Contents

18 Cumulative, Transboundary and Interactive Effects

18.1 Introduction

This chapter summarises the residual effects that have been identified in **Chapters 6** to **17** and identifies whether they give rise to cumulative and/or interactive, and or transboundary effects based on best scientific knowledge. Accordingly, when topic specific chapter has concluded that there are likely residual significant effects that could give rise to cumulative and/or transboundary and/or interactive effects, it is referred to further in this chapter.

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 the other existing and/or permitted projects with this proposed development.

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

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

This chapter has been prepared by Simon Grennan and Dan Garvey of Arup. A description of the authors' qualifications and experience is presented in **Appendix 1.1**.

18.2 Assessment Methodology

18.2.1 Overview

The assessment of cumulative, transboundary and interactive effects has been undertaken by each of the environmental topic leads based on best scientific knowledge.

The approach is aligned with the EIA guidance documents listed in **Section 1.9.2** of **Chapter 1** as well as the methodology adopted for each environmental factor as described in **Chapters 6** to **17**. A summary of these effects is provided herein based on best scientific knowledge.

18.2.2 Interactive Effects

The EIAR has considered and assessed the interactive effects arising from the construction, operation and decommissioning of the proposed development based on best scientific knowledge. Interactive effects (or interactions), as explained in **Section 18.1** above, specifically refer to any direct or indirect effects caused by the interaction of environmental factors as outlined in Part 1 of Article 3 of the EIA Directive which states:

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

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

The consideration of interactive effects was an integrated process which commenced at the very outset of the project. As the project developed, an number of workshops were held with the various experts feeding into the EIAR where interactive effects were identified and discussed. Relevant interactive effects were then integrated into the various assessments carried out by the discipline experts. This assessment also had regard to submissions and responses received as part of the public consultation process and in consultation with statutory bodies.

18.2.3 Cumulative Effects

The EIAR has considered and assessed cumulative effects arising from the construction, operation and decommissioning of the proposed development. A cumulative assessment has been undertaken based on best scientific knowledge in accordance with Part 5 of Annex IV of the EIA Directive.

"e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resource,"

Through workshops and consultations, the discipline experts identified the existing and past developments in the vicinity of the proposed development, including developments under construction, which had the potential for a significant impact cumulatively with the proposed development. The Arup EIAR team undertook a planning search, using the Wexford County Council online planning search facility. Developments in the vicinity of the proposed development (typically 250m from the cable route), which had received planning permission, but had not commenced construction, were identified. In addition, information on other consented developments, such as Strategic Housing Developments, Strategic Infrastructure Developments, Local Authority

developments such as Part 8 works, and applications made by local authorities directly to An Bord Pleanála such as Part 10 developments was compiled. Due to the nature of the proposed development and distance from neighbouring counties, planning applications within County Waterford or County Kilkenny were not assessed.

This was a live and interactive process. This assessment also considered submission and responses received as part of the public consultation process and in consultation with statutory bodies. The EIAR project manager brought the future developments which had the potential for cumulative impacts, to the attention of the discipline experts. The assessment of the effects was undertaken by the discipline experts.

18.2.4 Transboundary Effects

The EIAR has considered and assessed transboundary effects arising from the construction, operation and decommissioning of the proposed development. A transboundary assessment has been undertaken based on best scientific knowledge in accordance with Part 5 of Annex IV of the EIA Directive.

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

Relevant transboundary effects were identified by the discipline experts in discussion with the EIAR project manager at the outset of the assessment process. The assessment of the transboundary effects was undertaken by the discipline experts.

18.3 Interactive and Indirect Effects

18.3.1 Introduction

Table 18.1 presents the effects matrix. The effects matrix examines the potential for the environmental effect in the left-hand column to have an interactive or indirect effect on the environmental medium listed in the top row of the matrix.

If there is the potential for an effect during the construction and/or decommissioning phase, this is indicated by a 'C'. An 'O' indicates the potential for an effect during the operational phase and 'CO' indicates the potential for an effect during construction and/or decommissioning and operational phases. If there is considered to be no potential for an effect, this is indicated by '-'.

The purpose of the matrix of effects is to identify potential effects in different environmental media. Sections 18.3.2 to 18.3.24 describe the likely interactive effects, based on the findings of the studies and assessments undertaken to complete chapters 6 to 17 of this EIAR. The likely interactive effects and their significance are dealt with in the most relevant chapter of the EIAR.

Table 18.1: Matrix of Key Environmental Interactions

Key Environmental Interaction Matrix	Traffic and Transportation Infrastructure	Air Quality and Climate	Noise and Vibration	Biodiversity	Archaeology, Architectural	Landscape and Visual Amenity	Land, Soil, Geology and Hydrogeology	Water Quality and Hydrology	Resource and Waste Management	Population and Human Health	Material Assets
Traffic and Transportation Effects		C	C	C	C	C	-	-	-	C	-
Air Quality and Climate	-		-	C	-	-	-	-	-	CO	-
Noise and Vibration	-	-		C	-	-	-	-	-	C	C
Biodiversity	-	-	-		-	-	-	-	-	C	-
Archaeology, Architectural and Cultural Heritage	-	-	-	C		C	-	-	-	-	-
Landscape and Visual Effects	-	-	-	-	-		-	-	-	CO	-
Land, Soil, Geology and Hydrogeology Effects	-	-	-	-	-	-		-	C	-	-
Water and Hydrology	-	-	-	C	-	-	-		-	C	-

Key Environmental Interaction Matrix	Traffic and Transportation Infrastructure	Air Quality and Climate	Noise and Vibration	Biodiversity	Archaeology, Architectural	Landscape and Visual Amenity	Land, Soil, Geology and Hydrogeology	Water Quality and Hydrology	Resource and Waste Management	Population and Human Health	Material Assets
Natural Resources and Waste Management	-	-	-	-	-	-	-	-		-	-
Population and Human Health	-	-	-	-	-	-	-	-	O		O
Material Assets	-	O	-	-	-	-	-	-	O	CO	
Risk of Major Accident and/or Disasters	-	-	-	-	CO	CO	-	-	CO	-	-

The potential environmental interactions and indirect effects arising from the proposed development, indicated in the matrix, are summarised in the following sections.

