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Non-technical Summary

Introduction

Greenlink Interconnector Limited is proposing to develop Greenlink, linking the existing electricity grids in Ireland and Great Britain. Greenlink will consist of two converter stations, one close to the existing 220kV substation at Great Island in County Wexford, in Ireland, and one close to the existing transmission grid substation at Pembroke in Pembrokeshire, in Wales. The converter stations will be connected by underground cables onshore and subsea cables offshore.

An environmental impact assessment report has been prepared for the onshore Ireland components of the Greenlink project, hereafter referred to as the "proposed development". The cumulative, transboundary and interactive effects with the onshore elements in Wales and the offshore elements in both Ireland and Wales are also fully addressed. Separate environmental impact assessment report / Environmental Statements (which is what an environmental impact assessment report is called in Wales) have been prepared for the Irish offshore and Welsh elements of Greenlink as they fall within a different jurisdiction. This document is the non-technical summary of the environmental impact assessment report for the proposed development.

The proposed development consists of the following permanent and temporary elements:

Landfall compound – a temporary landfall compound at Baginbun, where the high voltage direct current cables will come ashore. The cables will be installed underground below the beach and cliff at Baginbun Beach by horizontal directional drilling technique;

High Voltage Direct Current Cables – two high voltage direct current electricity cables with a nominal capacity of 500 megawatts (MW), installed underground from the landfall at Baginbun to the converter station at Great Island, including jointing bays and ground level markers at intervals along the route;

Converter Station – a converter station, which will converter alternating current to direct current electricity and vice versa, situated close to the existing Great Island 220kV substation in Wexford;

Loughtown Tail Station - a 220kV substation located beside the converter station. The Loughtown tail station will connect the high voltage alternating current 220kV cables into the 220kV electrical transmission grid via the existing Great Island 220kV substation;

MV Substation – an ESB MV substation will be located outside the converter station and tail station perimeter fences but within the landholding. This substation will provide the MV and LV connections required for the development;

Converter station construction compound: temporary compound to be used by the contractors for the construction of the converter station and tail station at Great Island;

Cable Contractor compounds – three temporary compounds, to be used by the contractor installing the cables, will be required at (i) the landfall site close to Baginbun Beach (ii) the proposed converter station and (iii) one along the onshore route in the townland of Lewistown;

Horizontal Directional Drilling Contractor Compounds – temporary compounds are required by the horizontal directional drilling contractor. (Horizontal directional drilling is explained in the construction strategy section below.) One will be located close to the cable contractor compound at Baginbun Beach with another horizontal directional drilling compound located at either side of the Campile River Estuary crossing;

High Voltage Alternating Current Cables – one 220 kV high voltage alternating current electricity cable circuit consisting of three cables, installed underground connecting the converter station via the tail station to the existing EirGrid Great Island 220kV substation;

Fibre Optic Cables – fibre optic cables for control and communication purposes, laid underground with the high voltage direct current cables and high voltage alternating current cables; and

Community Gain Roadside Car Parking near Baginbun Beach – in consultation with Wexford County Council, circa 54 roadside car parking spaces will be constructed near Baginbun Beach; and

Community Gain in Ramsgrange Village – in consultation with Wexford County Council, extension to existing footpaths, four new street lights and a speed activated sign at Ramsgrange.

The location of the proposed development is indicated in **Figure 1**.

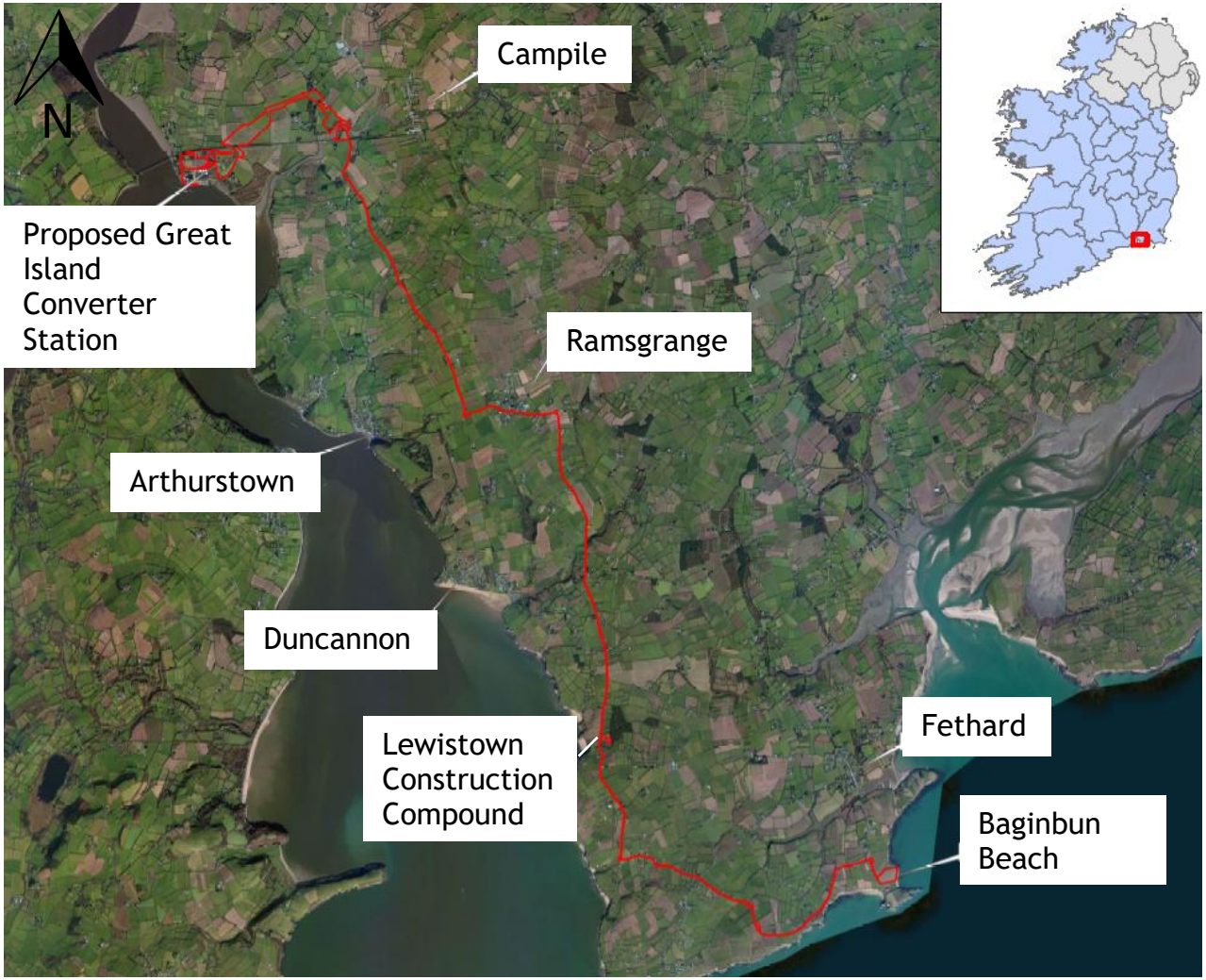

Figure 1: Overview of the proposed development (not to scale | background mapping from Bing © Microsoft 2020)

Statutory Consents

For the preparation of this environmental impact assessment report, Greenlink Interconnector Limited is the 'developer' of the proposed development. Greenlink is a Project of Common Interest i.e. a cross border infrastructure project that links the energy systems of EU member states. An Bord Pleanála is the 'competent authority' for Projects of Common Interest in Ireland and will undertake the environmental impact assessment and decide whether to grant consent for the proposed development.

Consultation

During the preparation of this environmental impact assessment report, several statutory and non-statutory bodies were consulted to ensure that issues relating to the proposed development were addressed. Consultees included An Bord Pleanála – Strategic Infrastructure Development unit, An Bord Pleanála – Project of Common Interest (PCI) unit, Wexford County Council, Port of Waterford Company and the Commission for Regulation of Utilities.

In addition, a number of public consultation events have been carried out in the local areas for residents and other interested parties to provide updates on the progress of the proposed development. Greenlink has a project specific website (https://www.greenlink.ie/).

The scope and concept of public participation has been developed and agreed in consultation with the PCI unit.

Need for the Proposed Development

The Greenlink interconnector will link the high voltage electricity transmission network in Ireland, which is operated by EirGrid, and the high voltage electricity transmission network in Great Britain, operated by the National Grid, and the markets which they serve. The project is independent from the power generation sources that will generate the power to be transmitted through the interconnector. The interconnector will utilise whatever sources of electrical power are supplied to those networks from time to time. The interconnector will facilitate power transfer in both directions.

The advantages likely to result from Greenlink are summarised in **Figure 2**.

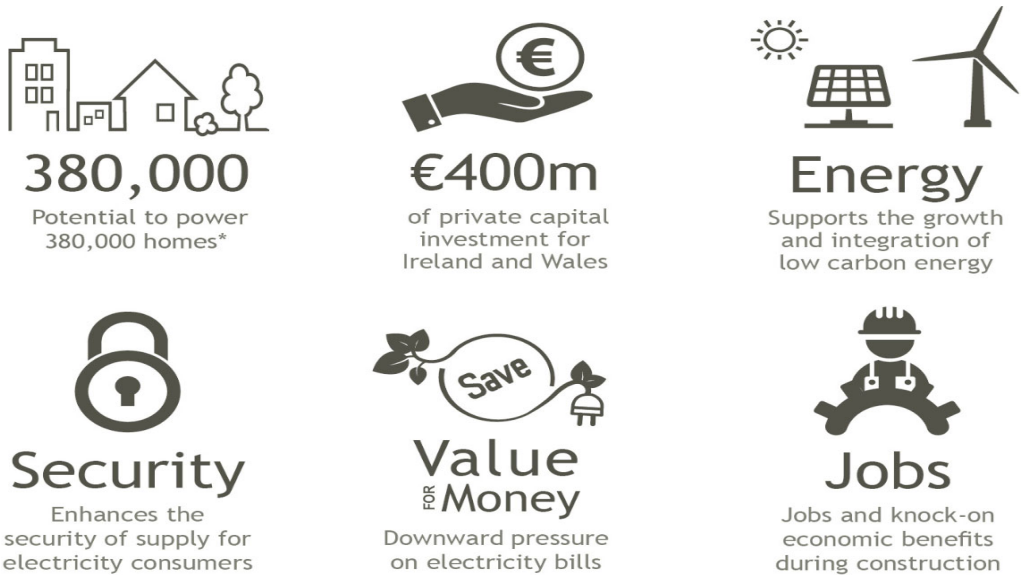

Figure 2: Potential benefits of the proposed development

* Figure for number of homes is based on typical annual household use of 4,200 kWh (Commission for Energy regulation (CER, Review of Typical Consumption Figures – Decision Paper 12 March 2017 (CER17042) and estimated total flows from UK to SEM of 1,600,000 MWh/yr.

Alternatives Considered

This section provides a description of the alternatives, which Greenlink Interconnector Limited considered, prior to deciding upon the final project design. An indication is given of the main reasons for selecting the chosen option, including a comparison of environmental effects.

Do Nothing Alternative

The 'do-nothing' alternative is that Greenlink would not be constructed.

Currently, there are occasions when the amount of electricity generated by renewable sources in Ireland exceeds the capacity of the electricity grid in Ireland to use that electricity and the capacity of the two existing interconnectors to export the electricity. In these circumstances, the renewable generation must be shut down. There are also times when fossil fuel generation is required to augment the renewable electricity generation in Ireland, at a time there is surplus renewable electricity in Great Britain. If there was more interconnector capacity, surplus renewable electricity in Ireland could be exported rather than shut down, and surplus renewable electricity could be imported, rather than generating electricity using fossil fuels in Ireland.

If Greenlink is not built, the current constraints on the export of electricity when the amount of renewable generation exceeds demand, and on the import of electricity, when demand exceeds the amount of renewable generation generated, will continue.

Connection Strategy and Options

Greenlink Interconnector Limited had the option of an interconnector directly to the European mainland, rather than to Great Britain. The lower capital and operating costs, associated with using Great Britain as an interconnector stepping stone to continental Europe, directly translate into lower resource use for manufacturing cables, lower fuel use and emissions for construction and operation, and lower species and habitat disturbance and other environmental effects of construction and operation than for the longer interconnector (i.e. between Ireland and mainland Europe directly).

Once the decision was made to connect to Great Britain, the location of the link was considered. The primary factor driving the choice of location of the link between Ireland and Great Britain was distance between the markets. There were three broad choices for the interconnector location:

- Northern Ireland – Scotland; this option was ruled out due to insufficient electrical grid capacity in Scotland;
- Dublin – Anglesey (North Wales): as an interconnector must operate to both supply electricity and import it to meet a demand, this option was eliminated as the demand for electricity is high at both locations which could result in limiting trade;
- Wexford – Wales; this was the preferred option as both Great Island in Wexford and Pembroke in Wales have the following characteristics: a) both are very robust nodes on their respective networks, with several high voltage transmission powerlines connecting to each; b) shortest feasible sub-sea cable route; and c) as there are no existing interconnectors at either location, there is a high probability that the network could accommodate electricity flows in both directions at all times. In addition, Great Island is close to the existing EirGrid 220kV substation which would be the connection point to the Irish transmission grid.

Alternative Locations and Onshore Routing

Converter Station

Three potential sites for the location of the converter station at Great Island were considered. Two of the sites were to the north of the railway and one was to the south of it, east of the woodland which is adjacent to the SSE power station. Following an assessment of the existing constraints (e.g. overhead lines and underground services), as well as environmental aspects such as cultural and archaeological heritage, visual impact and biodiversity, the site south of the railway line was selected as the preferred option. It was considered that the proposed site will be seen to be an extension of an existing developed area, rather than as an entirely new feature in the scenic rural landscape.

