13 MATERIAL ASSETS AND OTHER ISSUES

13.1 INTRODUCTION

This chapter assesses the impacts of the Development on material assets. The Development refers to all elements of the application for the construction of Gortyrahilly Wind Farm (**Chapter 2: Project Description**). The assessment will consider the potential effects during the following phases of the Development:

- Construction of the Development
- Operation of the Development
- Decommissioning of the Development

Common acronyms used throughout this EIAR can be found in **Appendix 1.2.** This chapter of the EIAR is supported by Figures provided in Volume III and by the following Appendix documents provided in Volume IV of this EIAR:

- **Appendix 13.1 Ai Bridges Telecommunications Impact Study**
- **Appendix 13.2 PUNCH Civil & Structural Due Diligence Report**

13.2 STATEMENT OF AUTHORITY

This chapter has been prepared by Ms. Sarah Moore with the assistance of Ms. Shirley Bradley of Jennings O'Donovan & Partners Limited. The Telecommunications Impact Survey (**Appendix 13.1**) was carried out by Kevin Hayes, David McGrath, Patrick Tinney and Karla Chagas in Ai Bridges Ltd.

Ms. Sarah Moore is a Senior Environmental Consultant and holds a Bachelor (Hons.) Degree in Environmental Science from University of Limerick and a MSc (Dist) in Environmental Engineering from Queen's University, Belfast. She has worked in environmental consultancy for over fourteen years and has prepared AA Screenings, Environmental Reports and EIARs.

Ms. Shirley Bradley is a Graduate Environmental Scientist with a First-Class Honours Degree (BSc Hons) in Environmental Science from the Institute of Technology, Sligo. She was also awarded with the Governing Body award for a BSc in Environmental Protection. Shirley's key capabilities are in report writing, assisting Senior Consultants and GIS.

Kevin Hayes is the Founding Director and Engineering Contracts Manager in Ai Bridges Ltd. Kevin has over 20 years' experience in Telecommunications Network Design and Project Management. Kevin has a B.Eng Hons in Electronic Engineering – Communications & Industrial Automation and M.Eng Hons in Electronic Engineering- Communications & Communications Engineering. He also managed and designed the software prediction model for the TVI & Broadband EMI Interference Studies for Wind Farms.

David McGrath is a Radio Planning Engineer in Ai Bridges Ltd. David has a Bachelor of Science degree in Computing and has received a Bachelor of Engineering in Electronic Engineering. David has experience in analysing Radio Frequency issues, research and development in varying wireless network projects and supervision of Dublin Institute of Technology Master's degree students.

Patrick Tinney is a Communications Engineer in Ai Bridges Ltd. with a B.Eng. in Electronics, Occupational First Aid and 3 years' experience as a Health and Safety representative. He has received a B.Eng. in Computer and IT Systems. Patrick has experience in conducting site surveys and RF. He provides on-site support for the roll-out of fixed wireless access in Ireland.

Karla Chagas is a Software Engineer in Ai Bridges Ltd. with over 14 years' experience working in radar, telecommunications and radio related interference and telecommunications modelling projects. Karla has over 4 years' experience working with aviation, telecommunications and EMI interference and remediation projects. She has received a M.Sc. in Electrical Engineering and is currently undertaking a Ph.D. in Computer Engineering.

Further details and biographies/CVs of those involved in the development of each chapter have been included in **Chapter 1: Introduction** (Section 1.9).

13.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Following preliminary consultations with key consultees during the scoping process, desk-based assessments, site visits and field surveys were undertaken. In line with the EIA Directive 2011/92/EU as amended by EIA Directive 2014/52/EU and current (draft) EPA Guidelines, this chapter of the EIAR aims to focus the assessment solely on those elements likely to have a significant effect on the environment. Economic assets of natural heritage include non-renewable resources such as minerals or soils, and renewable resources such as wind and water. These assets are addressed in **Chapter 8: Soils and Geology**, **Chapter 9: Hydrology and Hydrogeology**, and **Chapter 10: Air and Climate**. Peat and spoil are assessed in **Chapter 8: Soils and Geology**. Amenity resources and tourism are addressed in **Chapter 4: Population and Human Health**. The cultural assets of Archaeology and Cultural Heritage are addressed in **Chapter 14: Cultural Heritage** and traffic is addressed in **Chapter 15: Traffic and Transportation**. Utilities such as water, wastewater and waste services are addressed in this chapter and in **Chapter 2: Project Description**.