18.3.2 Traffic and Air Quality and Climate

The generation of traffic during the construction phase of the proposed development has the potential to affect air quality and climate. Less traffic will be generated during the decommissioning phase, and the potential to have a significant interaction with air quality and climate is less. Traffic levels generated by maintenance vehicles during the operational phase will not be significant enough to have a detectable effect on air quality and climate.

The effects of the traffic generated by the development on air quality are assessed in **Chapter 7**, *Air Quality and Climate*.

Following the implementation of the proposed mitigation measures, no significant residual significant effects on air quality or climate due to emissions from construction traffic are expected.

18.3.3 Traffic and Noise and Vibration

The generation of traffic during the construction and decommissioning phases of the proposed development has the potential to generate noise and vibration. Traffic levels generated by maintenance vehicles during the operational phase will not be significant enough to have a detectable effect on noise and vibration.

The effects of the traffic generated by the development on noise levels at the nearest sensitive receptors are assessed in **Chapter 8**, *Noise and Vibration*.

Following the implementation of the proposed mitigation measures, no significant residual noise or vibration effects from traffic are expected.

18.3.4 Traffic and Biodiversity

The generation of traffic during the construction and decommissioning phases of the proposed development has the potential to generate noise, which in turn could affect species. Traffic levels generated by maintenance vehicles during the operational phase will not be significant enough to have a detectable effect on noise levels and, consequently, species.

The effects of the construction noise on species are assessed in **Chapter 9**, *Biodiversity*.

Following the implementation of the proposed mitigation measures, no significant residual effects on species due to noise from construction traffic are expected.

18.3.5 Traffic and Landscape and Visual Amenity

The generation of traffic during the construction and decommissioning phases of the proposed development has the potential to affect the visual amenity of the public, for example construction works close to Baginbun Beach.

Traffic levels generated by maintenance vehicles during the operational phase will not be significant enough to have a notable visual effect on the surrounding landscape.

The effects of the construction activity, including construction traffic, on the landscape and visual amenity are assessed in **Chapter 10**, *Landscape and Visual*.

During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape or visual amenity.

18.3.6 Traffic and Population

The generation of traffic during the construction and decommissioning phases of the proposed development has the potential indirectly to affect the population. Traffic flows on the public road network in the cable working areas will be disrupted during the construction works. Temporary effects on road users, including pedestrian movements, will arise because of this disruption. The emissions to air, of the traffic generated by the proposed development, have the potential to affect human health.

The effects of the traffic generated by the development on local road users is assessed in **Chapter 6**, *Traffic and Transport*. The effects of the traffic generated by the development on air quality and the potential consequent effect on human health is assessed in **Chapter 7**, *Air Quality and Climate*.

There will be a short-term significant impact on the residents and road users in the vicinity of the HVDC cable trench excavations and cable installation works for the duration of the works. Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.

The provision of 54 additional car parking spaces will result in a permanent positive effect.

18.3.7 Air Quality and Climate Effects and Biodiversity

A potential interaction between air quality and climate effects and biodiversity during the construction and decommissioning phases of the proposed development is identified. Dust generated during the construction and decommissioning works has the potential to affect habitats along the onshore cable route and close to the converter station and tail station. Emissions to air such as nitrous oxides from construction equipment, and the consequential impact on local air quality, has the potential to have a negative impact on local biodiversity. The direct emissions to air from the proposed development during operation will be insignificant.

The beneficial effect of the operation of the proposed development on air quality and climate has the potential to have a beneficial effect on biodiversity. The emissions of pollutants and carbon dioxide from fossil fuel power generation will be reduced, thus improving air quality and reducing climate change, both of which have negative effects on the biodiversity.

The effects of emission to air from the development on air quality and climate is assessed in **Chapter 7**, *Air Quality and Climate*.

Following the implementation of the proposed mitigation measures, no significant residual negative effects on air quality and, consequently, biodiversity are expected due to the proposed development.

18.3.8 Air Quality and Population and Human Health

A potential interaction between air quality and population and human health during the construction phase of the proposed development is identified. Dust and other emissions generated during the construction works has the potential to affect properties, businesses and social facilities along the onshore cable route, as well as the homeowners, employees, visitors and customers who frequent these areas. The emissions to air by the proposed development during operation will be insignificant.

The effects of emission to air, during the construction phase, on air quality and the consequent effect on human health is assessed in **Chapter 7**, *Air Quality and Climate*.

Following the implementation of the proposed mitigation measures, no significant residual effects on air quality and, consequently, human health, due to the proposed development are expected.

In operation, the proposed development will support increased levels of renewable power on the national grid, and consequent proportional reductions in the generation of power using fossil fuels. The associated reduction in combustion emissions will have a long-term positive effect on population and human health.