Landfall Site

Ten potential landfall sites were identified and assessed based on their proximity to the Great Island substation. Eight sites were on the Hook Head peninsula, one was on the western side of the Estuary and one was at Bannow Beach, east of Hook Head. A number of sites were ruled out based on their distance from the converter station site, ecological and environmental

constraints, amenity impact, beach composition, coastal erosion and cable length. Baginbun Beach was ultimately selected as the preferred landfall location as it offered the shortest overall cable route length from Great Island to Wales, while avoiding significant adverse effects on the integrity of the Hook Head Special Area of Conservation.

Onshore Routing

Following the identification of the converter station and landfall sites, the onshore cable route was assessed. The objective was to select a route that achieved the right balance between environmental, technical, safety, and economic considerations. A number of feasible cable route options were identified which were then subjected to a comparative assessment against the route selection criteria. These included the directness and length of the route; use of on-road route rather than cross-country route, use of wide and straight roads and the avoidance of nature conservation areas, protected structures/areas; towns and villages; and the avoidance of adverse social effects.

Although the selected route is one of the longer routes considered, the reduced social and environmental impacts and lesser technical challenges of the route make it preferable to the other route options.

Interconnector Technology Options

High Voltage Direct Current or High Voltage Alternating Current

The proposed interconnector will use high voltage direct current technology to connect the two high voltage grids. This is the preferred technology as it is a more efficient mechanism for transmitting electricity over a long distance. High voltage direct current requires only 2 cables to transmit the same level of power as three cables for high voltage alternating current, thus reducing the level of environment impact in respect to horizontal directional drilling and trenching both on land and subsea. There is a clear environmental benefit in using this technology to maximise the value of electricity generation, whether this is primarily sourced from fossil fuel power plants or renewable technologies.

Cable Technologies

The transmission of high voltage direct current uses either one of two cable types. Both are fundamentally the same except they use different conductors and/or insulators. The environment effects of the options are essentially the same.

Interconnector Configuration

Three interconnector configurations were considered. The proposed monopole configuration was chosen as it reduces costs and environmental impacts.

Converter Technologies

Two technologies for converting between alternating current and direct current were considered. Greenlink Interconnector Limited chose Voltage Source Converter technology over Line Commutating Converter technology due to the requirement for less reinforcement to the alternating current grid at the

connection point as well as allowing very rapid change of flow direction and reactive power.

Converter Station Configurations

Two layouts for the converter station have been identified and considered in the environmental impact assessment report. The successful contractor will choose the preferred configuration. The environmental effects of the two designs are essentially the same.

Tail Station

Two layouts for the tail station were considered. The preferred option using Gas Insulated Switchgear, was selected as it will have a smaller footprint, will require less construction and will have less visual impact than the alternative Air Insulated Switchgear.

Trench Construction Options

The preferred option for the cable installation is to excavate a trench, install ducts in the trench and backfill it with appropriate material. The cables are pulled through the ducts later. This 'open cut' option minimises the construction time, the numbers of construction personnel and the use of resources. However, at Baginbun Beach and Campile River Estuary the cable will be installed by horizontal directional drilling. Mini-horizontal directional drill is the preferred method for crossing the existing transmission gas pipeline at Great Island and the Kilmannock Stream. If the preferred construction methodology of mini-horizontal directional drilling is not used, an open cut methodology will be used for these two crossings. Horizontal directional drill and mini-horizontal directional drill eliminate the disturbance of sensitive habitat or the disruption to features or amenities. (These techniques are described in the Construction strategy section below.)

Car Parking Options

Three parking configurations for the car-parking facilities at Baginbun Beach were assessed under a number of environment aspects including safety of pedestrians and road users, material assets and land take. The three configurations were perpendicular parking on one side of the road, parallel parking on one side of the road, and parallel parking on both sides of the road.

Parallel parking on both sides was the preferred option as it will be the safest option while also providing ample car parking spaces.

Alternatives Relating to Community Gain in Ramsgrange

The provision of footpaths and associated street lighting was the preferred option as it would give rise to minimal environmental effects. The inclusion of speed control signage at the western side of Ramsgrange was also considered to be appropriate.

Alternatives Relating to Delivery of Abnormal Loads

A number of routes have been identified for delivery of abnormal loads including Belview Port in Kilkenny, Rosslare Port in Wexford and also by sea through the SSE Power Station Site. The route will be selected by the Contractor who will have regard to the length of the delivery route. A shorter route would reduce costs, noise and vehicle exhaust emissions.

Decommissioning Options

There are two possible decommissioning options in relation to the cables. Removal of the cables would require more intrusive works than leaving them in place and would also disrupt residents and traffic flows during removal of the cables. Leaving the cables in place would avoid disruption and associated impacts but the recovery of the cable material would not be possible.

Greenlink Interconnector Limited's proposal is that the cables, ducting and duct surround will be left in place.

Proposed Development

Main Elements of the Proposed Development

High Voltage Alternating Current Grid Connection

The high voltage alternating current grid connection will be made from the existing Great Island 220kV substation to the proposed new converter station via the proposed 220kV Loughtown tail station.

The connection from the tail station will be made into an existing spare bay in the Great Island 220kV substation. No extension of the 220kV switchgear is required. No reinforcement is required to the 220kV transmission grid elsewhere in Ireland, of which the Great Island substation is a node, to facility the Greenlink converter connection.

High Voltage Alternating Current Cable Route

The converter station, tail station and the existing Great Island 220kV substation are adjacent to each other and the connection will be made by an underground 220kV cable. The cable will run southwards from the proposed tail station, turn westwards, crossing under an existing underground high pressure gas pipeline, which serves the power station, then through a grove of tree in the SSE site, and into the Great island 220kV substation.

Figure 3: High Voltage Alternating Current Cable Route (magenta line) | not to scale

High Voltage Direct Current Cable Route Description

The cable route between the converter station and the landfall site at Baginbun beach is approximately 23 kilometres long.

The cables will be laid in farmland from the converter station at Great Island, passing northwards under the railway line, then eastwards in the townland of Kilmannock, before meeting the R733 road to the west of Campile, just south of Dunbrody bridge.

The route then heads southwards, at first on the R733 road, passing through the townlands of Dunbrody, Saltmills and Grange, then on the L4050 road, passing through the townlands of Kilhile, Rosetown and Coleman. At Suttons Cross, the cable route joins the R733 road once more, turning in an easterly direction towards Ramsgrange. After passing through Ramsgrange, at the junction of the R733 and the L4045 roads, the route turns southwards. Travelling along the L4045 road, through the townlands of Ramsgrange, Kilbride, Ballinruan, Aldridge and Booley to Lewistown, where a temporary construction compound will be located. From Lewistown the route continues southwards on the L4045 road through the townland of Kilcloggan to the junction with an unnamed local road at the Templar's Inn, in the townland of Templetown. From the junction with the L4045 road, the route follows the unnamed local road in a generally easterly direction through the townlands of Graigue Little and Graigue Great. The route then passes through the village of Ramstown to the junction with the L4049 road. At the junction with the L4049 road, the route turns south along

the L4049 road, towards the coast until it reaches the field proposed for the landfall site adjacent to Baginbun Beach. Figure 1 shows the cable route.

For the entire route the cables will be installed underground, approximately 1m below ground level. The onshore cables are routed along local roads, apart from the portions of the route closest to the landfall location and the converter station. Where the road route turns through a sharp bend it is necessary to divert the route off-road through farmland land, to facilitate installation of the cables.

The Campile River Estuary will be crossed using horizontal directional drilling and the preferred technology to cross the Kilmannock Stream will be mini-horizontal directional drilling. In the event that this method is not employed, the stream will be crossed using an open-cut trench.

Onshore Cable Technology

High Voltage Direct Current

The two high voltage direct current onshore cables will be installed in ducts and buried underground in a single trench with a typical depth of cover of 850mm to 1000mm.

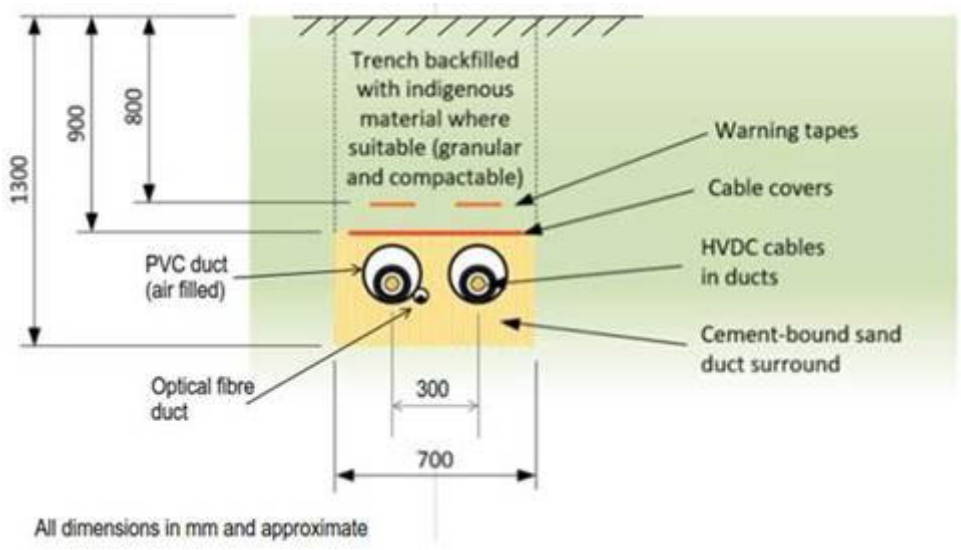

Figure 4: Typical High Voltage Direct Current Trench Cross-Section (source: WSP | not to scale)

Where cables need to be buried at a greater depth (i.e. to avoid existing services or at a horizontal directional drill), it will be necessary to increase the cable spacing to maintain the cable capacity rating, i.e. the amount of power the cables can carry.

For virtually the complete route the duct surround will be a granular well-compacted thermally suitable material (e.g. cement bound sand) up to the protective covers. For horizontal directional drill locations it is not possible to have a special backfill around the cables and therefore the ducts will be installed at a greater spacing to improve heat dissipation and ensure no drying out of the indigenous soil occurs.

Above ground marker posts will be installed along the cable route at the following locations:

- Along railways or at railway crossings;
- At road crossings;
- Across agricultural land, in which the maker posts will be located at the edge of a field, where cables enter and leave the field;
- At joint locations; and
- At change of direction of the cable route.

Link boxes will be located along the route at approximately 5km intervals. They will be located in a pit close to the joint-bay (typically less than 10m). Fibre optic cable splicing boxes (communication chambers) will be located near each cable joint bay.

High Voltage Alternating Current

The arrangement for the underground High Voltage Alternating Current cables is illustrated below.

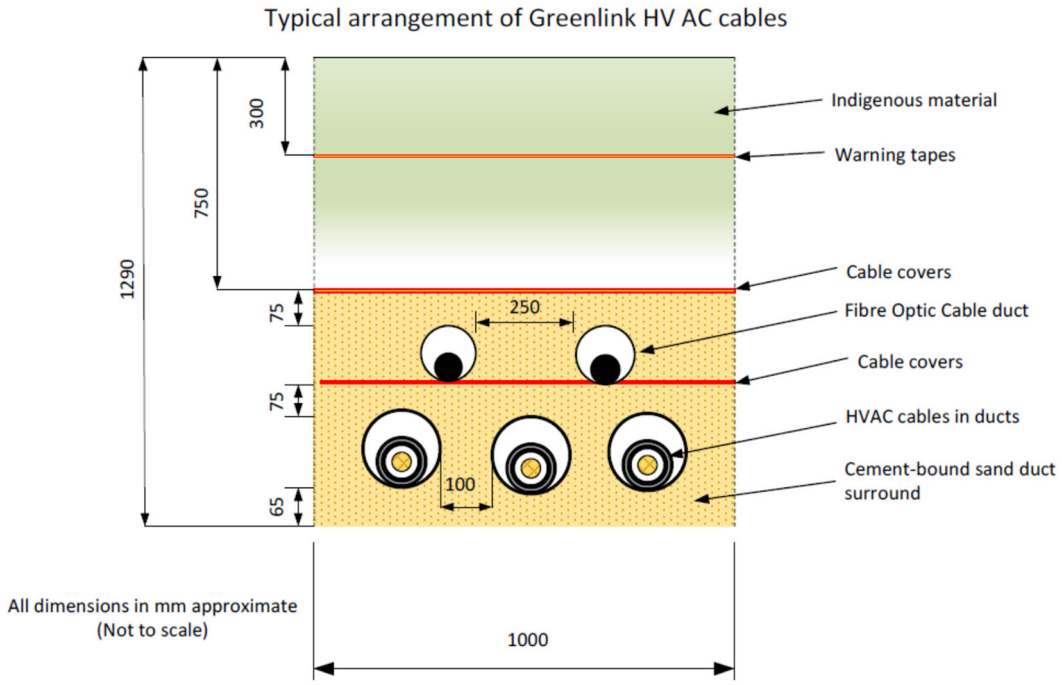

Figure 5: Typical High Voltage Alternating Current Trench Cross-Section (source: EirGrid | not to scale)

Landfall Site

The landfall site is located adjacent to Baginbun Beach. The site, which is a large field, marks the point where the onshore cables will be connected, via horizontal directional drill, to the offshore subsea cables. The subsea cables will be manufactured to a different specification than the onshore cables.