The material assets considered in this chapter include:

- Land Use - Agriculture
- Land Use - Forestry
- Telecommunications
- Air Navigation
- Quarries
- Utilities (gas, water, waste)

13.4 LAND USE - AGRICULTURE

13.4.1 Baseline Environment

The Site, located 4.3km south-west of Ballyvourney, is characterised as being generally commercial forestry and rural, agricultural land. There are also a number of residential properties and established wind farms in the region. The Development as a whole is characterised by elevations of between 230m and 423m AOD and a spatial area of 667 hectares. Most of the Site is located above the 300m AOD mark.

The agricultural land is predominantly utilised for sheep and cattle grazing. The commercial forestry is mainly made up of Sitka Spruce and is further detailed in **Section 13.5**.

13.4.2 Assessment of Potential Effects

The total land-take of the Development, including the Site Access Roads, Turbine Hardstands, Turbine Foundations, Grid Connection Route, Turbine Delivery Route nodes and sub-station is 135 hectares. The Site is 667 hectares therefore the total land take is 20% of the Site. The proposed Site Access Roads and upgrade to existing roads will improve access for surrounding agricultural use.

The construction, operational and decommissioning phase of the Development will result in a change of 127 hectares of agricultural land use in areas where new Site Access Roads, wind turbine bases, hardstanding areas, Met Mast, the Onsite Substation and Control Building and associated drainage infrastructure will be located.

The construction of the Grid Connection Route and Turbine Delivery Route will only require relatively localised excavation works within and adjoining the public roads, with some works in private lands and Site Boundary and will be reinstated upon installation of cables.

There will be ten turbines located on or partly on agricultural lands. This will result in the change of use from agricultural pastureland to wind farm use. This will have a long-term slight, negative impact on agricultural land use due to the removal of grazing lands for the duration of the Project during construction and operation phases.

The approach proposed for decommissioning is one of minimal intervention:

- Decommissioning works will be limited to action necessary to remove the wind farm structures, i.e., removal of turbines and monitoring mast, extraction of cables but leaving ducting in-situ.
- Roads and associated drainage systems will remain in place to serve ongoing forestry and agriculture activity.
- Hardstanding areas will be allowed to revegetate naturally.
- Turbine plinths will be removed, and the hardcore covering Turbine Foundations will be allowed to revegetate naturally.
- Soil disturbance will be avoided as much as possible.

Therefore, the effects of the decommissioning phase on agriculture will be less than those during the construction phase and not significant.

13.4.3 Mitigation Measures and Residual Effects

Mitigation measures to minimise impacts on agricultural land use have been incorporated into the design stage. The construction and operational footprint of the Development has been kept to the minimum necessary to avoid impact on existing land uses and existing tracks have been used where possible.

These mitigation measures will allow for the prevention of unnecessary or inappropriate ground works or land use alterations to occur and will avoid unnecessary soil compaction.

Implementation of the measures outlined above will ensure that residual impacts will be slight negative for the duration of the construction and operational lifespan of the Project.

There are no worse residual impacts predicted, with respect to land use, arising from the operational phase.

All existing access points (i.e., to domestic premises, business, farms) are accessible during temporary road closures and diversions. This is to maintain local access and avoid impacts on other various land uses. **Chapter 15: Traffic and Transportation** refers to all proposed

works and deliveries along the turbine delivery route to avoid undue impact to adjacent land uses. This is also considered for the decommissioning phase for which traffic will be required along the Construction Haul Route. The Turbine Delivery Route will no longer be needed. This is further detailed in **Chapter 2: Project Description**. Thus, the residual impact on surrounding agricultural land uses is negligible during construction, operation and decommissioning

13.4.4 Cumulative Effects

Due to the localised nature of the proposed construction/decommissioning works, there is no potential for significant cumulative effects in-combination with other local developments on the agricultural land use as apart from some small sections of the Turbine Delivery Route, all effects are directly within the Site.

Other projects outside the Site do not have the potential to reduce or increase the magnitude of effects of the Development on land use within the Site. Therefore, this will not contribute to any significant cumulative effects during the construction/decommissioning or operational phases.

Land management practices in the wider area which are considered to have potential for cumulative effects with the Project are agriculture and forestry. All existing and approved projects in **Appendix 2.5** were considered. There are no applications for large-scale commercial or industrial activities near the Site. Minor domestic and agricultural development will not introduce potential for cumulative effects during the construction, operational or decommissioning phases as the impacts will be localised and not significant.