18.3.9 Noise and Vibration and Biodiversity

There is a potential interaction with noise and vibration and biodiversity during the construction and decommissioning phase. Noise emissions from construction and decommissioning activities along with vibration effects at the tunnelling locations, could result in the disturbance/displacement of birds and mammals such as otters. The noise and vibration generated by the proposed development during operation will be insignificant.

The effects of the construction and decommissioning noise on species are assessed in **Chapter 9**, *Biodiversity*.

Following the implementation of the proposed mitigation measures, no significant residual effects on species due noise or vibration effects from the proposed development are expected.

18.3.10 Noise and Vibration and Population

A potential interaction between noise and vibration and the population during the construction, operational and decommissioning phases of the proposed development is identified.

Noise and vibration generated from construction and decommissioning activities, and the resulting traffic, has the potential to be a nuisance to nearby residential receptors and the local population. Low level noise from the converter station and noise from maintenance activities along the onshore cable route during the operational phase also has the potential to cause nuisance to nearby residential receptors and the local population.

The effects of noise and vibrations from the construction, decommissioning and operational phases on sensitive receptors are assessed in **Chapter 8**, *Noise and Vibration*.

Following the implementation of the proposed mitigation measures, no significant residual noise effects on sensitive receptors from the proposed development are expected.

18.3.11 Vibration and Material Assets

A potential interaction between vibration and material assets during the construction phase of the proposed development is identified. Vibration generated from construction activities and construction traffic has the potential to affect buildings close to the construction works.

The effects of vibrations from the construction, decommissioning and operational phases on buildings are assessed in **Chapter 8**, *Noise and Vibration*.

Following the implementation of the proposed mitigation measures, no significant residual vibration effects on buildings from the proposed development are expected.

18.3.12 Biodiversity and Population

A potential interaction between biodiversity and population has been identified. A significant negative effect on biodiversity, when habitats are removed during the construction phase, has the potential to have a negative effect on residential and recreational amenity, and enjoyment of the area.

The effects of the construction phase on biodiversity are assessed in **Chapter 9**, *Biodiversity*. The effects of construction on the population in the local area are addressed in **Chapter 15**, *Population and Human Health*.

Following the implementation of the proposed mitigation measures, no significant residual effects on biodiversity due to the proposed development are expected. Consequently, an indirect effect on population is not expected.

18.3.13 Archaeology, Architectural and Cultural Heritage and Biodiversity

There is a potential interaction between archaeology and biodiversity during the construction phase. It may be necessary to remove a significant area of surface vegetation and the topsoil layer to resolve previously un-recorded archaeological features, encountered during site clearance and excavation.

The effects of the proposed development on archaeology, architectural and cultural heritage are addressed in **Chapter 10**.

The proposed development is not expected to have a significant effect on known archaeology, architecture or cultural heritage. However, there is a possibility that unknown archaeological sites will be uncovered during ground disturbance during construction works.

18.3.14 Archaeology, Architectural and Cultural Heritage and Landscape and Visual Amenity

There is a potential interaction between archaeology and landscape and visual amenity during the construction phase. It may be necessary to remove a significant area of surface vegetation and the topsoil layer to resolve previously un-recorded archaeological features, encountered during site clearance and excavation. There is also a potential effect on the setting of these protected structures in the surrounding environment during the proposed construction works.

The effects of the proposed development on archaeology, architectural and cultural heritage are addressed in **Chapter 10**.

The proposed development is not expected to have a significant effect on known archaeology, architecture or cultural heritage. However, there is a possibility that unknown archaeological sites will be uncovered during ground disturbance during construction works.

18.3.15 Landscape and Visual Effects and Population

A potential interaction between landscape and visual effects and population during both the construction and operational phase of the proposed development is identified.

Activities at the converter station site, along the onshore route and at the landfall site have the potential to have a negative effect on visual amenity, with a consequent negative effect on the residential and recreational amenity of the receptor population. As a specific example, a hoarding or fencing erected at the various working areas during the construction phase has the potential to result in negative visual amenity. During the operational phase, the converter station has the potential to have a negative effect on in visual amenity, with a consequent negative effect on the residential and recreational amenity of nearby residential receptors and the local population.

The effects of the proposed development on landscape, visual amenity and local population receptors are assessed in **Chapter 11**, *Landscape and Visual*.

During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape, visual amenity or on local population receptors.

18.3.16 Hydrogeology and Natural Resources

Excavations during the construction phase have the potential to affect an underlying aquifer which may be used as groundwater resource.

The effects of the proposed development on hydrogeology, and groundwater as a resource, are assessed in **Chapter 12,** *Land, Soils, Geology and Hydrogeology***.**

The residual effects on geology and hydrogeology due to the proposed development are expected to be of negligible magnitude and imperceptible significance. Following the implementation of the proposed mitigation measures, no significance residual effect on groundwater, as a resource, is expected.

18.3.17 Water and Hydrology and Biodiversity

Negative effects on water quality and changes to the hydrological regime, arising from the construction of the project, have the potential to have effects on aquatic biodiversity.

The effects of the construction phase on biodiversity are assessed in **Chapter 9**, *Biodiversity*. The effects of the proposed development on Water and Hydrology are assessed in **Chapter 13,** *Water and Hydrology***.**

Following the implementation of the proposed mitigation measures, no significant residual effects on water and hydrology and, consequently, on biodiversity due to the proposed development are expected.