Tail Station

The high voltage alternating current cables will connect the existing EirGrid Great Island 220kV substation to a small new substation, located adjacent to the proposed converter station. This new substation will be referred to as the 'Loughtown tail station'. The tail station will have a footprint of 33m by 35m (0.12 hectares (circa 0.3 acres) and will be approximately 11 metres height.

Converter Station

The converter station will be located in an area of pasture, to the east of the SSE Great island power station. The converter station will have a site footprint of approximately 1.85 hectares (circa 4.6 acres). This footprint will accommodate a nominal 500MW station for the conversion between high voltage alternating and high voltage direct electrical currents. The two converter station configurations and equipment were considered and assessed. The preferred option will be chosen by the Contractor.

The converter station will include various buildings, apparatus and equipment. These will include a converter hall, converter transformers, alternating current switchgear and busbars, harmonics filters, lightning towers, ancillary plant such as a cooling bank and a diesel generator, and a control building.

A comprehensive landscaping scheme will be implemented, incorporating significant earthworks, mounds, planting of approximately 15,000 woodland trees of various native species, and zones of grassland meadow.

Operation

Greenlink is anticipated to provide permanent employment for approximately 20 people for the overall project in Ireland. Of this figure, approximately five people will have particular responsibility for the proposed development during the operational phase. Two personnel will be stationed at the converter station at all times operating the interconnector. It is expected that one or two vehicles may attend the site every four weeks for an inspection.

EirGrid will operate the tail station. The tail station will operate continuously. It will be unmanned and be operated remotely. EirGrid staff will visit infrequently to inspect equipment. The tail station will be subject to an annual maintenance visit of several days' duration by a small crew.

Community Gain

Circa 54 roadside car parking spaces will be constructed close to Baginbun Beach. In Ramsgrange there will be the provision of extending the footpaths and providing associated street lighting.

Decommissioning

The converter station and tail station will be decommissioned when Greenlink ceases operation. The design life of these assets will be 40 years. The current trend is to refurbish high voltage direct current equipment at the end of its operational lifetime and thus extend the lifetime of the interconnector.

When it becomes appropriate to decommission the interconnector, each item of equipment in the converter station and tail station will be removed for appropriate management, based on the waste regulations at the time of decommissioning. All above ground structures within the proposed converter station and tail station footprint will be removed and the site will be returned to its previous state. It is not proposed to remove landscaping mounds and planting. The attenuation pond will be filled in with some subsoil from the original site works, used to form the landscape mound, and then top-soiled.

Construction Strategy

A large infrastructure project such as Greenlink takes several years from concept to construction. Subject to obtaining planning approval and the relevant permits and licences, on-site construction of the proposed development will commence in 2021. Greenlink is expected to be fully operational in 2023.

The following sections outline the planned methodology for the main construction elements of the proposed development.

Enabling Works and Site Clearance

These works will include implementing the Construction Traffic Management Plan and the Surface Water Management Strategy, construction of temporary site access to the construction compounds, removal of vegetation, installing hoarding and fencing around the temporary construction compounds, provision of welfare facilities where foul sewage will be removed off-site and undertaking all required utility and service connections.

Converter Station Site

The construction strategy to be employed at the converter station site is outlined below.

1. **Access Road and Converter Station Construction Compound**

These works will include -

- Protection of existing services;
- Establishment of a converter station construction compound,
- Building the temporary access road; and
- Building the permanent access road.

2. **Earthworks on Converter Station Site, Haul Roads and Piling**

A level platform circa 2.04ha (circa 5 acres) in area, on which the converter station, tail station and ESB MV substation will be located, will be created by bulk excavation and filling. The platform will require the excavation of approximately 70,900m^3 of material, of which circa 23,000m^3 will be rock. The rock will be crushed on site. The excavate material will be reused to raise levels to create the platform and in landscaping mounds on site. Approximately

20,500m^3 of structural crushed stone fill will be imported to the site to be placed under the buildings and equipment.

Precast concrete piles will be used for the building foundations.

The work will include the construction of haul roads and bulk excavation and the installation of the precast piles.

3. **Converter Station Site perimeter**

The earthworks to the footprint of the converter site will be completed within a perimeter secured by temporary fencing. The permanent fencing will be installed following completion of earthworks.

The permanent internal roads, temporary roads and pedestrian access routes will be established within the site perimeter, ensuring ongoing safe and efficient access.

4. **Converter Station Site Drainage, Temporary Drainage, Interceptors, Ducts, Troughs, Earthing Grid**

- Temporary drainage including silt removal/interception (for removal of oil from surface water) will be installed
- Installation of permanent drainage i.e. attenuation pond (which will slow down the rate that rainwater drains from the site) and oil interceptors ;
- Carrier drains, filter drains, manholes including penstock chambers
- A storm water drainage system will be installed including road gullies;
- An earthing grid will be installed; and
- The installation of ducts and troughs.

5. **Reinforced concrete foundations and slabs**

- Excavations will be undertaken;
- Steel fixing will begin;
- Shuttering and preparation for concrete pouring will commence; and
- Placement, compaction, finishing and curing of concrete will be completed.

6. **Converter Station and Tail Station Steel superstructure erection, wall cladding, roof installation, gutters and rainwater pipes.**

7. **Converter Station and Tail Station Fit out**

- Floor will be finished, and
- The construction of the internal walls and partitions will be completed.

8. **Finishes and Surfacing**

This will include final road surfacing, painting white lines, signage and placing stone chippings where there will not be roads.

Cable Route

Duct Installation in Roads, Footpaths and Verges

The temporary working area, for cable construction in a road, will depend on the width of the road or lane.

Where feasible, if the road or lane is wide enough, one carriageway will remain open to traffic. A section of the route in the road between 100 and 300 metres long, depending on road conditions, will be fenced-off at the start of the week, the road excavated, the ducts installed, and the trench backfilled with duct surround material (cement-bound sand or concrete and compacted aggregate) each day. At the end of the week, the road surfacing will then be reinstated over the completed trench section.

In general, because the full-depth trench will only be open for less than 24 hours, and the ground will be well compacted, internal trench supports will not be required while the trench is open.

Cables and Ducts Trench Construction Off-Road

A schematic of the arrangement of the construction activities, within the working width, which will be used for the construction of the portions of the cable route in farmland is presented below. A 30m construction working width (centred on the permanent wayleave) has been agreed with the landowners. This 30m temporary working width will give sufficient area for the excavation of the trench and storage of topsoil and subsoil from the trench. It will also have room for a temporary haul road for the movement of the excavation equipment, general installation vehicles, and for the delivery of materials such as ducting, protective covers and bedding. The arrangement of the working area in farm land is illustrated in **Figure 6**.

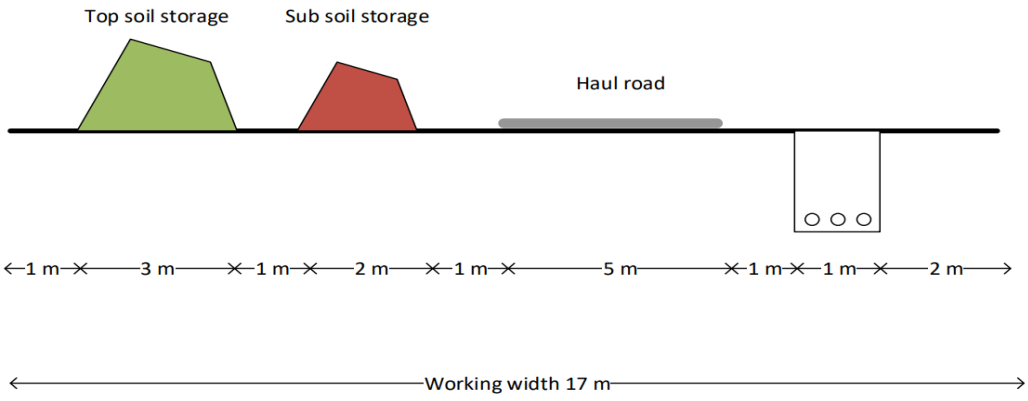

Figure 6: Working Corridor for Cables (source: WSP | not to scale)

Duct Installation by Horizontal Directional Drilling

Horizontal directional drilling is the method of cable installation which will be used at Baginbun Beach and the cable crossing of the Campile River Estuary. Mini-horizontal directional drilling is the preferred method for crossing the existing underground gas pipeline at Great Island and for the crossing the Kilmannock Stream. Gas Networks Ireland has been consulted on the crossing of the pipeline. Horizontal directional drilling is a technique whereby a hole is drilled under a feature so that the cable installation avoids disturbance of the

feature. A pipe is inserted into the drilled hole. The pipe acts as a duct through which the cable is pulled. The horizontal directional drilling may require a drilling fluid to cool and lubricate the drill head. Typically, bentonite is used, which is a non-toxic, natural substance.

Typical depths for horizontal directional drilling will be in the range of 5m to 10m.

When cables are installed at a greater depth than the normal trench depth of 1m, then to maintain the voltage and current that can be transmitted in the cables (the cable rating), it will be necessary to increase the cable spacing. The depth of the horizontal directional drilling will be dependent on the ground profile. The cable spacing will be dependent upon the cable ratings.

Once commenced, the horizontal directional drilling activity will continuously operate over a 24-hour period until each bore is complete.

Figure 7: Photo of Typical Horizontal Directional Drilling Rig

Figure 7 is a photograph of a horizontal directional drilling drill rig. For mini-horizontal directional drilling the rig is much smaller, and the area require to operated it is much less.

Joining of Cables

The cables will be supply to site on very large drums. The lengths of cable will be joined at jointing bays. A jointing bay will be required every 1.8km of a cable installation, at a minimum. However, jointing bay locations depend on the geometry of the cable route. It is expected that there will be joint bays at circa 1km centres. A jointing bay provides a temporary safe and clean environment for an engineer to work in while connecting two cable ends. Any works within private land will be agreed with landowners in advance of the works.

Landfall Transition Jointing Bay

The onshore cables will be to a different specification to that of the subsea cables. The onshore cables will be connected to the marine cables at the

Transition Jointing Bay, which will be located below ground level in the horizontal directional drilling contractor's compound adjacent to Baginbun Beach.

Watercourse Crossing

The cable corridor crosses a watercourse, Kilmannock Stream (Newtown Stream), northeast of the converter station. The preferred method to cross the stream is a horizontal directional drill using a mini-rig. The non-preferred option is a trench crossing.

A trench crossing would be deeper than the typical 1m to provide a 1.5 metre minimum separation distance between the top of the cable protection and the bed of the stream. In addition, extra cable protection is required. In the unlikely event that mini-horizontal directional drilling technique is not used, this watercourse will be temporarily dammed immediately upstream and downstream of the cable installation. Stream water will be pumped from above the upstream dam to below the downstream dam to ensure a continuous flow of water in the stream. Once reinstatement of the cable trench is complete, the temporary dams will be removed and pumping ceased.

With the preferred mini-horizontal directional drill crossing, the stream would not need to be dammed, no works would take place in the stream and extra cable protection would not be required.

Gas Pipeline Crossing

The high voltage alternating current cable from the Loughtown tail station to the Eirgrid Great Island 220kV substation will be laid under the Gas Networks Ireland high-pressure gas pipeline. A horizontal directional drill mini-rig is the preferred method to install the cables under the gas pipeline. The alternative is a trenched crossing. In the case of a trenched crossing, once the pipeline has been located, it would be uncovered by hand digging. Protective timbers would be strapped around it. The trench would be deepened to allow the ducts to be installed under the pipeline. The protective timbers would be removed as the trench would be backfilled carefully by hand. A horizontal directional drill would install the cables well under the pipeline and hand digging, once the pipeline was located, would not be required. With either crossing method, the works will be supervised by a Gas Networks Ireland Inspector.

Off-Road Locations

There are a number of special locations along the cable route, at which the cable diverts from the public road or at which a greater construction area is required. At each of these locations it will be necessary to remove the hedgerow or field boundary and install fencing to secure the area. It is recommended that the vegetation be removed outside of the breeding season. Once construction is completed the field boundaries will be reinstated.

These areas include –

- Ramstown;
- Graigue Great Areas 1 and 2;
- Templars Inn;

- Ramsgrange;
- Coleman;
- Railway Crossing at the Campile River Estuary;
- Campile River Estuary to the Great Island Converter Station Site.

Invasive Species Management

The non-native, invasive species Japanese Knotweed, Rhododendron and Three Cornered Leek were recorded within or in proximity to the proposed works area. All three species are listed on both the "Most Unwanted: Established Threat" and on the "High Risk: Recorded Species" lists compiled by Invasive Species Ireland, a joint initiative by the Northern Ireland Environment Agency and National Parks and Wildlife Service. The Amber listed species Winter Heliotrope was recorded within the works area. It is ubiquitous along roadside verges in this area. (Amber list species are species that, in the right ecological conditions, may have an impact on the conservation goals of a protective site or may impact on a water body achieving good/high ecological status under the Water Framework Directive.) An invasive species management plan has been prepared and will be implemented for the duration of the construction phase.

Construction Compounds and Working Areas

Land will be temporarily required to accommodate construction compounds and temporary on-site activities.

Cable Contractor Compounds: Three construction compounds/lay down areas will be required. There will be one at each end of the cable route (i.e. adjacent to the converter station site and at the landfall site close to Baginbun Beach) and one will be located in the townland of Lewistown, along the onshore route.

Horizontal Directional Drilling Contractor compounds: There will be a compound for the horizontal directional drilling contractor adjacent to Baginbun Beach and another at either end of the Campile River Estuary horizontal directional drilling crossing.