The nearest wind farm is located 189m to the south of the Development (Derragh Wind Farm). Surrounding agricultural activities can and will continue during the construction, operational and decommissioning phases of the Development when fencing has been fully established.

13.4.5 Statement of Significance

No significant impacts are predicted on agricultural land use.

13.5 LAND USE - FORESTRY

13.5.1 Baseline Environment and Description of Development

Permission is being sought by the Developer for the construction of 14 No. Wind Turbines, a meteorological mast, an on-site substation and all ancillary works, works along the Turbine Delivery Route and the construction of an underground Grid Connection Route to Ballyvouskill 220kV GIS substation, Co. Cork. A full description of the Development can be found in **Chapter 2: Project Description**.

The Site contains 154 hectares of forestry which is classified as commercial forestry. The proposed windfarm infrastructure layout (i.e., roads, Turbine Hardstands, etc.) affects forestry and 6 No. turbines are located within forestry. A summary of the forestry affected is provided in **Table 13.1a** with Site Access Roads and the site compound also cutting through some of these plots**.**

Table 13.1a: Summary of Removal of Forestry to facilitate The Development

Infrastructure	Area of forestry lost (Ha)	Species present
Turbines 3, 4, 5, 6, 10, 11	19.86	Sitka spruce / Lodgepole Pine
Site Compound	0.44	Sitka spruce / Lodgepole Pine
Borrow Pit	1.9	Sitka spruce / Lodgepole Pine
Access Roads	7.54	Sitka spruce / Lodgepole Pine
Bio Enhanced Area	5.68	Sitka spruce / Lodgepole Pine
Totals	**35.42**	

Detailed consideration of the approach to afforestation requirements associated with the Project is attached in **Appendix 2.2**. It should be noted that the clearfelling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the Developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than

10km from the wind farm site and also outside any potential hydrological pathways of connectivity i.e., outside the catchment within which the proposed project is located. On this basis, it is reasonable to conclude that there will be no more than imperceptible, indirect or in-combination effects associated with the replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licenced appropriately by the relevant consenting authority.

13.5.2 Assessment of Potential Effects

The lands affected by the Development are currently in use for commercial forestry and agriculture.

Arc GIS Pro was used to calculate areas of forestry within the surrounds of the Development. Cleanrath was calculated to have 157ha, Gortnatubrid was calculated to have 73ha, the townland of Gortyrahilly has 202ha and Derryfineen has 167ha. The majority of the forestry within the surrounds of the Development was classed as 'Coniferous forest' according to CORINE Land Cover (Copernicus)[1].

The removal of 35.4 hectares (21%) of 154 hectares commercial forestry lands within the Site will have a permanent slight, negative impact on the existing forestry land use during the construction, operation and decommissioning of the Development.

13.5.3 The 'Do-Nothing' Impact

If the Development does not proceed, lands in the vicinity of the Site will continue to be used for forestry and agricultural purposes. This would have a neutral effect.

13.5.4 Mitigation Measures and Residual Effects

Existing forestry tracks have been incorporated into the design to minimise the construction of new Site Access Roads and minimise the removal of forested areas. New Site Access Roads have been sensitively designed to minimise impact on forestry. Electricity cables will be installed underground in or alongside Site Access Roads to avoid and minimise negative impact. The construction and decommissioning works will be planned and managed by a Construction and Environmental Management Plan (CEMP) (**Appendix 2.1**). This provides details on day to day works and methodologies. As part of these works, the public and other stakeholders will be provided with updates on construction activities which will affect access

[1] Environmental Protection Agency Maps https://gis.epa.ie/EPAMaps/ [Accessed Online_22/06/2022]

to surrounding lands. This will be communicated to members of the public through a community liaison officer employed for the duration of the construction period.

The impact on land take during construction/decommissioning is likely to have a permanent slight, negative impact on the forestry, in that it alters the character of the environment, albeit in a manner consistent with existing and emerging wind farm trends in the surrounding area. Implementation of the measures outlined above will ensure that any residual impacts will be slight negative and short term in duration.

During the operational phase, the impact on forestry land take is likely to have a moderate negative permanent impact on the environment of the area (in that it alters the character of the environment); however, this change is consistent with existing and emerging trends. There are no predicted residual impacts, with respect to forestry land use, arising from the operational phase.