18.3.18 Water and Hydrology and Population and Human Health

A potential interaction between water and hydrology and human health during the construction phase of the proposed development is identified. If flooding or pollution of surface water, within the proposed works area, causes pollution of a drinking water source, this has the potential to result in a negative effect on human health. There is also the potential for increased sedimentation and pollution of local watercourses which may have an effect on recreational activity.

The effects of the proposed development on Water and Hydrology are assessed in **Chapter 13,** *Water and Hydrology***.**

Following the implementation of the proposed mitigation measures, no significant residual effects on water and hydrology and, consequently, on human health due to the proposed development are expected.

In operation, accidental spills or discharges from the converter station site would have the potential to affect population and human health, in the absence of the design and procedural controls that will be in place to prevent such events.

18.3.19 Population, Natural Resources and Waste Management

A potential interaction between population and the use of natural resources and waste management during the construction, operational and decommissioning phases of the proposed development is identified.

The construction and decommissioning phases of the proposed development will create employment, which will give rise to greater use of natural resources and greater waste generation in the region. The direct employment arising from the operation of Greenlink will be negligible.

Refer to **Chapter 15**, *Population and Human Health* for a description of employment creation. The effects on natural resources and waste management are addressed in **Chapter 14**, *Resource and Waste Management*.

18.3.20 Population and Material Assets

A potential interaction between population and material assets during the operational phase of the proposed development is identified.

The construction and decommissioning phases of the proposed development will create employment, which will give rise to greater use of material assets in the region. The direct employment arising from the operation of Greenlink will be negligible.

Refer to **Chapter 15,** *Population and Human Health* for employment creation.

18.3.21 Material Assets and Air Quality and Climate

A potential interaction between material assets and air quality and climate during the operational phase of the proposed development is identified.

The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce emission to air of nitrous oxides, sulphur dioxide, particulate and carbon dioxide from fossil fuel power plants. This will improve air quality and reduce a cause of climate change.

The direct and indirect effects on material assets are addressed in **Chapter 16**, *Material Assets*. Effects on air quality and climate are addressed in **Chapter 7**.

18.3.22 Material Assets and Natural Resources

A potential interaction between material assets and natural resource consumption, during the operational phase of the proposed development, is identified.

The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce fuel consumption in fossil fuel power plants, and the generation of waste by solid fuel power plants.

The direct and indirect effects on material assets are addressed in **Chapter 16**, *Material Assets*. Effects on resources and waste management are addressed in **Chapter 14**.

18.3.23 Material Assets and Population and Human Health

A potential interaction between material assets and population during construction may arise in the case of accidental interaction with existing utility infrastructure, such as asbestos water pipes.

Arrangements will be made to ensure that any accidental interference is remedied as quickly as possible, by ensuring that the contractor retains replacement pipework on-site for immediate use.

A potential interaction between material assets and population during the operational phase of the proposed development is identified.

The proposed development will increase the security of electricity supply in Ireland. It should also provide more competition in the electricity market in Ireland. This will provide economic and social benefits to electricity consumers.

The direct and indirect effects on material assets are addressed in **Chapter 16**, *Material Assets*. The direct and indirect economic and social benefits are addressed in **Chapter 15,** *Population and Human Health*.

The provision of road-side car parking near Baginbun Beach, and the improvements to pedestrian amenity at Ramsgrange will provide long-term benefits to tourist and local populations.

18.3.24 Major Accidents and Disasters

In the event of a major accident or disaster occurring during the construction, operational or decommissioning phase of the proposed development, there is the potential for direct effects on environmental media including human health, material assets including transport networks, air quality, climate, biodiversity, surface water, groundwater, land and soils. Negative effects on air and water quality could have an indirect negative effect on archaeological, architectural or cultural heritage due to increased weathering. Buildings and equipment directly affected by the incident may have to be replaced, resulting in increased waste generated and use of natural resources. A fire could have a temporary visual impact until the fire damaged buildings and equipment had been replaced. Waste material could also be generated arising from damage associated with a major accident.

The direct and indirect effects of major accidents and disasters are addressed in **Chapter 17**.

Following the implementation of the proposed mitigation measures, no significant residual effects on the environment are expected to result from a major accident or disaster at the proposed development.

18.3.25 Summary of Likely Significant Residual Interactive and Indirect Effects

The following likely significant residual interactive or indirect effects have been identified:

Traffic and Visual Amenity:

During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape or visual amenity resulting from the traffic generation by the project.

Traffic and Population:

There will be a short-term significant impact on the residents and road users in the vicinity of the HVDC cable trench excavations and cable installation works for the duration of the works. Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.

Landscape and Visual Effects and Population

During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape or visual amenity.

Population, Natural Resources and Waste Management

The construction and decommissioning phases of the proposed development will create employment, which will give rise to greater use of natural resources and greater waste generation in the region. The direct employment arising from the operation of Greenlink will be negligible.

Population and Materials Assets

The construction and decommissioning phases of the proposed development will create employment, which will give rise to greater use of material assets in the region. The direct employment arising from the operation of Greenlink will be negligible.

Material Assets and Air Quality and Climate

The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce emission to air of nitrous oxides, sulphur dioxide, particulate and carbon dioxide from fossil fuel power plants. This will improve air quality and reduce a cause of climate change.

Material Assets and Natural Resources

The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce fuel consumption in fossil fuel power plants, and the generation of waste by solid fuel plants.

Material Assets and Population

The proposed development will increase the security of electricity supply in Ireland. It should also provide more competition in the electricity market in Ireland. This will provide economic and social benefits to electricity consumers.

