified and mapped but the individual habitats and species for which they are designated, (or that occur outside of designated sites) will be considered as part of a more detailed ecological assessment if the project progresses.

6.4.1. Landfall areas

In the West Wexford Connection Point study area, Baginbun Beach and Fethard beach are located within Natura 2000 sites while Bannow Beach and Cullenstown Beach are located adjacent to Natura 2000 sites.

Within the East Cork Connection Point study area, Redbarn Beach is located adjacent to a Natura 2000 site (and a pNHA). Claycastle Beach and Ballinwilling Strand are located adjacent to a pNHA. The location of the Natura 2000 sites in relation to the landfall areas is illustrated on map references PE424-D8019-001-003-001 (West Wexford Connection Point Study Area Biodiversity Map) and PE424-D8019-001-014-001 (East Cork Connection Point Study Area Biodiversity Map)

Table 6.1 below indicates whether or not a landfall area is within a Natura 2000 site or states the distance to the nearest Natura 2000 site for each landfall area.

Landfall Site	SAC	Distance to Site	SPA/pSPA	Distance to Site
West Wexford Connection Point Study Area				
Rathmoylan Cove	000671 Tramore Dunes and Back Strand	3.4 km	0044027 Tramore Back Strand	3.4 km
Baginbun Beach	000764 Hook Head	Within	004033 Bannow Bay	2km
Fethard Beach	000764 Hook Head	Within	004033 Bannow Bay	0.75km
Bannow Beach	000764 Hook Head	0.35 km	004033 Bannow Bay	1 km
Cullenstown Beach	000696 Ballyteige Burrow	Within	004118 Keeragh Islands	2 km
East Cork Connection Point Study Area				
Inch Beach	001058 Great Island Channel	9.3 km	004030 Cork Harbour	5 km
Ballycroneen Beach	001058 Great Island Channel	9.2 km	004022 Ballycotton Bay	6.3 km
Ballinwilling Strand	000077 Ballymacoda (Clonpriest and Pillmore)	6 km	004022 Ballycotton Bay	1.4 km
Redbarn Beach	000077 Ballymacoda (Clonpriest and Pillmore)	1.5 km	004023 Ballymacoda Bay	0.3 km
Claycastle Beach	002170 Blackwater River (Cork/Waterford)	1.4 km	004023 Ballymacoda Bay	1.6 km

Table 6-1: Location of Landfall Areas in Relation to Natura 2000 Sites

All potential landfall areas will require Screening for Appropriate Assessment (for potential impacts on Natura 2000 sites) taking into account designated sites that may fall within the zone of influence of any proposed development.

At this feasibility stage, this in itself is not sufficient to rule out these landfall areas from further consideration, but due regard must be given to the implications of Appropriate Assessment requirements in any future detailed assessment of their suitability as landfall areas. Due to the difficulties of locating sites within, or close to, Natura 2000 sites, it is recommended that landfall areas outside identified Natura 2000 sites areas should be prioritised in the first instance.

6.4.2. Route Options

In the East Cork Connection Point study area, the UGC route options traverse both Natura 2000 and pNHA sites to the east of Youghal.

In the West Wexford Connection Point study area all the UGC route options either traverse or are adjacent to Natura 2000 sites at some point along their length.

While it is premature to assess whether or not any of the UGC route options outlined in this report would adversely impact upon specific designated sites, the conventional methodology employed in detailed route selection is to avoid all identified constraints where possible and to mitigate unavoidable constraints. Having regard to this methodology, it would be premature at this stage to rule out any of the route options on the grounds of potential impact upon Natura 2000 or other ecologically important sites.

6.4.3. Converter Station Site Areas

In the East Cork Connection Point study area, no site areas are located within or adjacent to a Natura 2000 site or pNHA.