Construction Converter Station Compound: This compound will be adjacent to the converter station and tail station.

These compounds will provide space for the storage of construction plant, parking spaces, wheel wash, and the provision of site offices and welfare facilities. In addition the construction compounds/lay down areas will be used for the external storage of plant, ducts, protective tiles, warning tapes, cable drums, duct surround materials etc.

Site Management

Greenlink Interconnector Limited will have a construction management team. The team will be responsible for ensuring compliance with the conditions

attached to all consents and for ensuring that the mitigation measures listed in the Environmental Impact Assessment Report are implemented in full.

A Construction Environmental Management Plan, which includes a schedule of mitigation measures, has been prepared to define the minimum standards which will be achieved during the construction phase of the proposed development. All measures outlined the plan will be implemented in full. Method Statements will be prepared in advance of any works commencing on site.

A Construction Traffic Management Plan, which includes specific construction traffic mitigation measures, has been prepared. The Plan will be implemented in advance of any works taking place. Traffic flows and scheduling will be appropriately planned to ensure traffic to and from the proposed works areas are managed efficiently and effectively.

An Invasive Species Management Plan, which includes specific mitigation measures, has been prepared. The Plan will be implemented in advance of any works taking place in any areas where invasive have been located.

The construction waste management strategy, which includes specific construction waste mitigation measures, has been included in the Construction Environmental Management Plan. It will be implement in advance of any works taking place.

Emergency Response

Appropriate site personnel will be trained as first aiders and fire marshals. In addition, appropriate staff will be trained in environmental issues and spill response procedures. Tanks and drums of potentially polluting materials will be stored in secure containers or compounds which will be locked when not in use. Secure valves will be provided on oil and fuel storage facilities. Equipment and vehicles will be locked, have keys removed and be stored in secure compounds.

There will be a site emergency response strategy which will cover all foreseeable risks i.e. fire, flood, collapse etc.

In preparing this strategy, Greenlink Interconnector Limited will liaise with the emergency response services.

Workforce on Site

It is anticipated that there will be approximately 250 construction employees on site during the peak construction period. Temporary offices and welfare facilities will be installed in three separate locations along the proposed cable route and converter station construction compound. The core construction working hours for the proposed development will be:

- 7am – 7pm: Monday to Friday; and
- 8am – 2pm: Saturday.

Planning and Policy

An Bord Pleanála, in making its decision on the planning application for the proposed development, is required to have regard to the proper planning and sustainable development of the area or region, in which the proposed development will be located. The national, regional, county and local development plans, strategies and policies provide the framework for the proper planning and sustainable development of the area or region.

European and United Kingdom Policy on Interconnectors

The 'Energy Union' launched by the European Commission in February 2015, and endorsed by Member States in October 2015, is driving a fundamental transition towards more innovative ways to produce, transport and consume energy, and to address different approaches to design, implement and, where needed, enforce energy policy. A range of actions will be required to make this happen, including improvements to the interconnectedness of energy grids (both gas and electricity) in Europe. The EU has a target of 10% interconnection by 2020 and 15% by 2030.

The European Commission considers that an interconnected European energy grid is vital for Europe's energy security, for more competition in the internal energy market resulting in more competitive energy prices, and for better achieving the decarbonisation and climate policy targets, to which the EU has committed.

The United Kingdom government has stated that it is committed to mechanisms to continue the efficient cross border trade in electricity between the UK and the European Union after Brexit.

Irish Policy on Interconnection

The National Policy on Electricity Interconnection to Ireland, an Irish Government policy document, sets out the strategic importance of interconnection to Ireland and to the three pillars of the Irish Government's energy policy – sustainability, security of supply and competitiveness.

Regardless of the outcome of Brexit, Greenlink will be an example of how Ireland and the United Kingdom can continue to work positively and profitably together to meet their energy and economic objectives.

Irish Policy on Carbon Emission Reduction

The Energy White Paper 2015

The White Paper "Ireland's Transition to a Low Carbon Energy Future 2015 – 2030" is the Government's most recent energy policy update. The White Paper acts to guide policy and the actions that the Government intends to take in the energy sector up to 2030. The White Paper does not set out detailed proposals or work packages but outlines high level government actions to support an energy transition to a low carbon energy system. Additional interconnection is

recognised as a technology which would support renewable energy generation and enhance security of supply.

National Mitigation Plan 2017

The National Mitigation Plan, which was published in July 2017, is the first Irish Government publication with the primary objective to set out a plan to reduce Ireland's carbon emissions. In July 2020, the Supreme Court rules that the 2017 Plan did not comply with the requirements of the Climate Action and Low Carbon Act 2015 as it was not specific enough. A replacement plan has yet to be published. It is expected that the replacement plan will have similar objectives to the 2017 Plan. The Plan includes over 100 individual actions for various Ministers and public bodies to take forward. Section 3.1 of the Plan recognises the role of interconnectors in supporting decarbonisation of electricity generation, i.e. reducing the emissions of carbon dioxide from power generation.

Climate Action Plan 2019 to Tackle Climate Breakdown

The Plan sets out the actions the Government intends to take to address climate breakdown across sectors such as electricity, transport, built environment, industry and agriculture. In Section 7.2, the Plan sets out a target of 70% renewable electricity generation by 2030. The plan acknowledges that to achieve this will require greater interconnection with other countries, in addition to other measures.

Planning Framework

National Planning Framework Project Ireland 2040 (February 2018)

One of the primary objectives of the National Planning Framework is to improve resource efficiency and promote the movement towards a low carbon economy. The aim is to achieve this by:

- Sustainable land management and resource efficiency;
- Low carbon economy; and
- Renewable energy.

The proposed development supports this objective as it supports the growth of and integration of low carbon and renewable energy.

National Development Plan 2018 – 2027

The Department of Public Expenditure and Reform published the most recent National Development Plan 2018 - 2027 in February 2018. Of the ten national strategic outcomes, which the Government intends to achieve in the lifetime of the plan, number eight relates to the "Transition to a Low-Carbon and Climate-Resilient Society". To achieve this outcome the plan identifies various strategic investment priorities and investment actions which includes "*Develop further interconnection to increase energy security and facilitate more variable electricity generation on the grid….*"

Regional Spatial and Economic Strategy for the Southern Region 2020

The Regional Spatial and Economic Strategy came into effect on 31st January 2020. The Southern Region comprises counties Cork, Clare, Kerry, Limerick, Tipperary, Waterford, Carlow, Kilkenny and Wexford. The Southern Regional Spatial and Economic Strategy sets out a 12-year strategic development framework for the Southern Region.

The policies in the Strategy are structured under Regional Policy Objectives (RPOs) and MASP (Metropolitan Strategic Area Plan) Objectives.

Greenlink aligns with several objectives of the Strategy's regional policy objectives.

Overall Strategy number 8 is stated on page 27 as follows:
"*Safeguarding and enhancing our environment through sustainable development, prioritising action on climate change across the region, driving the transition to a low carbon and climate resilient society.*"

The sector specific regional policy objectives relating to action on climate change and supporting low carbon energy development include:

- **RPO 87** - Low Carbon Energy Future
- **RPO 95** - Sustainable Renewable Energy Generation
- **RPO 96** - Integrating Renewable Energy Sources
- **RPO 99** - Renewable Wind Energy
- **RPO 103** - Interconnection Infrastructure

Wexford County Council Development Plan 2013 - 2019

The Wexford County Development Plan 2013 – 2019 is the current plan for the County. There are several objectives in the Wexford County Development Plan which are supported by the proposed development. Greenlink will improve the energy network in Ireland and will support significant low carbon generation development.

Conclusion

EU and Irish national energy policy and climate action plans, discussed above, identify greater interconnection of the Irish electricity grid with other countries as a key requirement to facilitate increased renewable electricity generation.

By providing additional interconnection for the Irish electricity grid, Greenlink will further the objectives of the National Planning Framework and the National Development Plan, the Regional Spatial and Economic Strategy and the Wexford County Development Plan. Greenlink will enhance the security of the energy supply, underpin the decarbonising of energy generation in Ireland and bring economic benefits by increasing competition in the Irish electricity market.

Environmental Topics

The next sections of this non-technical summary summarise the assessments of the effects on the environment of the construction, operation and decommissioning of the Greenlink project.

Traffic and Transportation

To assess the impact of the proposed development on the local road network, an examination of existing traffic flows in the area was carried out. Traffic counts were undertaken during August 2018 and November/December 2018. The traffic flows recorded were quite low, as would be expected given the rural nature of the area. Flows were generally higher in summer due to tourist traffic, particularly in the southern part of the study area (i.e. in the area close to Baginbun Beach).

The level of traffic generated during the construction phase of the proposed development will be noticeable because the current levels of traffic on the road network are very low.

The traffic will consist of construction staff commuting to and from the working areas, as well as general construction traffic associated with the delivery of materials and removal of waste. The following activities will also generate construction traffic and will be on a once-off basis during the construction period:

- Delivery and removal of construction equipment; and
- Delivery and removal of lifting and hoisting equipment.

It is estimated that there will be approximately 50 staff per day at each of the cable compounds, eight at the HDD compound in Campile, and 190 staff at the converter station at the peak of construction. Heavy goods vehicles (such as trucks, construction tractors and trailers and low loaders transporting construction equipment) trips to and from the site locations have been calculated based on the volumes of material for import/export and other construction deliveries. Heavy goods vehicles trips will likely be spread evenly over the day.

The construction works along the cable route will be timed to avoid the summer tourist season. It is acknowledged that whilst the increase in traffic due to the construction of the cable route will be minimal, there will be a certain level of inconvenience to local residents and businesses along these routes as a result of the works, in particular due to their linear nature and temporary lane or road closures. Where roads will be closed, there are alternative routes available, which have ample spare capacity. Lane closures with stop/go systems are considered to have a slight to moderate temporary effect on traffic conditions along this section of the cable route.

The works will be co-ordinated to minimise these effects in consultation with the local authority and local residents.

During construction the following effects have been identified for the various works areas –

Table 1: Construction Effects on Traffic

Location		Effect
Converter Station		**A moderate to significant temporary negative effect on traffic conditions**
Landfall Site		**A moderate temporary negative effect on traffic conditions Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.**
Cable Route from the Converter station to Ramsgrange Village	This section will require: • Full Road Closure of 200m stretches: 10 days total • Stop/Go system of 120m stretches: 47 days total • Works in Verge (with road open as normal) of 70m stretches: 6 days total	**A short term significant negative effect on traffic conditions, for duration of the cable works Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.**
Cable Route from Ramsgrange Village to the Templars Inn	• Stop/Go system of 120m stretches: 66 days total • Works in Verge (with road open as normal) of 70m stretches: 2 days total	**A short term significant negative effect on traffic conditions, for duration of the cable works Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.**
Cable Route from Templars Inn to the landfall site	• Full Road Closure of 200m stretches: 10 days total • Stop/Go system of 120m stretches: 25 days total • Works in Verge (with road open as normal) of 70m stretches: 15 days total	**A short term significant negative effect on traffic conditions, for duration of the cable works Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.**

The traffic levels during the operational phase of the proposed development will be very low and will therefore be imperceptible. Traffic levels for the decommissioning of the project will be less than that associated with the construction works and the impact of this traffic will be less. There will be very

little decommissioning works along the cable route. Decommissioning effects on traffic are predicted to be short term and slight.

A Construction Traffic Management Plan has been prepared and will be in place for the duration of the proposed works. The effectiveness of the construction traffic management plan will be continually monitored to ensure the effects on traffic flows on the surrounding road network are minimised and additional mitigation measures are introduced as required to assist the flow of traffic. No mitigation or monitoring measures are required for the operational phase.

Following the implementation of the proposed mitigation measures, at most there will be a short-term significant impact on the residents and road users in the vicinity of the high voltage direct current cable trench excavations and cable installation works for the duration of the works. No significant residual effects are predicted as a result of the operational phase of the proposed development.

Air Quality and Climate

Air Quality

The air quality assessment is concerned with the presence of airborne pollutants in the atmosphere. To reduce the risk of poor air quality, National and European statutory bodies have set limit values to the concentrations of air pollutants in ambient air. These limit values are set for the protection of human health and biodiversity. The limits are set out in the Air Quality Standards Regulations.

The Environmental Protection Agency monitors and reports on air quality in Ireland. The Environmental Protection Agency has found that the background levels of the air pollutants, which would be relevant to the proposed development, are very low in rural areas in Ireland like Great Island and Hook Head. The background levels in rural areas are well below the limits set in the Air Quality Standards Regulations.

The primary air quality issue associated with the proposed construction works would be the dust and exhaust emissions during the construction phase.

Dust emissions are likely to result from site excavation and earthworks, excavation of the cable trench, stockpiling of materials, handling of construction materials, construction traffic movements and landscaping in dry windy weather. Airborne concentrations of dust particles arising from the construction works would be low and very local to the construction areas. Particles generated by most construction activities tend to be larger than 10 micrometres in diameter, and too large to enter the human lung. The construction phase of the proposed development is of a moderate scale. Once the proposed dust minimisation measures are implemented, construction activities have the potential for dust to settle within 50m, and particles, less than 10 micrometres in diameter, and vegetation effects within 15m of the works.

Several sensitive receptors, primarily neighbouring dwellings, are located along the route of the onshore cables. The closest dwelling is located approximately one metre from the edge of the proposed cable route works area.

The exhaust from construction vehicles and equipment will contain air pollutants such as nitrous oxides, nitrogen dioxide, sulphur dioxide, particles less than 10 micrometres in diameter and particles less than 2.5 micrometres in diameter. It is not predicted that there will be an exceedance of the Air Quality Standard limits for these pollutants during the construction phase. No odour emissions are predicted from the proposed construction works.