18.4 Cumulative Effects

18.4.1 Overview

The EU Guidelines define cumulative impacts as:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For example:

- *incremental noise from a number of separate developments;*
- *combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
- *Several developments with insignificant impacts individually but which together have a cumulative effect."*

Consequently, the assessment of cumulative effects considers the total effect of the proposed development when combined with other past, present, and reasonably foreseeable future developments.

18.4.2 Combined Effect of Individual Impacts on a Particular Receptor

Two particular classes of receptor were identified as potentially likely to be significantly impacted by the combination of a series of individual impacts during the construction and decommissioning phases. These are habitats and species, in the vicinity of the entire works, and residents in the vicinity of the cable works, including at the landfall.

Habitats and species have the potential to be negatively affected by the removal of habitat, direct disturbance, noise and vibration, emissions to air and emissions to water, which are a combined effect of construction activities. The effects of construction activities on habitats and species are addressed in **Chapter 9**, *Biodiversity*. It was concluded that there would not be a significant negative effect on biodiversity from construction activities.

Residents in the vicinity of the cable works have the potential to be significantly negatively affected by construction traffic, direct disturbance, noise and vibration, dust emissions, and visual effects when the excavation of the cable trench, installation of ducting and reinstatement is underway in their vicinity. Pulling and jointing of the cables and reinstatement of the jointing bays also has the potential to have a significant negative effect on nearby residents. The combined effects of construction activities on residents are addressed in **Chapter 15**, *Population and Human Health*.

18.4.3 Combination of Incremental Effects – Past and Present Development

In the assessment chapters of this EIAR, chapters 6 to 17, the effects of all relevant existing development are included as part of the environmental baseline for that environmental factor. The type of development which is relevant depends on the environmental media and the nature of the effect being assessed. If an existing development would not or could not contribute to a cumulative effect, it was not included. Examples are:

- The traffic counts in chapter 6, include traffic from all developments, such as businesses, industrial and commercial premises, quarries, fishing enterprises, farming activities, schools, tourism businesses and activities,

and dwellings, which contributed traffic to the road network on the days the counts were taken.

- The noise levels recorded by the noise monitoring, described in Chapter 8, include all background noise, audible at the monitoring points from existing developments, including road traffic, shipping, industrial and commercial premises, farms and dwellings, at the time the monitoring was undertaken.
- The visual and landscape baseline described in chapter 11, includes the landscape and visual effects of existing developments, which can be seen from the viewpoints chosen, or have an effect on the landscape, including industrial premises, roads, railway line, existing vegetation, farms and dwellings.

The effects of the proposed development are combined with the existing baseline to determine the likely significant effects reported in each of the assessment chapters.

18.4.4 Combination of Incremental Effects – Past, Present and Proposed Developments and Plans in Ireland

This assessment specifically considers whether the proposed and/or recently approved schemes in the local area have the potential to alter the significance of effects associated with the proposed development, based on best scientific knowledge. The Arup EIAR team undertook a planning search, using the Wexford County Council online planning search facility, within 10km of the proposed. In addition, information on other consented developments was reviewed as described in **Section 18.2.3**. Developments in the vicinity of the proposed development, which had received planning permission in the past 5 years, but had not commenced construction, were assessed. In addition, information on other consented developments, such as Strategic Housing Developments, Strategic Infrastructure Developments, Local Authority developments such as Part 8 works, and applications made by local authorities directly to An Bord Pleanála such as Part 10 developments was compiled. Two permitted developments have been identified, which will be located in the general vicinity of the proposed development site and which are of sufficient scale to have the potential to result in cumulative effects arising from their construction and/or operation and/or decommissioning. These were the only proposed developments in the area which were of sufficient scale to have the potential to have a significant cumulative impact with the proposed development. The two developments are outlined in **Table 18.2.**

These proposed developments are not related to or dependent on Greenlink, in any way.

A proposal by Irish Water to improve the sewage infrastructure at Arthurstown, with the potential for works at Ramsgrange, was mentioned during the public consultation process. Greenlink Interconnector Limited has determined that, at the time of preparation of this EIAR, there is no committed development by Irish Water that would directly interact with the proposed development. Notwithstanding this, Greenlink Interconnector Limited commits to liaise with the developer of projects or works that may arise, to minimise adverse effects on communities.

Statutory plans that could have cumulative effects with the proposed development were reviewed.

These include the following:

- River Basin Management Plan 2018-2021
- Inland Fisheries Ireland Corporate Plan 2016-2020
- Irish Water Capital Investment Plan 2014-2016
- Water Services Strategic Plan 2015
- Wexford County Development Plan 2013-2019.

No adverse cumulative effects were identified associated with the implementation of these plans in parallel with the proposed development.