13.5.5 Cumulative Effects

Due to the localised nature of the proposed construction/decommissioning works which will be kept within the Site Boundary, there is no potential for significant cumulative effects in-combination with other local developments on commercial forestry as all effects are directly within the Site.

The surrounding commercial forested area of the Development will continue its ongoing commercial maintenance, felling and replanting schedule throughout the operational life of the Project.

As forestry activity is expected to continue on surrounding lands throughout the lifespan of this Project, no potential significant cumulative effects are considered likely.

13.5.6 Statement of Significance

No significant impacts are predicted on commercial forestry outside of the Site.

13.6 TELECOMMUNICATIONS

Microwave links need an unobstructed line of sight from end to end because blocked links will perform inadequately. It is therefore necessary to ensure tall wind turbines will not interrupt links. Impacts can include reflection, diffraction, blocking and radio frequency interference.

During operation, wind turbines have the potential to interfere with electromagnetic signals passing above the ground due to the nature and size of the wind farm.

Ireland saw the roll out of Digital Terrestrial Television, locally known as Saorview TV, in October 2010, incorporating the switchover from analogue to digital television. According to Ofcom (a regulatory UK body) (2009), *digital television signals are much better at coping with signal reflections, and digital television pictures do not suffer from ghosting*[2]. Ghosting is the replica of a transmitted image which is offset in position and is superimposed on top of the main image.

Since digital switchover, there have been very few reported cases of wind turbine interference with domestic analogue reception. Modern turbine blades are also typically made of synthetic materials which have a minimal impact on the transmission of electromagnetic radiation. Therefore, potential effects on television and radio signals from the Development will be negligible and are not considered further, given the advancements in technology.

13.6.1 Guidance

Potential telecommunication effects generated by the Development have been assessed with reference to the following documents.

- Cork County Development Plan, 2022
- 'Best Practice Guidelines for the Irish Wind Energy Industry', published by the Irish Wind Energy Association (2012).
- Information about Electric & Magnetic Fields and the Electricity Transmission System in Ireland, EirGrid[3]
- Wind Energy Development Guidelines: Planning Guidelines, Department of Environment, Heritage and Local Government (DHPCLG) 2006[4]

13.6.2 Scoping and Consultation

Telecommunications providers were consulted about the Development. A summary of responses is outlined in **Table 13.2** and **Appendix 1.1** outlines full consultation responses.

[2] Ofcom (2009) *Tall Structures and Their Impact on Broadcast and Other Wireless Services*, OFCOM, United Kingdom. Available online at: https://www.ofcom.org.uk/__data/assets/pdf_file/0026/63494/tall_structures.pdf [Accessed 14/11/2019]
[3] Eirgrid (2014) *Information on Electric and Magnetic Fields*. Available online at : http://www.eirgridgroup.com/site-files/library/EirGrid/Information%20on%20Electric%20and%20Magnetic%20Fields.pdf [Accessed on 18/11/2019]
[4] Department of Housing, Planning, Community and Local Government (2006) Planning Guidelines. Available online at: https://www.gov.ie/en/publication/f449e-wind-energy-development-guidelines-2006/ [Accessed 25/02/2021]

Table 13.2: Summary of Consultations

Consultee	Response Date	Response
RTÉ Donnybrook Dublin 4 (*2RN is the trading name of RTÉ Transmission Network DAC*)	17/11/2020	*2RN have three off air links that pass through the proposed Turbine locations. The Turbine numbers 1, 4 and 9 are of particular concern. For the 90 MHz service we require a 400m corridor and 350m for the 474 MHz service. There is also a risk of interference to DTT* [Digital Terrestrial Television] *viewers in the Ballingeary area. We would therefore request that a protocol be signed between the developer and 2RN should the site go ahead.*
Virgin Media Television Westgate Business Park Ballymount Dublin 24	13/11/2020	*Virgin Media does not have any record of underground services at this location as indicated by your drawing.* *The actual position of underground services must be verified and established on site before any mechanical plant is used.*
Vodafone Netshare Ireland Iveagh Buildings Carrickmines Dublin 18	15/02/2021	Highlighted links that will be affected, namely CKSRN-CKMGH, Inchee-Cashelmore and CKMGH-CK171.
Tetra Ireland	09/12/2020	*"We anticipate no impact from the development as proposed."*
ENET	19/02/2021	Highlighted links close to turbines

13.6.3 Assessment Methodology

Following scoping, AI Bridges were commissioned to undertake a telecommunications impact assessment of the operation phase of the Development, which is attached as **Appendix 13.1**.