There will be short term increases in traffic volumes on local roads during temporary (typically 10-day) diversions for cable trench construction. The changes will be well below a ten percent increase in the annual average traffic volume. This is the level which would trigger the need for detailed modelling of air emissions. A short term, imperceptible effect on air quality is predicted.

No significant indirect effects on biodiversity or human health, due to emission to air, are predicted during the construction phase.

There will be no routine process emissions to air from the operation of the proposed development. The only potentially significant source of emissions to air from the operation of the proposed development will be the exhaust from the standby diesel generator. There will be no exceedances of the Air Quality Standards as a result of this equipment. In normal circumstances the generator will only run for eight hours a year, as part of its routine maintenance. There will not be a significant increase in traffic during the operational phase. An imperceptible effect on air quality is predicted.

Decommissioning of the proposed development will involve activities which will be similar to the construction phase but on a smaller scale. There is not expected to be a significant effect on air quality during the decommissioning phase.

No significant negative residual effects on air quality are predicted during the construction, operation or decommissioning phases of the proposed development.

Climate

The Environmental Protection Agency Report *Ireland's Greenhouse Gas Emission Projections 2018-2040* (EPA, 2019d) projects Irelands total emissions of the greenhouse gases. These are the gases which cause climate change. Greenhouse gas quantities are usually stated in carbon dioxide equivalent. Ireland has a target to reduce greenhouse gas emissions by 2040 to less than 20% of the 2005 level for the electricity, building and transport sectors. The current projections indicate that Ireland will not meet this target.

Given the scale of the proposed works, and their temporary nature, the carbon dioxide emissions predicted to arise during the construction phase of the proposed development are not expected to be significant, and a short-term, imperceptible negative effect on climate is predicted.

There will be no combustion processes and no routine emissions of greenhouse gases from the proposed development during operation. Direct negative

operational effects on climate will arise from the combustion of diesel in the standby generator, which will result in a imperceptible effect on climate. Sulphur hexafluoride will be used in closed systems at two locations at the converter station. Sulphur hexafluoride is an extremely potent greenhouse gas and therefore strict controls will be established to ensure best industry practice in the management, reporting, monitoring and controls of the gas.

As an interconnector, Greenlink has the potential to save circa 59 million tonnes of carbon dioxide emissions over its 40-year life. It would do this by enabling the export of electricity generated by renewables, if there is a surplus in Ireland, to replace electricity generated by fossil fuels in the United Kingdom and enabling the import of electricity generated by renewables in the United Kingdom if the demand in Ireland exceeds the supply of electricity generated by renewables.

Decommissioning of the proposed development will involve activities which will be similar to the construction phase but on a smaller scale. There is not expected to be a significant direct effect on climate during the decommissioning phase. However, the beneficial effect of the operation of Greenlink on climate will cease once the proposed development is decommissioned.

Noise and Vibration

An assessment of the noise and vibration effects arising from the proposed development on the existing environment was carried out for the construction, operation and decommissioning phases. The baseline noise environment was determined by conducting attended surveys at noise sensitive locations near the proposed development. The Noise sensitive locations were dwellings. The proposed development, including the converter station site, landfall site, onshore cable route and all associated construction compounds are located in rural areas with low background noise levels.

The highest noise levels will be generated during the site preparation, excavation and foundation stage at the site of the converter station and tail station. These activities will include excavation in rock, rock breaking or blasting, rock crushing and pile-driving. For the cable construction, the excavation of the trench will give rise to the highest noise levels. The joining of cables at the joint bay also contributing to the predicted noise levels. The horizontal directional drilling at the crossing of the Campile River Estuary and at the landfall site will give rise to relatively lower noise levels but the operation will last longer than excavating the trench at any location.

Construction noise was assessed using the guidance provided in the appropriate British Standard Code of Practice for Noise and Vibration Control on Construction and Open Sites for noise at dwellings. A worst-case scenario was assessed. Construction of the cable trench and activities at the joint bays will result in a temporary and locally significant effect at nearby dwellings. No significant noise effects are predicted as a result of horizontal directional drilling. Similarly, no significant noise effects are predicted during construction works at the converter station, tail station, associate infrastructure and contractor compounds.

No significant vibration effects are predicted during construction works.

Noise and vibration from construction traffic will not be significant.

During operation, there will be no operational noise or vibration effects from the occasional maintenance and testing of the cable. Noise emissions from the converter station and tail station will have a long-term slight negative effect on the closest dwellings. However, the noise emissions will not exceed the relevant limits set by the Environmental Protection Agency for noise from industrial activities.

Noise and vibration effects during decommissioning will be less than those outlined for the construction and operational phase.

Mitigation measures which will be implemented as required, including: the selection of quiet and low vibration equipment; review of construction programme and methodology to consider quieter methods (including non-vibratory compaction plant, where required); sensitive location of noise generating equipment on site, control of working hours; the provision of acoustic enclosures and the use of less intrusive alarms; such as broadband vehicle reversing warnings; and screening - for example local screening of equipment, perimeter hoarding or the use of temporary stockpiles.

Operational mitigation requires the final converter station design to comply with maximum parameter noise values to ensure there are no significant effects at local receptors.

There will be temporary and locally significant noise effects at residences located adjacent to the cable route. At any given location these effects will be of short duration, and mitigation measures outlined above will be implemented to ensure that the adverse effects are minimised. No significant vibration effects are predicted associated with the cable route construction. There will be no significant residual noise or vibration effects arising from the construction works at the site of the converter station and tail station or during the operation and decommissioning of the proposed development.

Biodiversity

Biodiversity refers to the interactions and variety of, and variability within species, between species, and between ecosystems. An ecosystem is a community of living organisms in conjunction with the non-living components of their environment, interacting as a system. Ecology is concerned with the interrelationship of organisms and their environments.

The likely effects on biodiversity from the proposed development during its construction, operational and decommissioning phases were assessed.

As well as reviewing existing information, a number of specialist surveys were carried out to establish the current baseline ecological condition of the study area. These studies included a habitat survey, invasive species survey, winter bird surveys, breeding bird surveys, barn owl survey, general mammal survey, bat emergence survey, bat day time roost/winter hibernation survey, an tree survey and a visual survey of the Kilmannock (Newtown) Stream.

The National Parks and Wildlife Service, Inland Fisheries Ireland and Birdwatch Ireland were among the stakeholders consulted.

A natural impact statement has been prepared, to comply with the requirements of the European Union Habitats Directive. The natural impact statement provides information on the potential effects of the proposed development on Natura 2000 sites. Natura 2000 sites are sites designated under the Habitats and Birds directives for the protection of certain habitats and species and wild bird, respectively. The National Parks and Wildlife Service had specified the qualifying interests, i.e. the species for which the Natura 2000 site is designated, and the conservation objectives, i.e. the condition to be achieved by the species and habitat types within the Natura 2000 site in order to maximise the contribution of the site to achieving favourable conservation status at the national, biogeographical or European level.

The natural impact statement concluded that, following a comprehensive evaluation of the potential direct, indirect and cumulative effects on the qualifying interests and conservation objectives for the relevant Natura 2000 sites, the proposed development, either alone or in combination with other plans or projects, will not have an adverse effect on the integrity of any Natura 2000 sites.

Terrestrial and Aquatic Habitats and Species

Invasive Species

Four non-native invasive species, Japanese Knotweed, Rhododendron, Three Cornered Leek and Winter Heliotrope, were recorded within and adjacent to the proposed development area. Where possible the proposed development will avoid direct effects on these species and with the implementation of the mitigation measures specified in the Invasive Species Management Plan, the proposed development will not cause these species to spread outside their current distribution.

The operational phase will have no effect on invasive species.

Otter

Following a survey carried out in 2018 and 2019, the presence of otter was recorded at Baginbun Beach and along the Campile River Estuary. No holts or couches were recorded. Based on the absence of otter breeding sites, the distance of the horizontal directional drill sites from high value otter habitat and the short-term nature of the construction works, the effect on otter during the construction phase is expected to be short-term, slight and negligible.

Bats

A bat survey was carried out at Dunbrody Bridge, over the Campile River Estuary in September 2018. While no bats were recorded emerging from the bridge, the survey did detect limited usage of the surrounding area by Brown Long-eared Bat, Daubenton's Bat and Leisler's Bat. The bat survey results are indicative of bat activity along the section of the Campile River Estuary, where the cable route will cross it.

Construction of the proposed development will result in the loss of immature woodland, scrub and small areas of grassland around the proposed converter

station site and small areas of grassland, hedgerow, treeline and scrub habitat along the proposed cable route, which will reduce the net feeding area available for bats. The effect will be temporary to long term and slight in the context of the amount of similar habitat in the surrounding landscape.

Overall the effect on bats is predicted to be long term and slight and the effect will be localised and will not significantly affect overall bat populations as there will be no significant loss of critical resources for bats.

During operation, artificial lighting from the proposed converter station site could have a potential negative and long-term effect on bat behavior. The external lighting being switched off during the hours of darkness. The planting of approximately 15,000 native mixed-woodland trees and zones of grassland meadow will provide breeding and nesting habitat for bats. The resulting effect on bats during the operational phase will be long term and slight.

Badger

A main badger sett was recorded within the woodland habitat approximately 220m southwest of the northern terminal of the Campile River Estuary horizontal directional drill. An active annexe sett was recorded approximately 50m east of the main sett along the northern periphery of the woodland habitat. Although grassland habitat suitable for foraging was recorded within the proposed works area, no specific signs of badger foraging were recorded.

Badgers could potentially be affected via loss of habitat, increased noise and disturbance and via direct impacts on setts. In this instance there will be no direct effect on the setts. The setts are not located in proximity to the proposed development area and due to the distances involved no effect on badger using these setts, including badgers that could potentially be breeding, will occur.

It is concluded therefore that the removal of habitats within the proposed onshore route will not have significant effects on badgers although changes in feeding patterns may occur during construction. Overall the effect is predicted to be temporary and slight.

Other Mammals

Signs of Irish Hare were recorded within the proposed converter station site and other mammal species such as such as Sika Deer, Hedgehog, and Red Squirrel could potentially occur within the proposed development area. Most of the works will impact on common habitats. Effects on these species due to loss of habitat and increased noise and disturbance, and lighting are predicted to be long-term and slight at the converter station and temporary and slight within the proposed cable route and at compounds and other offline areas.

Birds associated with terrestrial habitats

The terrestrial bird species recorded during bird surveys are typical of the types of habitat noted on site and are generally common. No rare or uncommon bird species or species of high conservation value were recorded. There will be a net loss of semi-natural habitats within the proposed development area and the loss of scrub, in particular, will have a localised effect on nesting and feeding resources for common bird species. However, the scrub within the proposed converter site is not diverse or of particularly high value. Overall, the loss of

habitat for breeding birds within the development site is considered a long term, slight effect.

Some disturbance/displacement of terrestrial and breeding birds may occur during construction due to increased noise and disturbance. However, this will be short in duration. The effect is therefore predicted to be temporary and slight. Disturbance levels will be relatively low during operation, this is considered a long-term, slight impact.

Birds associated with shoreline/estuarine habitats

Bird surveys were carried out to determine the degree to which the shoreline/estuarine habitats and waters in proximity to the proposed development site are utilised by birds and, in particular, important populations of overwintering waders and waterfowl. A total of 26 species were recorded during the winter bird surveys. Effects on birds near the proposed development areas could potentially arise during construction when levels of noise and activity increase.

There will be increased activity during works, although only activities near the Baginbun Beach and the Campile River Estuary or at height will be visible to birds feeding within shoreline/estuarine habitats.

Shoreline/estuarine habitats adjoining the proposed development areas are already subject to relatively high levels of disturbance and to a degree, any birds which utilise these areas will have become accustomed to high levels of daytime disturbance.

Overall, given the scale and temporary nature of the works, the distances involved, existing disturbance factors and avoidance of works in key areas during the bird wintering period, there will be no significant effect on bird populations utilising estuarine and marine habitats.

Effects on other fauna

No signs of amphibians or reptiles were recorded. The proposed development area is only likely to support common invertebrate species.

Given that the habitats which will be affected are relatively common in the surrounding landscape and the limited scale and short-term nature of the proposed development works, any effect on these species during construction will be temporary and slight.

Potential effects on water quality and aquatic ecology

There are no substantial freshwater habitats which will be affected by the construction works. The Campile River Estuary which will be crossed via horizontal directional drill is estuarine at the crossing point. A horizontal directional drill method will also be employed at Baginbun Beach and thus there is the potential to impact on the marine environment. It is intended that the Kilmannock (Newtown) Stream will be crossed using trenchless techniques (mini-horizontal directional drill), which will result in no direct interaction with the water quality and aquatic ecology.

In the unlikely event that the Kilmannock (Newtown) Stream is crossed via an open-cut methodology, mitigation measures will be implemented to ensure

ecological impacts are minimised. Overall it is concluded that the crossing of the Kilmannock (Newtown) Stream will have a temporary, slight effect on water quality and aquatic ecology.

The effect on water quality and aquatic ecology during construction is predicted to be short-term and not significant to slight.

Operational effects from noise and visual disturbance

There will be no ongoing noise and disturbance associated with the cable route apart from occasional maintenance works. There will be a long-term increase in noise and activity at the converter station during operation. It is noted that the converter station will be located in proximity to the existing Great Island gas fired Power Station and therefore existing levels of noise and activity will already be relatively high. It is also noted that noise mitigation measures are integrated into the design of the converter station.