Table 18.2 Consented Developments near the Proposed Development

Name	Planning Ref.	Description	Status
Great Island – Kilkenny 110 kV Line Uprate Project	20181228	Permission was sought for the development at the existing Great Island to Kilkenny 110 kV overhead line which is approximately 49 kilometres long. Approximately 2.6km of the existing circuit is located within the functional area of Wexford County Council with approximately 46.4km located within County Kilkenny. The development will consist of the uprate of the Great Island Kilkenny 110 kV overhead line which will primarily include: re-stringing the conductor with a higher capacity conductor, replacement of a large proportion of existing structures, breaking out and reconstruction of the concrete foundation and shear blocks of metal masts, painting of mast structures, replacement of insulators, crossarms, stays and/or fittings on existing structures; and the fitting/replacement of bird flight diverters. No additional structures are proposed along the existing circuit. Any replacement structures will be reconstructed at or immediately adjacent to the existing structures they will replace and will be of a generally similar height and appearance. Associated temporary site development works to gain access to the existing structures include clearance of vegetation, disassembly and reassembly of stone walls and gate posts and removal and reinstatement of existing fencing. The proposed development includes all other temporary associated and ancillary site development works required for the uprate of the existing circuit, including the installation of silt traps, silt fences, stone roads, bog mats and clean span bridges. No additional structures, no alteration to the nature, extent, alignment, character or voltage of the existing electricity infrastructure is proposed. A NIS and an environmental report, but not an EIAR, were submitted with the planning application.	Granted with conditions
Great Island Energy Storage System	20180506	Permission for the development of a grid system services facility within a total site area of up to 1.15 hectares, to include 1 no. TSO compound including 1 no. single storey TSO electrical substation building and 1 no. single storey customer substation, electrical inverter/transformer station modules, containerised battery storage modules on concrete support structures, heating, ventilation and air conditioning units (HVAC units). Access tracks and upgraded site entrance, associated electrical cabling and ducting, security gates, perimeter security fencing, CCTV security monitoring system, landscaping works and all associated ancillary infrastructure on land. An environmental report, but neither an EIAR nor a NIS were submitted with the planning application.	Granted with conditions

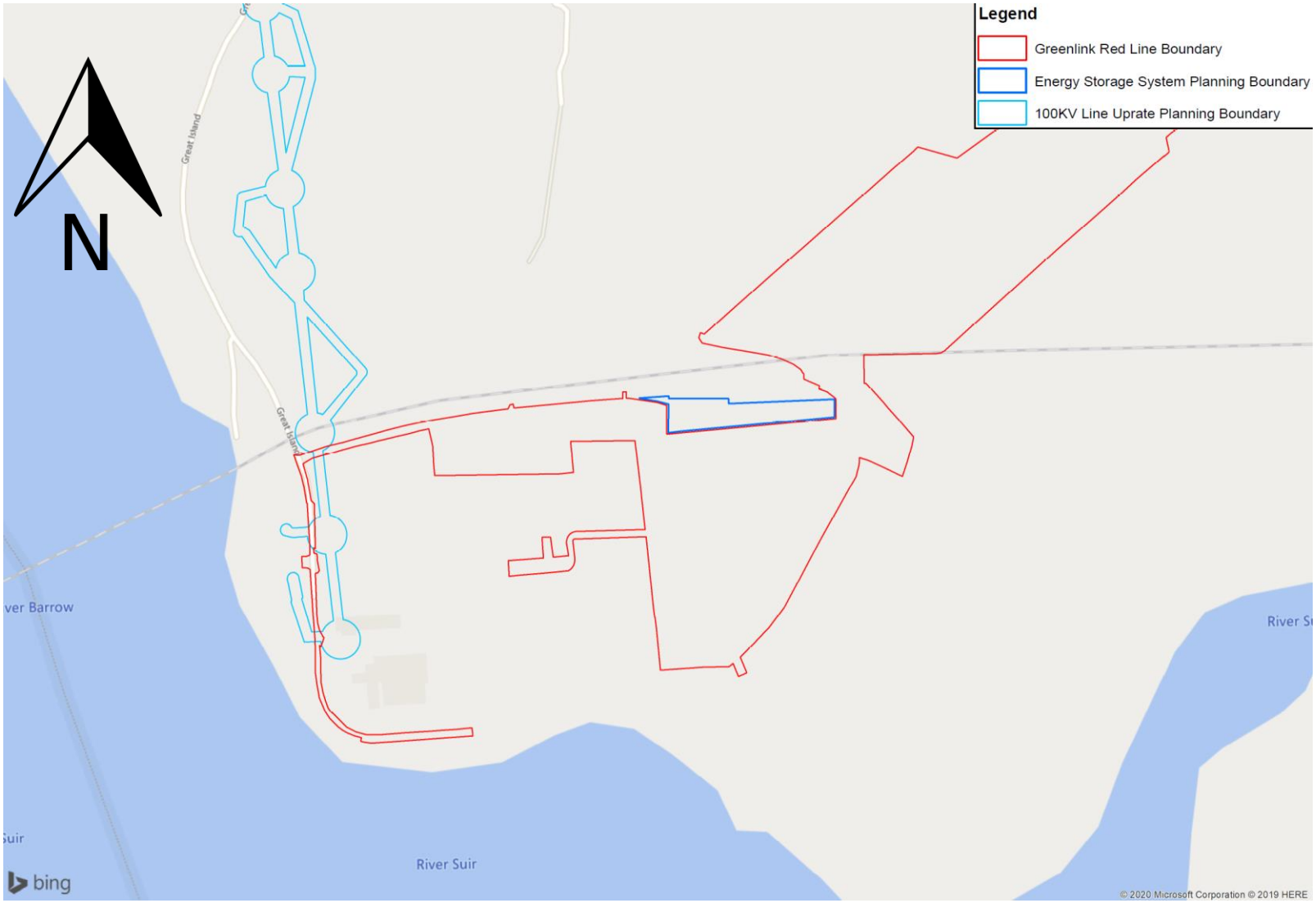

Figure 18.1 Proposed Development Red-line Boundary in the Context of Adjacent Permitted Development | not to scale

18.4.4.1Cumulative Effects During Construction

Potential cumulative effects of the proposed development, the Great Island 110kv uprate project and the Great Island Energy storage project during construction phase are described in the individual assessment chapters of this EIAR – **Chapter 6** through **Chapter 17**. **Figure 18.2** below indicates the possible overlaps in construction schedules, based on the information provided in the documentation submitted to support the planning applications for the two developments.