In the West Wexford Connection Point study area, the following site areas are located within or adjacent to a Natura 2000 site or pNHA:

- Site No. 5
- Site No. 6
- Site No. 7

Notwithstanding the proximity of the sites to the designated areas, it is considered premature to exclude any of the potential converter station site areas on the grounds of potential impact upon Natura 2000 or other ecologically important sites in the absence of knowing more specific locations or more detailed environmental assessment.

6.4.4. Summary

In summary, none of the constraints identified under the ecological criteria exclude any of the landfall areas, route options or potential converter station locations at this feasibility stage. However, it is recommended that those sites outside Natura 2000 sites should be considered in the first instance.

6.5. Soils and Geology

There is limited scope or information for considering the potential for impacts on soils and geology at this feasibility stage.

6.5.1. Landfall areas

Within both study areas, significant excavations would be required to land the cable, however these would be temporary and the areas would be reinstated. The most significant potential for impacts arises during the construction stage when beach erosion could arise. Measures can be incorporated into the detailed design to mitigate against this.

6.5.2. Route Options

UGC projects create linear impacts along long distances.

In the context of UGC, whilst the intention would be to focus development along the public road network, excavations across undeveloped lands cannot be excluded at this time. Similarly though, no constraints have been identified which would exclude further consideration of any of the indicative corridors.

Conventional methodology employed in detailed route selection is to avoid all identified constraints and to mitigate unavoidable constraints. On this basis all UGC route options are considered feasible.

6.5.3. Converter Station Site Areas

In the West Wexford Connection Point study area, no constraints have been identified which lie within or close to any of the feasible station site areas.

In the East Cork Connection Point study area, there are a number of site areas identified which lie within or close to a number of constraints. As with the route options discussed previously, there is no reason at this feasibility stage to exclude these potential site areas given that further studies would refine the location of a station within the identified sites. For the purposes of this feasibility study none of the potential converter station site areas should be excluded at this stage.

6.5.4. Summary

In summary none of the identified constraints criteria relating to soils and geology, exclude any of the landfall areas, route options or potential converter station locations at this feasibility stage.

6.6. Hydrology and Hydrogeology

The scope of this section considers the potential for impacts on identified water bodies such as rivers, estuaries and lakes. Identified water bodies are generally protected by ecological designations and are also important as fisheries. At this stage only general non-site specific information is known about groundwater, water supplies or areas subject to flooding. These would all be considerations at a later stage.

6.6.1. Landfall areas

As previously identified excavations would be required to bring a cable onshore at all landfall areas and there is a risk of impacts in terms of water quality and /or pollution events of the areas where works are located. The risk is similar for all landfall areas however, standard and proven mitigation measures can be incorporated into the construction management and detailed design to ameliorate any such impacts.

6.6.2. Route Options

As previously stated, UGC projects create linear impacts.

UGCs have the potential to create significant impacts during the construction phase where they cross water courses, if cables need to be placed in or under the river bed.

The UGC routes identified to connect into the West Wexford Connection Point all propose to cross water bodies at existing bridges with the exception of the crossing associated with the Landfall area at Rathmoylan Cove. A structural assessment of the bridges would be required to determine the optimal method of the crossing in each case. Where possible, cables would be laid in the deck of the bridge. Alternatively, they can be attached to the side of the bridge, or installed adjacent to the bridge. This UGC route would require a crossing of the River Suir which is a significant water body as well as being an ecologically protected site. Whilst a crossing is feasible and should not be excluded, it would be preferable to progress other options in the first instance.

The UGC routes identified to connect into the East Cork Connection Point all propose to cross water bodies at existing bridges, therefore no potential for impacts arise.

6.6.3. Converter Station Site Areas

In the West Wexford Connection Point study area, the following site areas are located close to significant water bodies:

- Site No. 6
- Site No. 7

In the East Cork Connection Point study area, no site areas are located close to a significant water body.

Notwithstanding the above, it is considered premature to exclude any of the potential converter station site areas on the grounds of potential impact upon hydrology and hydrogeology in the absence of more detailed environmental assessment or knowing more specific locations.