Given the distance from the Bannow Bay Special Protection Area, the existing levels of noise and activity in this general area, the ability of winter birds to become accustomed to increased levels of light, noise and activity, no effect on the winter birds listed as qualifying interests for the Bannow Bay Special Protection Area will occur.

During the operational phase the levels of activity will stabilise and birds and mammals in the surrounding landscape will become accustomed to increased activity. Two personnel will be stationed at the converter station at all times and levels of activity will be low. The effects on birds and mammals in habitats adjoining the proposed development is therefore predicted to be long term and not significant during operation.

Decommissioning

As the site of the converter station and cable route is generally of low biodiversity interest, the impact of decommissioning will be temporary and not significant following the implementation of standard mitigation measures.

Conclusion on Biodiversity Impacts

All potential ecological constraints were identified and incorporated into the project design and appropriate mitigation specified. Overall, it has been concluded that the project will not have a significant effect on ecological receptors and no significant on ecology has been identified.

Archaeology, Architectural and Cultural Heritage

This assessment studied the likely effects on archaeological, architectural and cultural heritage from the proposed development, during the construction, operational and decommissioning phases.

Archaeology

The area, in which the proposed development is located, is located on the eastern side of the river estuary. It was easily accessible by sea from early antiquity and this is reflected in the region's cultural heritage. The extensive maritime connections of the area influenced the development of the region and this is reflected in the visible monuments, particularly from the medieval period onwards.

There are four areas where the proposed cable route and associated working areas traverse the archaeological zone (zone of archaeological constraint) around known archaeological monuments. These are:

- Baginbun (Ramstown) Anglo-Norman Invasion landing site and earthworks;
- Templetown Possible Deserted Medieval Village;
- Kilcloggan Castle – adjacent to archaeological constraint zone; and
- Dunbrody Cistercian Abbey, Parish Church and graveyard and Castle (Jacobean House).

The proposed development is not likely to have an effect on known archaeological features. It is possible however, that previously unrecorded archaeological remains may be uncovered during topsoil stripping in areas not previously developed.

Architectural Heritage

The proposed development will have no effects on architectural heritage within the development area as the proposed cable route, converter station or tail station are not within the curtilage of any upstanding protected structures.

Underwater Archaeology

The proposed development includes a landfall close to Baginbun Beach, a river crossing of the Campile River Estuary at Dunbrody and a crossing of the Kilmannock (Newtown) Stream. The construction methodology at the landfall site will be horizontal directional drill with an on-shore reception pit. There will consequently be no significant effects in the context of marine or coastal archaeology. The crossing of the Kilmannock (Newtown) Stream, to the north of the converter station and tail station site, will be undertaken by mini-horizontal directional drill or open cut. If the crossing is done by open cut, it will be subject to surveying to ensure any unknown features are identified and avoided and archaeological monitoring, under licence. An archaeologist will be onsite for the excavation of the trench across the stream. The Campile River Estuary crossing will also be constructed using horizontal directional drill and there will be no effects on the river course or banks.

The operation of the proposed development will not have any adverse effects on archaeology, architectural or cultural heritage.

Considering no intrusive, below-ground works are associated with decommissioning, no significant effects on archaeology, architecture or cultural heritage are predicted during decommissioning.

With the implementation of the archaeological mitigation measures such as monitoring by a suitably qualified archaeologist, no significant residual effects on archaeological, architectural and cultural heritage are predicted during the construction, operation and decommissioning phases.

No effects on social cultural heritage, such as the literary and artistic associations, are expected.

Landscape and Visual

This assessment considers the proposed landscape and visual effects from the proposed development. The assessment was formed by several site surveys and Zone of Theoretical Visual Influence mapping. Zone of Theoretical Visual Influence mapping is produced by a computer program which creates a three – dimensional model of the development set into the surrounding hills and valleys. The program predicts the surrounding areas, from which the proposed development will be visible.

The main elements of the proposed development that have the potential to give rise to Landscape and Visual impacts are outlined below:

- A converter station and tail station to the east of Great Island 220kV substation and power station,
- Alterations to ground levels utilising soils and materials on the converter site; and
- The landfall of the offshore cable together with onshore cable route with cable laid below ground.

The proposed development will also have a number of associated features which may also giving rise to landscape and visual impacts, namely:

- Removal of existing scrub vegetation on the converter site and sections of hedgerow at tight bends in the road along the route of the underground cable from Baginbun Beach;
- Construction activity, contractor's compounds, and stockpiles;
- Site security fencing and boundary treatments;
- Staff car parking;
- Planting of additional trees and vegetation;
- Permanent marker posts; and
- Link boxes.

The following elements of the proposed development will create temporary visual impacts, including from locations of heritage sensitivity:

- Construction activity, contractor's compound and car parking, temporary lighting, laying underground land cables, landing of undersea cables and construction storage areas.

- At the time of joining the land cable with the sea cable at Baginbun Beach, there will be the presence of a large specialised cable laying ship and other craft which will be visible from properties surrounding Baginbun Beach.

Construction Impacts

Effects of the proposed Converter Station on Landscape Character

The large-scale nature of the converter station site buildings and structures, and associated significant excavation works, will have locally moderate, negative effects on the landscape character of the site, particularly from the immediate area to the north at Great Island. It is considered that the landscape is sufficiently robust to accommodate this development with an increased intensification of use of the site.

Effects of the landfall site on Landscape Character

Some localised effects on nearby residents, beach visitors and nearby cultural heritage features at Baginbun Beach will arise due to the presence of the drilling rig and associated compound, and cable ship in the bay, which are considered to be locally moderate negative, and temporary.

Effects of the Cable Route on Landscape Character

For most of its route, the underground cabling will impact on the landscape for the temporary/short-term phase, during construction and for a brief period afterwards. Once construction is complete, the cable route will be buried, and the land will be reinstated to the original land use and boundaries replaced. In addition, where the cable trench was located within the road, the asphalt will be reinstated. The visual receptors affected by the cable route are predominantly small settlements (Ramsgrange and Dunbrody), scattered farmsteads, residential properties, Templeton Church, and tourists visiting the area. Effects are considered to be locally significant, negative, and temporary.

Visual Receptors

The potential for visual impact will fluctuate at the converter station and tail station site throughout the period of construction, particularly during specific construction operations relating to the taller structures. As construction progresses on these elements there would be a gradual change in the visual 'environment' as the working height changes.

Additional temporary visual effects will be caused as a result of construction vehicle movements to and from the construction site and for general construction operations.

During the construction period of the cable landing at Baginbun and horizontal directional drill crossing under the Campile River Estuary, temporary visual impacts will be evident because of construction operations. There will be no direct effect on the beach or coastline at Baginbun, or the estuary at Campile. Due to the sensitivity of the coastal and estuarial setting (residents and beach visitors), impacts will be locally significant, negative but temporary in nature.

The laying of underground cable will temporarily impact locally during construction and for a brief period afterwards, which are considered to be

locally significant, negative, and temporary in nature for nearby adjoining residents. Once construction is complete the cable route will be buried, and the land reinstated to the original condition, with land use and boundaries replaced.

Operational Impacts

Landscape Character

The development of the converter station and tail station compound will inevitably bring about a degree of change to the landscape character of the site, immediate surroundings, on nearby residential properties and cultural heritage features. At a site level the change of use from agriculture to industrial use, regrading and planting will significantly change the character of the site. Outside the site, in the area immediately north of the site in Newtown/Great Island the effect will be noticeable leading to moderate, negative and long-term effects. In the wider landscape, due to the intervening distance, topography and vegetation limiting views of the proposed converter buildings and compound, the proposed development will only form a small part of the overall landscape, leading to slight, negative or neutral and long- term character effects, depending on the viewing location. It is considered that the landscape is sufficiently robust to accommodate this development with an increased intensification of use of the site.

As the cables will be laid underground, there will limited effects on the landscape character of these areas, with slight negative effects where marker posts and cable link kiosks will be visible along the cable route.

Visual Impact Assessment

As the cables will be underground, there will be no long-term visual effects along their route, apart from occasional marker posts which indicate the presence of the underground cable entering and exiting agricultural land and the occasional link box.

Due to the scale of the proposed converter building site and compound, it will be visible from a number of locations with varying sensitives to changes in the visual environment. The surrounding areas of the landscape, where the converter site and compound will be visible, include areas of settlement, routes used for walking, cycling, and driving and recreational areas. Ten viewpoints within a five-kilometre radius were assessed. (with one viewpoint outside this area at Slievecoillte). Photomontages accompanying the assessment illustrated the existing environment and the proposed development with other unbuilt but permitted projects. At worst, a moderate negative effect on nearby residents is predicted at Newtown / Great Island and The Strand, Cheekpoint Village, County Waterford.

Landscaping and replanting at the converter station and compound and along the cable route, where hedgerows and vegetation were removed, will be carried out to reduce landscape and visual effects. The proposed building colour and materials, as well as the proposed landscape mounding and planting, will complement and successfully integrate the proposed development into the landscape and visual environment. Ecological expertise informed the selection of the proposed planting mix.

On maturity of the landscape mitigation, there will be no significant visual impacts, and no significant impacts on landscape character during the operation of the proposed development.

Decommissioning Impacts

During the decommissioning phase all above ground civil works associated with the converter station, tail station and cable rote will be removed, and the site returned to its previous state. To minimise environmental impacts underground cables will remain in-situ. The impact of decommissioning with be not significant.

Land, Soils, Geology and Hydrogeology

This section describes the likely effects of the proposed development on land, soils, geology and hydrogeology. Geology involves the materials that make up the Earth, the natural features and structures on Earth and the processes which act on them. Hydrogeology is the distribution and movement of water in the soil and rock below the ground.

The predicted construction and residual effects of the proposed development on geological features are outlined in **Table 2** below.

Table 2: Summary of Construction and Residual Effects

Feature	Importance		Magnitude of Impact		Significance of Impact	Mitigation Measures	Residual Impact	Residual Significance of Impact
	Ranking	Justification	Ranking	Justification				
Compression of soil and/or rock layers below ground	Low	Subsoils have experienced higher levels of compression in the past	Small adverse	Removal of soils and replacement with structures or placement of structure on the subsoils will not impact on the characteristics of the soils	Imperceptible	Movement monitoring, Implementation of Construction Environmental Management Plan	Negligible	Imperceptible
Loss of agricultural land topsoil and subsoil	High	Well drained and/or high fertility soils	Small adverse	Irreversible loss of a small proportion of local high fertility soils	Moderate / slight	Area in which soils will be removed permanently has been minimised in the design. Soils will be replaced in the cable trench and at the construction compounds on completion of construction	Negligible	Imperceptible
Loss of rock	Low	Rock has a low value on a local scale	Large adverse	Loss of a small proportion of any possible rock which could be quarried and used as an aggregate	Moderate / slight	Volume of bedrock removed permanently has been minimised in the design	Moderate adverse	Slight

Feature	Importance		Magnitude of Impact		Significance of Impact	Mitigation Measures	Residual Impact	Residual Significance of Impact
	Ranking	Justification	Ranking	Justification				
Effects of excavation on surrounding ground	Low	Soils have experienced higher levels of compression in the past therefore settlement is unlikely	Small adverse	Adequate design of temporary works limits movements to an acceptable limit	Imperceptible	Excavation support, Movement monitoring, Ground settlement control, Implementation of Construction Environmental Management Plan	Negligible	Imperceptible
Excavation of soft mineral soils	Low	Volume of soft soil (deposited by water action) to be excavated is small on a local scale	Small adverse	Requirements to excavate small proportion of soft mineral soils beneath the route	Imperceptible	Implementation of Construction Environmental Management Plan	Negligible	Imperceptible
Mobilisation of soils that had settled to the bottom of a water body	High	Due to the close proximity to sensitive environments	Small adverse	Based on ground conditions, there should be limited mobilisation of those sediments.	Moderate / Slight	Implementation of Construction Environmental Management Plan	Negligible	Imperceptible

The converter station and tail station site and approximately 8km at the northern end of the cable route is underlain by a regionally important bedrock aquifer. An aquifer is an underground layer of permeable water-bearing rock, fractures in the rock, or soil. The bedrock will be excavated to form the platform for the converter station and tail station. Precast piles will be used for the foundations of the converter station and tail station. The precast piles will only penetrate as far as the weathered top of the bedrock, not into the intact rock. The installation of the precast piles does not have the potential to impact the bedrock aquifer. Due to the shallow depth of the excavation in the bedrock at the converter station and tail station site, the magnitude of the impact on the aquifer will be small, adverse.

The horizontal directional drill bore for the Campile Estuary River crossing is expected to have a 200mm to 250mm outer diameter. It will be a closed system, with drilling fluid recirculated, the drill cuttings recovered, and drilling fluid reused. The cable trench excavation will, typically, be less than two metres deep. Consequently, the magnitude of the impact of the cable route on the bedrock aquifer is expected to be small adverse.

The operational phase of the proposed development will have an overall neutral long-term impact on the soils and geology along the routes. Coastal erosion will have no effect on the proposed development, as the cables and structures will be located sufficiently distant from areas vulnerable to erosion.

With the implementation of appropriate mitigation measures and monitoring, no residual effects of significance on land, soils, geology and hydrogeology are predicted during construction, operation or decommissioning.

Water and Hydrology

Hydrology is concerned with the movement, distribution and management of water.

An assessment was undertaken to identify the likely effects of the proposed development on surface water, water quality and the existing hydrological regime during the construction, operation and decommissioning phases of the proposed development. The vulnerability of the proposed development to flooding, and the effect of the proposed development on flood risk outside the site boundaries, were also assessed.