It is concluded that should the construction of the developments listed in **Table 18.2** above occur concurrently, the potential cumulative construction effects are **not significant**, given the implementation of construction environmental measures as documented in **Chapter 4**, the Construction Environmental Management Plan for the proposed development and a Construction Traffic Management Plan.

18.4.4.2Cumulative Effects During Operation

No potential significant operational impacts of the proposed development and the 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. This potential was assessed in the relevant assessment chapters. No potential significant cumulative impacts are predicted after completion of construction of the proposed development and the Great Island Energy storage project.

Figure 18.2: Possible overlap in construction timing and durations

Note – Timing and durations indicated in the figure above represent construction durations as outlined in their respective planning documentation (with a start date of 6 months post grant of planning unless otherwise stated in the planning documentation).

18.4.5 Cumulative Effects of All Elements of Greenlink

The components of the Greenlink project offshore Ireland, offshore Wales and onshore in Wales are described in **Chapter 3**, *Proposed Development*.

Two subsea HVDC cables and a fibreoptic cable will be laid from the landfall at Baginbun to a landfall at Freshwater West in Pembrokeshire, Wales, and onshore cables will be laid from there to a converter station at Pembroke. The Pembroke converter station will be connected by HVAC cables and a fibre optic cable to the Pembroke National Grid substation.

18.4.5.1 Construction and Decommissioning Inter-Project Effects

The construction activities for the proposed developed is described in **Chapter 4**. The construction phase onshore in Wales will require similar activities. 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.

Table 18.3 identifies the potential negative pressure-receptor pathways at the interface between components of the project offshore and onshore in Ireland, which have been identified and considered by the environmental appraisal process.

Taking into consideration the potential for both direct and indirect effects on all receptors, it is not likely that a significant negative cumulative effect would occur in the construction phase between onshore Ireland and offshore or onshore in Wales. In the Habitats Regulation Assessment of the offshore Wales component, the competent authority Natural Resources Wales determined that the construction of that component would have a significant adverse effect on the Pembrokeshire Marine SAC. There is no potential for a cumulative adverse effect on this protected site from the onshore Ireland component.

In the decommissioning phase, at the converter stations and the Loughtown tail station, all buildings and installations will be removed to ground level, and the sites will be reinstated. Marker post, link boxes etc will be removed along the onshore cable route but the cables will remain in situ. The offshore cables will remain in situ. There is not likely to be an interproject cumulative effect during the decommissioning phase.

The beneficial cumulative significant effect of the construction phase will be the investment of €400 million. This will include the purchase of cables, converter station equipment and associated equipment, and for the offshore cable laying and onshore construction works in Ireland and Wales, and associated costs.

Table 18.3: Summary of intra-project effects

Interface		Receptor	Summary of environmental effect	EIAR Conclusion
Components				
Offshore Ireland	Onshore Ireland	Amenity	There is potential that, if works in the nearshore area occur at the same time as works at the Baginbun HDD and cable compounds, there could be a temporary elevation in the visual and noise disturbance to the recreational users of Baginbun Beach. At certain times of the year the public will be more sensitive due to increased use of the beach for specific events i.e. May 2020 (Anglo-Norman commemorations) or during the peak holiday period of July and August. Construction will not have commenced by May 2020. Construction of the cable route and the landfall HDD will be scheduled to avoid July and August.	**No significant effects**
Offshore Ireland	Onshore Ireland	Birds	The Campile Estuary is too far away from the nearest point, at which the offshore construction activities will occur, for there to be intra-project effects on birds between these two project components. Potential effects, including cumulative effects, on biodiversity are fully documented in **Chapter 9** of the EIAR. There is a potential for intra-project effects between the onshore works, close to and at Baginbun Beach, and the nearshore works for the offshore cable. The HDD at Baginbun is scheduled to be undertaken from January to March 2022. The offshore works are scheduled to be undertaken from April to November 2022. There will be minimal time overlap between the two activities. 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, and the onshore site is not of particular value to the offshore bird species. Consequently, it has been concluded there will be no significant intra-project effects.	**No significant effects**

18.4.5.2 Operational Interproject Effects

Once Greenlink is operational, there will be beneficial cumulative significant effects. The effects will be:

- 500MW of interconnector capacity between Ireland and Great Britain, and onwards to continental Europe;
- 500MW of interconnection providing increased security of electricity supply in Ireland and Great Britain;
- 500MW of export capacity providing support for low carbon generation in Ireland and Great Britain by reducing the need for curtailment and providing access to higher priced markets; and
- 500MW capacity of increased market trading opportunities for efficient generators in Ireland or Great Britain, potentially lowering energy prices by increasing market competition.

18.5 Transboundary Effects

The transboundary effects of Greenlink will be beneficial and significant.

The effects will be:

- the investment of €400 million on the purchase of cables, converter station equipment and associated equipment, and for the offshore cable laying and onshore construction works in Ireland and Wales, and associated costs.
- 500MW of interconnector capacity between Ireland and Great Britain, and onwards to continental Europe;
- 500MW of interconnection providing increased security of electricity supply in Ireland and Great Britain;
- 500MW of export capacity providing support for low carbon generation in Ireland and Great Britain by reducing the need for curtailment and providing access to higher priced markets; and
- 500MW capacity of increased market trading opportunities for efficient generators in Ireland or Great Britain, potentially lowering energy prices by increasing market competition.