6.6.4. Summary

In summary, none of the constraints identified under the hydrology and hydrogeology criteria exclude any of the landfall areas, route options or potential converter station locations at this feasibility stage. However, it is noted that any UGC route which requires a crossing of the River Suir is likely to be particularly challenging.

6.7. Landscape and Visual

The capacity of the existing landscape to absorb the proposed development is considered in this section. Relevant issues to be considered for all elements of the proposed development include:

- Proximity of sensitive viewpoints (e.g. scenic routes, protected views) and visual receptors; and
- The location and height of the different elements.

6.7.1. Landfall areas

All the landfall areas in both the study areas occur along areas of soft coastline, typically along beaches which can be of significant amenity value. All the coastlines in the study areas have limited capacity to absorb development but having regard to the limited scale of the development associated with landing the cable and the limited extent of visual impacts associated, no landfall areas should be excluded at this stage. There would be no residual visual impact for connection from submarine cable to underground cable.

6.7.2. Route Options

UGCs by their nature do not create any significant visual impacts after construction, therefore all route options in both the study areas can be considered further.

6.7.3. Converter Station Site Areas

Converter station sites include tall structures and can be conspicuous in the landscape where they are located on prominent unscreened sites. When clustered with existing infrastructure such as generating stations, substations or industrial developments they can integrate more easily in the existing landscape.

In the East Cork Connection Point study area, no site areas are located in close proximity to the coastline.

In the West Wexford Connection Point study area, the following site areas are located in close proximity to the coastline and therefore have a greater potential to create visual impacts when compared to other sites.

- Site No. 3
- Site No. 7

Site No. 6 is located is close proximity to the existing electrical infrastructure and would therefore be seen in this context.

Notwithstanding the above, it is considered premature to exclude any of the potential converter station site areas on the grounds of potential visual impacts in the absence of more detailed environmental assessment or knowing more specific locations.

6.7.4. Summary

In summary, none of the identified constraints identified under the landscape criteria would exclude any of the landfall areas, route options or potential converter station locations at this feasibility stage. However, it is recommended that converter station sites which lie closest to the coastline should only be considered after all other options have been excluded.

6.8. Cultural Heritage

The archaeological and architectural heritage features located within the study areas can be categorised under the following headings:

- National/Recorded Monuments;
- Protected Structures/National Inventory of Architectural Heritage; and

- Designated landscapes/gardens.

6.8.1. Landfall areas

Within the East Cork Connection Point study area, 3 no. of the 5 no. landfall areas are located at beaches where heritage features are indicated, Inch beach, Ballycroneen Beach and Ballinwilling Strand.

In the West Wexford Connection Point study area, 3 no. of the 5 no. landfall areas are also located in close proximity to a heritage features, Baginbun Beach, Bannow Beach and Cullenstown Beach. At this feasibility stage, this is not sufficient to exclude these 6 no. landfall areas from future detailed assessment as landfall areas, but due regard must be given to the presence of heritage features in any future detailed assessment.

6.8.2. Route Options

In general terms, UGC construction by its nature has the potential to create direct impacts on archaeological heritage, due to the excavation work required during the construction stage.

During the operational phase UGC has little or no impact on architectural heritage, designated landscapes or historic gardens given that it is invisible and can be designed to avoid visible constraints while unknown archaeological deposits can be monitored during the construction phase.

While it is premature to assess whether or not any of the UGC route options outlined in this report would impact upon individual heritage sites, the conventional methodology employed in detailed route selection is to avoid all identified constraints and to mitigate unavoidable constraints. Having regard to this methodology, it would be premature to rule out any of the route options on the grounds of potential impact upon cultural heritage.