Water Quality and Hydrology

The Kilmannock (Newtown) Stream is located close to the eastern and southern boundaries of the converter station site. The Barrow and Campile River Estuaries are located circa 250 metres east and south of the converter station site, respectively.

No streams or rivers are located in close proximity to the landfall site at Baginbun Beach. Given its linear nature, several streams and rivers cross the onshore cable route between the converter station site and the landfall site.

The Environmental Protection Agency samples surface water bodies in Ireland and publishes water quality data. No surface water quality values for the

watercourses near the proposed development are available from the Environmental Protection Agency website. The proposed converter station is located adjacent to the Barrow, Suir and Nore Estuary, which is classified as a transitional water body, i.e. a water body connecting a fresh water river to the sea. The proposed cable route traverses the Campile River Estuary, which is part of the same water body.

The Environmental Protection Agency has assigned an "intermediate" water quality status to the water body, and it is classified as "not at risk" (of the water quality getting worse), downstream of the converter station site (including the Campile River Estuary).

The potential effects on surface water during the construction phase of the proposed development, in the absence of mitigation measures, include the following:

- Silt-laden surface run-off during site preparation, site clearance and construction of site access roads;
- The washing of construction vehicles and equipment may pose a pollution risk to watercourses in the area if undertaken in inappropriate locations;
- Excavations at the converter station site, landfall site and trench excavation for the onshore cable are likely to require temporary dewatering, which has the potential to generate runoff containing silt/sediment;
- Spillages of fuel, oil and concrete/cement run off from site vehicles and plant;
- Dewatering and storage of excavated materials are likely required during excavations which has the potential to generate run-off containing silt / sediment;
- The preferred method to cross the Kilmannock Stream (Newtown Stream) is a horizontal directional drill. If an open-cut trench crossing of the Kilmannock Stream (Newtown Stream)is used, it will incorporate damming the stream upstream and downstream of the crossing point, subject to the approval of Inland Fisheries Ireland. Temporarily the water in the stream would be pumped from above the upstream dam to below the downstream dam. This operation has the potential to release silt into the stream; and
- The proposed horizontal directional drill across the Campile River Estuary has the potential to generate run-off containing silt/sediment.

All of the above potential effects would be likely to be short term significant negative effects.

Potential effects on hydrology during the operational phase will be solely as a result of maintenance of the proposed development. The main contaminants potentially arising from maintenance activities, in the absence of mitigation measures, include hydrocarbons from inappropriate handling and storage and faecal coliforms from leaking of foul water sources. These effects, should they occur, will be temporary and minimal.

No significant effects on water and hydrology are predicted for the decommissioning of the proposed development.

The mitigation measures will be implemented to ensure that the construction of the proposed development will not have a significant effect on water quality. The measures will include control of rainwater runoff, silt removal and precautions for the proper storage of liquids and fuels in the construction compounds. The mitigation measures are described in the Construction Environmental Management Plan. This plan will be implemented for the duration of the construction phase. Operational phase mitigation measures include the installation of a hydrocarbon interceptor, which will remove oil from water, as part of the surface water drainage system and appropriate containment and disposal of sewage. Rainwater falling on the converter station site will be collected in a drainage system and discharged to a pond. The outflow from the pond will be controlled to avoid causing flooding of the stream, into which it flows.

Following the implementation of mitigation measures, no significant residual effects on water and hydrology are predicted during the construction and operational phases.

Flood Risk

A flood risk assessment was undertaken. Records of historic river and tidal floods, obtained from the Office of Public Works National Flood Hazard Mapping website, indicated that five previous flood events have been recorded within 1.5km of the proposed development, of which four records relate to the same flood event on February 3rd, 2014. None of the flood events affected areas within the footprint of the proposed development.

The Kilmannock Stream (Newtown Stream) lies within a “Drainage District”. These are areas used to improve land for agriculture and to mitigate flooding. The proposed converter station adjoins the Kilmannock Drainage District, and the onshore cable passes through the Kilmannock Drainage District over a length of approximately 800 metres. The access road to the converter station also passes through the Drainage District over a circa 500m length.

The converter station and tail station site will be located on higher ground, above the level that would be at risk for tidal flooding in the estuary.

The cable route crosses a number of streams. In the majority of cases, where the cable route crosses a stream, the cable will be in the existing bridge over the stream. Consequently, cable construction will not alter the flooding risk at these locations.

The proposed horizontal directional drill beneath the Campile River Estuary will similarly not affect flood risk in that area, as the launch and reception pits for the horizontal directional drill will be located on higher ground, outside areas which are subject to flooding.

The preferred construction method for the crossing of the Kilmannock Stream is mini-horizontal directional drill. If an open-cut trench crossing of the Kilmannock Stream is used, it will incorporate damming the stream upstream and downstream of the crossing point. This has the potential to locally increase flood risk to adjoining agricultural land, and associated risk to construction personnel, temporarily, while the dams are in place. This would have a potential short-term slight, negative effect.

Once construction is finished, the cable would not be vulnerable to flooding and would not increase the flood risk anywhere.

Resource and Waste Management

An assessment of the likely effects of the proposed development on resources and waste management during the construction, operation and decommissioning phases was undertaken.

Waste Management

Waste will be generated during the construction, operation and decommissioning of the proposed development.

Topsoil will be excavated at the converter station and tail station site and along the off-road sections of the cable route. This topsoil will be reused within the proposed development. Excavation in subsoil and rock will be required at the converter station and tail station site, the landfall site and along the onshore cable route. The ground level of the converter station platform has been chosen to balance, as far as is practicable, the volume of excavated material with the volume of fill. Surplus excavated material will be used in the screening mounds, which will be located to the south and the east of the converter station platform. Thus, the export of spoil, from the converter station and tail station site, will be avoided.

A significant proportion of the surplus excavation material from the landfall site and along the cable route will consist of uncontaminated soil, stone and naturally occurring material which will be reused in its natural state to backfill the cable trench. It is estimated that 70% of the excavated material will be reused in the trench.

An estimated 6,000 tonnes surplus material, excavated from the cable trench, will require removal from site. The preferred option is to reuse this material in another nearby construction project. In the event that this is not feasible for all or part of the surplus excavation material, it will be delivered for site authorised to accept such material in accordance with the Waste Management Act.

If soil containing hazardous substances (such as tar, cleaning chemicals, waste fuels/oils, lubricants and other hydraulic fluids) is discovered during the works, this will be delivered to a facility authorised to accept hazardous waste.

Other construction wastes will include bitumen road surfacing from excavation of the cable trench in roads, surplus concrete and unusable or damaged duct segments.

The construction offices will produce typical office waste such as paper, cardboard and printer cartridges. The canteen and welfare facilities will produce food waste, paper and waste plastic.

The waste generated during the operational phase will be negligible, and will include office-type waste and waste electrical and electronic equipment from maintenance activities.

Waste from the decommissioning phase of the proposed development will be minimised, and delivered to authorised recycling or waste disposal facilities, in accordance with the relevant Irish waste legislation at that time. No significant effects on waste management are expected.

The construction waste management strategy forms part of the Construction Environmental Management Plan. The measures which will be implemented to minimise the generation of waste during the construction phase are included in the plan. Following the implementation of the mitigation measures, the residual effect on waste management during the construction of the proposed development will not be significant.

A similar plan will be prepared for the demolition phase in approximately 40 years, at the end of the life of the project.

Resource Use

The main resources, which will be used during the construction of proposed development, are shown in **Table 3** below.

Table 3: Resource usage during the construction of the proposed development

Location	Resource
Converter Station and Tail Station Site	20,500m^3 of structural quality crushed stone fill
Cable Route	4,800m^3 of low cement content concrete for surrounding the cables
Campile River Estuary and Landfall Site	5m^3 of bentonite (naturally occurring clay which is added to water to lubricate the drill) per shift at the Campile River Estuary and 15m^3 per day at the landfall site
Construction Compounds	13,100m^3 of crushed stone for the footprint of the construction compounds
Temporary site facilities and construction works areas	400MWh and 1,700MWh respectively of power
All works areas	100m^3 of water
All works areas	Diesel will be used in construction equipment and for transport of material and the construction workforce
Converter Station and Tail Station Site	Structural Steel 460 tonnes

Location	Resource
Converter Station and Tail Station Site	Roof and wall external cladding 7,200m^2
Converter Station and Tail Station Site	Concrete 4,400m^3
Converter Station and Tail Station Site	Reinforced steel in concrete 900 tonnes
Converter Station and Tail Station Site	Asphalt (for permanent access road and station internal roads) 950m^3
Converter Station and Tail Station Site	Sub-stone base for permanent access road and station internal roads) 2,600m^3

The predicted quantities of resources that will be consumed during construction are typical for a construction project of this scale, with a slight adverse effect on resources predicted to arise from the use of construction materials.

The operation of the converter station and tail station will have ongoing electrical power requirements.

Electrical power, water and fuel will be used during the decommissioning phase. The quantities will be relatively insignificant and therefore a significant effect on resources during the operational phase is not predicted.

The Construction Environmental Management Plan will contain measures to minimise resource use. Following the implementation of the mitigation measures, the residual effect on resource use during the construction of the proposed development will not be significant.

Population and Human Health

The likely effects of the proposed development on population and human health during the construction, operation and decommissioning phases were assessed. The general amenity of people living in the vicinity of the proposed development and visiting the area, access to dwellings, community facilities and commercial premises, and business, tourism and employment in the area were considered in the assessment. The effects of the proposed development on human health were examined.

General Amenity

The construction of the proposed development will result in some dust, noise and vibration effects and visual effects, all of which have the potential to have an impact on the amenity of people in the area. Local residents and road users

will experience inconvenience due to roadworks, road closures and diversions during construction of the cable route. There will be a short-term significant disruption to journey amenity and access for local road users in the immediate vicinity of the cable installation works. A Construction Traffic Management Plan and a Construction Environmental Management Plan have been prepared. These plans will be implemented, and the construction works will be managed to minimise these effects. The residual effect is expected to be short term and temporary.

Construction at the landfall site close to Baginbun Beach, along the cable route and at the Campile River Estuary, close to Dunbrody, will be completed outside of the peak tourist season with public access to the beach being maintained. The use of horizontal directional drill techniques at Baginbun Beach and the Campile River Estuary will reduce the potential for adverse amenity impacts at both locations. As such, no significant effects on amenity at these locations are predicted.

During operation, the 54 new road-side parking spaces on the access road to Baginbun Beach, once completed, will have a positive effect for the users of the beach.

Noise emissions from the converter station site will not be significant as noise generating plant will be either housed within buildings, suitably located within the site, or acoustically shielded.

The level of traffic generated during the construction and operation of the proposed development will not be significant and therefore no long-term negative effects on road users are predicted to occur.

The decommissioning activities will be concentrated at the converter station and tail station site. Decommissioning will involve minimal activities and have negligible effect on amenity along the cable route. There will be limited additional traffic on the road network during the decommissioning phase, which is not expected to have a significant effect on amenity.

Accessibility

Road closures will be minimised, as far as is feasible. Access to local residences, shops and community facilities along the onshore cable route will be maintained during the construction phase. Public access to Baginbun Beach will be maintained for the duration of the construction works in the area. Any disturbance, should it occur, will be temporary and minimal. No significant negative accessibility effects are predicted during the construction phase.

The provision of 54 road-side parking spaces on the access road to Baginbun Beach, and the additional footpaths and lighting at Ramsgrange will improve local accessibility at these locations.

No negative accessibility effects are predicted during the operational phase.

Decommissioning will involve minimal activities and have negligible effect on accessibility along the cable route.

Business, Tourism and Employment and Consumers

The generation of approximately 250 jobs, the investment in materials and services and the demand for locally sourced inputs, such as materials or machinery, will result in a positive effect on the local economy during the construction phase. Construction works will have a limited effect on tourism due to disturbance from additional construction traffic, noise, air emissions and visual effects in the proximity of Baginbun Beach and Dunbrody during the construction works. No works will be carried out along the cable route during July and August to avoid the peak tourist season. There will be no significant negative effects during the construction phase.

During the operational phase, Greenlink will have a positive indirect effect on businesses and electricity consumers in Ireland. It will enhance the security and continuity of electrical supply and increased competition in the electricity market. It will allow greater integration of renewable energy and provide employment for approximately 20 people, of which five will be directly involved in the operation of the converter station. Greenlink will have a significant positive, long term effect on business and employment in Ireland.

Human Health

There will be no emissions of toxic substances to the environment, which could have a negative effect on human health, during the construction and operation of the proposed development. No exceedances of air quality standards are expected. During construction of the cable route, there will be some brief periods of time when the relevant noise limits will be exceeded at the houses closest to the route. No significant effects on human health are predicted during the construction or operational phase as a result of the proposed development.

The electricity flowing in the underground cables will create an electromagnetic field around the cables. At very high levels, electromagnetic fields can have a negative effect on human health. The International Commission on Non-Ionising Radiation Protection has set a limit on the level of an electromagnetic field to protect human health. The level of the magnetic field which will be created around the underground high voltage direct current cables was calculated. The level at the surface of the cables, with the cable operating at maximum current, will be less than 0.005% of the limit set by the International Commission on Non-Ionising Radiation Protection. The level will decrease with distance from the cables. The cables will be buried one metre below ground. One metre from the cables, at ground level, the field generate by the cables will be less than 0.004% of the limit set by the International Commission on Non-Ionising Radiation Protection.

The International Commission on Non-Ionising Radiation Protection set a restriction level to avoid interference with implanted medical devices. At ground level, the field generated by the cables will be 3% of the restriction level.