18.6 Conclusion

Interactive, cumulative and transboundary effects were identified and assessed in this EIAR. Short-term significant negative interactive and cumulative effects on traffic, road users and material assets will arise during the construction phase. Long-term significant positive cumulative and transboundary effects on material assets and the population will arise during the operation of Greenlink.

18.7 Impact Assessment Summary

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Interactive and Indirect Effects				
Traffic and Visual Amenity	During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape or visual amenity resulting from the traffic generation by the project.	Implementation of construction environmental controls, which are specified in the CEMP and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Local, short term, significant, negative**
Traffic and Population	There will be a short-term significant impact on the residents and road users in the vicinity of the HVDC cable trench excavations and cable installation works for the duration of the works. Once the cable works have been completed, there will not be a significant impact on the road network or on traffic.	Implementation of construction environmental controls, which are specified in the CEMP and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Local, short term, significant, negative**

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Visual amenity and population	During construction of the landfall and cable route, there will be local, short term, significant effects on the visual amenity of residents and visitors along the cable route and at Baginbun Beach. Once construction is completed there will be no significant effects on landscape or visual amenity.	Implementation of construction environmental controls, which are specified in the CEMP and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Local, short term, significant, negative**
Population, Natural Resources and Waste Management	The construction and decommissioning phases of the proposed development will create employment, which will give rise to greater use of natural resources and greater waste generation in the region. The direct employment arising from the operation of Greenlink will be negligible.	none	none	**Local, short term, slight negative**
Material Assets and Air Quality and Climate	The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce emission to air of nitrous oxides, sulphur dioxide, particulate and carbon dioxide from fossil fuel power plants. This will improve air quality and reduce a cause of climate change.	none	none	**Positive, significant**
Material Assets and Natural Resources	The operation of Greenlink will support renewable generation by reducing curtailment at times of surplus generation. The indirect effect will be to reduce fuel consumption in fossil fuel power plants, and the generation of waste by solid fuel plants.	none	none	**Positive, significant**

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Material Assets and Population	The proposed development will increase the security of electricity supply in Ireland. It should also provide more competition in the electricity market in Ireland. This will provide economic and social benefits to electricity consumers.	none	none	**Positive, significant**
Combined Effect of Individual Impacts on a Particular Receptor				
Residents and road users along Cable Route	During the excavation of the cable trench, installation of ducting and reinstatement of the trench there will be a short term (three weeks duration) significant negative impact on the nearby residents and road users from combined effects. At the 19 number jointing bays, which are in a road, the significant negative impact will be of seven weeks duration.	Implementation of construction environmental controls, which are specified in the CEMP and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Local, short term, significant, negative**
Combination of Incremental Effects – Past and Present with Proposed Development				
Visual Amenity	During the construction of the landfall and cable route, there will be a local, short term, significant effect on residents and users of the beach	Implementation of construction environmental controls, which are specified in the CEMP and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Local, short term, significant, negative**

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Material Assets, Population	Provision of the 500MW interconnector will enhance security of energy supply and competition in the Irish energy market, and support renewable energy generation	No mitigation	None	**Widespread, long term, significant, positive**
Combination of Incremental Effects - Past, Present and Future with Proposed Development				
Population	Cumulative effects of construction activities with concurrent construction of the Great Island – Kilkenny 110kv Line Uprate project, and the Great Island Energy Storage System Project	Implementation of construction environmental controls, the CEMP, and the construction traffic management plan	Monitoring will be in accordance with the CEMP and construction traffic management plan	**Not significant**
Greenlink Intra-Project Effects				
Amenity	Intra-project effects with the construction of the subsea cable. There is potential that if works in the nearshore area occur at the same time as works at the onshore HDD compound there could be a temporary elevation in the visual disturbance to the recreational users of Baginbun Beach. At certain times of the year the public will be more sensitive due to increased use of the beach or specific events i.e. May 2020 (Anglo-Norman commemorations), July and August.	Seasonal restrictions will be implemented to reduce the significance of the effect.	None	**Not significant**

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Birds	Intra-project effects with the construction of the subsea cable. The Campile Estuary is spatially too far apart from activities within the Marine Ireland component for there to be intra-project effects on birds between these two project components. Potential effects are fully documented in **Chapter 9** of the EIAR. The area identified as having potential for intra-project effects is at the interface between onshore works at the landfall site close to Baginbun Beach and nearshore works in the Marine Ireland component. However, due to a lack of temporal overlap between the two project component activities which could affect birds, and due to the difference in bird species which have the potential to be affected by the different project components, it has been concluded there will be no significant intra-project effects.	None	None	**Not significant**
Population and economic development, material assets	€400 million investment in Ireland, United Kingdom and location of materials and equipment manufacturers, suppliers and contractors. 500MW additional interconnector capacity, which will provide increased security of supply, support for low carbon generation in Ireland and Great Britain, lower energy prices and increased market competition.	None	None	**Widespread, long term, significant, positive**
Transboundary Effects				

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Population and economic development, material assets	€400 million investment in Ireland, United Kingdom and location of materials and equipment manufacturers, suppliers and contractors. 500MW additional interconnector capacity, which will provide increased security of supply, support for low carbon generation in Ireland and Great Britain, lower energy prices and increased market competition.	None	None	**Widespread, long term, significant, positive**

18.8 References

Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive);

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