6.8.3. Converter Station Site Areas

The potential converter station site areas, given their size, contain significant numbers of sites of cultural heritage importance. As with the route options discussed in the preceding section, there is no reason at this feasibility stage to exclude these potential sites given that further detailed investigation may exclude or include these sites and the location of the station would be refined. For the purposes of this feasibility study none of the potential converter station sties can be ruled out based on these assessment criteria.

6.8.4. Summary

In summary none of the identified constraints falling within the Cultural Heritage criteria exclude any of the landfall areas, route options or potential converter station locations at this feasibility stage.

6.9. Environmental Screening Conclusion

The study has considered the indicative locations of the different project elements in the context of environmental constraints identified within the study areas.

The routes, locations and sites which constitute the project elements do not conflict in a significant manner with identified constraints.

Chapter 7
Overall Conclusions

7. Overall Conclusions

This report is a feasibility assessment of the Irish landfall and onshore elements of a Celtic Interconnector. The scope of this study is to inform the Feasibility Phase of the project for EirGrid, the output of which would be to confirm whether or not the project is feasible. This desktop study is not intended to be a full environmental assessment, but an initial environmental screening for the purpose of identifying environmentally sensitive areas within the study area. Appropriate consideration of these conclusions will provide a basis from which to commence a further comprehensive and conclusive assessment. Further studies would be required at later stages if the project progress beyond the feasibility phase.

The report considers options for the converter station location for either potential transmission connection point (East Cork or West Wexford), AC and DC land circuit routes and landfall suitability. Feasibility is assessed against a range of criteria including technical, environmental and planning constraints within defined study areas.

- On the basis of land cable installation to the landfall areas and suitability for a marine cable installation, several landfall areas have been identified as being feasible for a connection into either West Wexford or East Cork Connection Points. The choice of optimal landfall area would be highly dependent on the marine surveys and converter station location.
- Several underground cable connection options from the shore landfall areas to a range of feasible converter station location areas are feasible for both West Wexford and East Cork Connection Points.
- The selection process has identified a number of feasible location area options within each study area for a potential converter station site.

For both East Cork and West Wexford Connection Points:

- The study has considered the indicative locations of the different project elements in the context of environmental constraints identified within the study areas.
- A range of feasible options are available for all the various project elements in Ireland. Some have been identified as less constrained options and others as more constrained options and, where appropriate, recommendations have been made regarding further consideration of those locations.
- The routes, locations and sites which constitute the project elements do not conflict in a significant manner with identified constraints.
- Detailed environmental assessments and studies would still need to be carried out if the project proceeds.

Appendix A
Drawing List

Appendix A: Drawing List

Title	Drawing No.
West Wexford Connection Point	
High Level Study Area Map	PE424-D8019-001-001-001
Cultural Heritage Map	PE424-D8019-001-002-001
Biodiversity Map	PE424-D8019-001-003-001
Infrastructure and Utilities	PE424-D8019-001-004-001
Population Settlement Map	PE424-D8019-001-005-001
Land Use Map	PE424-D8019-001-006-001
Soil and Geology Map	PE424-D8019-001-007-001
Water Map	PE424-D8019-001-008-001
Underground Cable Route Options Map	PE424-D8019-001-009-001
Converter Station Options Map	PE424-D8019-001-010-001
Landfall Options Map	PE424-D8019-001-011-001
East Cork Connection Point	
High Level Study Area Map	PE424-D8019-001-012-001
Cultural Heritage Map	PE424-D8019-001-013-001
Biodiversity Map	PE424-D8019-001-014-001
Infrastructure and Utilities	PE424-D8019-001-015-001
Population Settlement Map	PE424-D8019-001-016-001
Land Use Map	PE424-D8019-001-017-001
Soil and Geology Map	PE424-D8019-001-018-001
Water Map	PE424-D8019-001-019-001
Underground Cable Route Options Map	PE424-D8019-001-020-001
Converter Station Options Map	PE424-D8019-001-021-001
Landfall Options Map	PE424-D8019-001-022-001