The electromagnetic field generated by the high voltage alternating current cables will be negligible.

The converter station will comprise direct current and alternating current systems and there will be electromagnetic fields close to the building. The converter station and surrounding equipment are designed to ensure that negligible electromagnetic fields will be produced outside the boundary fence. The nature of the equipment in the converter station means that magnetic fields will decrease rapidly with distance. Outside the boundary fence, they will be well below the exposure limits. The converter station is assessed as having no adverse effects.

There will be no intrusive decommissioning works along the cable route, no significant effects on population and human health are predicted.

Material Assets

This section describes the potential effects the proposed development is likely to have on material assets in the form of land use and utilities.

Land Use and Property

Lands will be permanently acquired for the converter station and tail station. A permanent wayleave will be acquired along the cable route. For the installation of the cables and contractor compounds, there will be a temporary use of land which will return to its original condition after the works are complete. Construction phase effects on land use and property, within the red-line boundary, are expected to be significant and negative for the duration of the construction phase.

During the operational phase, there will be restrictions on the activities which can take place within the 15m wide cable wayleave strip . The restrictions are essential for the safety of personnel and the integrity of the cables. The restrictions include:

- No building within the wayleave width in the off-road sections;
- No storing of materials such as soil, sand, straw and hay, or changing of ground levels within the wayleave width;
- No crossing the high voltage direct current cables with other utilities, without written agreement from Greenlink Interconnector Limited;
- No digging within the wayleave width without written agreement from Greenlink Interconnector Limited (GIL). Excavations over cables will be by hand and supervised by Greenlink Interconnector Limited staff; and
- No planting of deep-rooted plants within the wayleave width.

Therefore, the operation of the proposed development will have a long-term, slight, negative effect on the future land use in the area of the proposed development.

Utilities

Electricity: The electricity required for the proposed development during the construction and operation at the converter station site will be sourced via a connection to the existing medium voltage supply.

Generators will be used in the works areas along the cable route. The construction compounds will be connected to the medium voltage network. It is predicted that the proposed development will have an imperceptible effect on electricity supplies during the construction phase.

There will be a slight increase in demand on the existing power supply network during the operation of the proposed development. However, as there is sufficient capacity within the network this effect will be long-term imperceptible. During operation, Greenlink will provide increased security and diversity of electricity supply, support for low carbon generation and increased competition in the energy market in Ireland.

The effect of the decommissioning phase will be the removal of the interconnector capacity provided by Greenlink. In the absence of this, the increased security and diversity of electricity supply, support for low carbon generation, increased competition in the energy market in Ireland and the direct economic benefits will end. This will be a significant negative effect.

Telecommunications: An underground connection for the converter station and tail station will be made to the Eir fixed line service. Apart from a temporary outage to make the connection to the fixed line, there will be no disruption to existing telecommunications near the proposed development during construction.

The operation of the proposed development will not have an adverse effect on the fixed line telecommunications network or the mobile networks in the area.

Gas: The high voltage alternating current cable route will cross an existing high pressure gas pipeline. Constructing the crossing will be supervised by Gas Networks Ireland to ensure that it will not give rise to adverse effects to the gas pipeline.

As no gas connection is required for the proposed development during the construction or operational phase, the proposed development will have an imperceptible effect on gas services.

Water Supply: The water demand for the proposed converter station and tail station site will be supplied via an existing water main (which has ample capacity). Water required in the other works areas will be provided via road tankers. During operation, water will be supplied to the converter station, which will be the only location which will be manned. Water use will be minimal. The proposed development will have an imperceptible effect on water use during both the construction and operational phase.

There is the possibility that existing asbestos watermains will be encountered during the trench excavation in the road network. Where asbestos is uncovered it will be removed in accordance with the relevant procedures and legislation. As requested by Wexford County Council the contractor will have a sufficient stock of replacement pipe on site in order to minimise the repair time.

Sewage: During the construction phase foul water services will be provided via portable toilets along the cable route and horizontal directional drill compounds. Holding tanks will be used at the construction compounds. All sanitary facilities will be frequently emptied and maintained by licenced contractors. During operation, foul water will discharge to a holding tank, the contents of which will be removed regularly to a licenced facility. The proposed development will have an imperceptible effect on wastewater treatment services.

Existing Services: Prior to cable trench excavation, the exact location of the existing services, which are in the vicinity of the cable trench, will be confirmed by the contractor. The contractor will put mitigation measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider. Adequate separation distances will be established between the cables and the existing services.

Conclusion

With the implementation of the proposed mitigation measures, no significant negative residual effects on material assets are predicted during construction. A long-term significant positive effect on the electricity network of Ireland, and long-term slight negative effects on activities and development within the cable wayleave are predicted during operation. A significant negative effect is predicted following decommissioning of the interconnector, as the benefits which arise from its operation will cease.

Major Accidents and Disasters

Major accidents and/or disasters are unplanned events that have the potential to affect and be affected by the proposed development.

An assessment was carried out of the likely effects on the environment, arising from the vulnerability of the proposed development to the risk of a major accident or disaster. A site-specific risk assessment was prepared to identify and quantify risks.

The identification of potential risks focused on non-standard but plausible incidents, which could occur at the proposed development during construction, operation and decommissioning, and which could cause a non-trivial impact on the environment. If an off-site event could cause the proposed development to have a non-trivial impact on the environment, this was also classified as a plausible risk.

Any risk to the proposed development, for which the probability of it occurring was determined to be lower than “extremely unlikely”, was excluded from the assessment.

Design and Construction Standards

The basic assumption of the risk assessment is that the proposed development has been designed and will be constructed in line with best international

practice. Consequently, mitigation against the risk of major accidents and/or disasters is embedded through the design. The detailed design of the proposed development will be subject to a fire safety risk assessment which will assist in identifying any major risks of fire on site, and the required mitigation during the construction and operational phases. A maintenance programme will be implemented during the operational phase to ensure that all critical equipment is operating correctly. A Construction Traffic Management Plan has been prepared and will be implemented for each working area which will limit the likelihood and consequence of a vehicle collision.

Disasters

Ireland's geographic position means natural disasters such as earthquakes or tsunamis, which might pose a risk to developments of this nature and scale in other parts of the world, are less likely to occur and less likely to be of significant magnitude. In recent times there has been an increase in the number of severe weather events in Ireland, particularly those leading to flash flooding, snow, lower than usual temperatures and strong winds.

With regard to disasters, severe weather conditions were considered to pose a plausible potential risk to the proposed development.

Major Accidents Hazard

The SSE Generation Ireland Limited (Great Island) power station, located adjacent to the proposed converter station and tail station, is the only industrial site close to the proposed development. The SSE Generation Ireland facility is designated as a 'lower tier site', in accordance with EU Directive on the control of major-accident hazards involving dangerous substances, due to the amount of diesel stored on site. A quantified risk assessment, which was a study of the major accident risks posed by the power station, was submitted by SSE to the Environmental Protection Agency and the Health and Safety Authority. The study showed that the potential risk of an effect on a person on the converter station site, from an incident at the SSE power station site, has a likelihood of less than "extremely unlikely". Consequently, this hazard was not included in the risk assessment.

An underground high-pressure natural gas pipeline runs in an approximately north-south direction in the SSE site, close to the converter station and tail station site's western perimeter fence. The gas pipeline is operated by Gas Networks Ireland. The Commission for Regulation of Utilities licenses gas companies. To obtain a licence, a gas company must demonstrate that its operations, including its gas pipelines, meet certain safety conditions and that the risks to society are below a certain threshold. This threshold is a lower probability than the "extremely unlikely" threshold. However, the cable will be laid under the gas pipeline and this activity was included in the risk assessment, as it is not part of the normal operation of the pipeline and is considered to represent a greater potential hazard.

The Great Island Energy Storage System has planning permission on a 1.5ha site adjacent to the converter station's northern boundary. The energy storage system will contain lithium ion battery packs. Information on fire risk and safety measures at the Energy Storage System was provided in the energy

storage system planning application. Based on this information and given the separation distance of 35m to 40m between the converter station buildings and the energy storage system site boundary, it was considered that the energy storage project does not represent a major accident hazard to the proposed development. Consequently, the operation of the energy storage system was not included in the risk assessment.

Other Potential Offsite Hazards

No other plausible offsite hazards were identified.

The ground levels at the converter station and tail station are well above the level at risk of tidal flooding. The underground cables are not vulnerable to flooding.

Risk Assessment

Potential events during construction, operation and decommissioning, which could cause damage to the public or the environment were identified in the risk assessment, and a risk register was prepared. Once the potential events were identified, the likelihood of each event occurring was assessed and given a numerical score. The consequence of the potential event was classified in terms of “minor”, “limited”, “serious”, “very serious” and “catastrophic” and given a corresponding numerical score. The likelihood and consequence scores were multiplied to establish the “risk score” to create a risk matrix.

Conclusion with Respect to Major accidents and Disasters

No plausible major accidents or disaster hazards were identified in the risk assessment, to which the proposed development will be vulnerable. No plausible potential risks were identified which would result in the proposed development causing a major accident or disaster on or outside the site of the proposed development.

Cumulative, Transboundary and Interactive Effects

Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:

- The interaction between the various effects within the proposed development;
- The interaction between the proposed development and the other elements of Greenlink (the offshore elements and the onshore elements in Wales); and
- The interaction between other existing and/or permitted projects with this proposed development.

Transboundary effects are effects which extend across international boundaries e.g. between Ireland and the United Kingdom.

Interactive effects address the interaction between the various environmental aspects, for example the interaction between noise and ecology.

Interactive and Indirect Effects of the Proposed Development

The following likely significant residual interactive or indirect effects have been identified and outlined in **Table 4** below:

Table 4: Interactive and indirect effects

Environment aspects	Effect	Significance
Traffic and Visual Amenity	Visual amenity of residents and visitors along the cable route and Baginbun Beach, during construction of the cables	Local, short-term, significant
Traffic and Population	Residents and road-users in the vicinity of the HVDC cable trench excavations and cable installation works, during construction of the cables	Short-term significant
Landscape and Visual Effects and Population	Visual amenity of residents and visitors along the cable route and at Baginbun Beach, during construction of the cables	Local, short-term significant
Population, Natural Resources and Waste Management	Creation of employment will result in greater use of natural resources and great waste generation, during construction and decommissioning	Negligible
Population and Material Assets	Creation of employment will result in a great use of material assets, during construction and decommissioning	Negligible

Environment aspects	Effect	Significance
Material Assets and Air Quality and Climate	Support for renewable energy and therefore reduce harmful air emissions, during operation of Greenlink	This will result in an improvement in air quality and reduce a cause of climate change.
Material Assets and Natural Resources	Support for renewable energy, during operation of Greenlink	This will result in an indirect effect of a reduction in fuel consumption in fossil fuel power plants and the generation of waste by solid fuels.
Material Assets and Population	Increase security of electricity supply in Ireland, during operation of Greenlink	The provision of economic and social benefits to electricity customers

There will no significant residual interactive or indirect effects.

Cumulative Effects

Past, Present and Proposed Developments in Ireland

Consented developments near the proposed development site which are of sufficient scale to result in cumulative effects are:

- Great Island – Kilkenny 110kV Line Uprate Project (2018/1228) - Granted
- Great Island Energy Storage System (2018/0506) – Granted

It is concluded that should the construction of the permitted developments occur concurrently with the proposed development, the potential cumulative construction effects are not significant, given the implementation of construction environmental measures, the Construction Environmental Management Plan for the proposed development and a Construction Traffic Management Plan.

No potential significant operational impacts of the proposed development and Great Island 110kV uprate project were identified. The proposed development and the Great Island Energy storage project have the potential to have a cumulative impact on traffic, noise and landscape and visual amenity. However, no significant potential cumulative effects are predicted.

Intra-Project Effects

During the construction phase, there is the potential for Greenlink intra-project negative effects to occur from activities which are geographically close to each other. The pressures they exert on receptors may overlap spatially and

temporally. At the interfaces between the onshore and offshore components in Ireland and in Wales, construction activities could occur at the same time.

The only potential intra-project effects identified between the offshore and onshore components are on amenity and birds. Amenity may be affected if works in the nearshore area occur at the same time as works at the Baginbun horizontal directional drill and cable compounds. There could be a temporary increase in visual effects to the recreational users of Baginbun Beach. However, construction of the cable route and landfall horizontal directional drill will be scheduled to avoid the peak holiday season. Potential intra-project effects on birds have been identified between the onshore works, close to and at Baginbun Beach, and the nearshore works for laying the offshore cable. However, as the two activities are scheduled to be completed at different times there will be minimal overlap. The bird species, which could potentially be affected by the onshore works, are different from the species, which could be affected by the works offshore.

Consequently, it has been concluded there will be no significant intra-project effects.

There will no significant residual interactive or indirect effects.

Operational Interproject Effects and Transboundary Effects

There is significant overlap between the transboundary and operational interproject effects of Greenlink which will be beneficial and significant. These are:

- The investment of €400 million in construction and the purchase of equipment in Ireland and Wales, and the countries in which equipment is manufactured;
- 500MW of interconnector capacity between Ireland and Great Britain, and onwards to continental Europe;
- Increased security of electricity supply in Ireland and Great Britain;
- Support for low carbon generation in Ireland and Great Britain; and
- Increased market trading opportunities for efficient generators in Ireland or Great Britain, potentially lowering energy prices by increasing market competition.

Viewing and Purchasing of the EIAR

The environmental impact assessment report, of which this is a non-technical summary, can be viewed and purchased at the offices of An Bord Pleanála, 64 Marlborough Street, Dublin 1, and also viewed online at www.greenlink.ie.