There are four primary stages in preparing and compiling a communication impact study:

- Telecom Operator Consultations
- Field Surveys
- Desktop Survey Network Modelling and Analysis
- Report Generation.

AI Bridges assessed the impact of the Development on seven communication links, three Vodafone links, three 2RN links and one ENET Link using 3D network modelling.

13.6.4 Assessment of Potential Effects

All potential effects, which are associated with the operational phase of the Development, are classified as long-term effects. It is predicted that significant effects will occur on the 2RN FM link from Mullaghanish to Bantry. However, mitigation measures have been agreed

with 2RN and will be implemented such that there will either be a negligible effect, or no effect, on infrastructure as a result of the Development and are discussed in **Section 13.6.5**. A detailed assessment of the effects of the Development on telecommunications can be found in **Appendix 13.1: Telecommunications Impact Study**.

13.6.4.1 The 'Do-nothing Impact'

If the Development does not proceed, there will be neutral impacts on telecommunications. This 'do-nothing' scenario would result in no interference in electromagnetic signals subject to the continuation of current activities and practices.

13.6.4.2 Construction Phase

During the construction phase, there are likely to be several sources of temporary electromagnetic emissions. Chief among these will be the brief use of electrical power tools and the use of electrical generators which may be brought onsite before mains electricity is provided. These devices are required by Irish and European law to comply with the EMC Directive 2014/30/EU. Compliance with this Directive will mean that the electromagnetic emissions from these devices will not cause interference to other equipment.

Other potential effects during the construction phase are likely to be as a result of tall cranes used for constructing the turbines. These cranes will be beside the proposed turbines. Any interference effects are likely to be similar to those arising during the operational phase of the Development. This is further detailed in **Appendix 2.1**.

Five telegraph poles will be temporarily removed along the L-3405-0 to facilitate the transport of Turbine components. This will have temporary, short-term effects on telecommunications in the locality which can be described as not significant.

13.6.4.3 Operational Phase

The telecoms impact assessment found there will likely be interference with one 2RN transmission link (FM link from Mullaghanish to Bantry). This is due to an infringement of 4.78m into the Fresnel Zone (0.6 Fresnel). The Fresnel Zone is the area around the visual line of sight that radio waves spread out into after they leave the antenna. Signal strength is dependent on the maintenance of a clear line of sight.

There will be no impact to the other six of the seven links assessed.

13.6.4.4 Final Decommissioning Phase

When decommissioning of the Development takes place, effects associated with this phase on telecommunications will be similar to those at the construction phase.

13.6.5 Mitigation Measures

All electrical elements of the Development are designed to ensure compliance with electro-magnetic fields (EMF) standards for human safety.

Mitigation measures were undertaken in the design phase through mitigation by avoidance i.e., the known routes of the telecommunication links were plotted and a buffer was applied to them, outside of which the proposed turbines were located. Compliance with the EMC Directive 2014/30/EU will mean that the electromagnetic emissions from devices used will not cause interference to other equipment.

Appendix 13.1: Telecommunications Impact Study states that during the construction phase, Turbines 3 and 7 will be oscillated into a position predicted to impact on the 2RN telecommunications links the most (i.e., worst case interference position). Should the predicted worst case interference be confirmed a solution to install a wireless data link between two points (point-to-point radio link)from Mullaghanish to Bantry Masts can be implemented. This will likely comprise one new satellite dish on each existing mast at these locations erected by a two-person crew in a single van, therefore minimising the impact. This link will be installed on behalf of 2RN by a third party and will be maintained by the wind farm operator for the duration of the operation of the wind farm. In terms of the details of the wireless data link to offset the potential impact on the 2RN FM link from Mullaghanish to Bantry, 2RN have confirmed that the following mitigation measure options are acceptable:

- The installation of upgraded Mullaghanish to Bantry microwave radio link/FM Radio Multiplex or equipment to be installed and maintained on behalf of 2RN for the duration of operation of the wind farm. This will include Annual Mast Rental to be covered by the wind farm owner for the duration of the operation of the wind farm; or
- The provision of point-to-point 10MB dedicated internet access connection from 2RN Head-end site to Bantry Mast Transmitter site for an FM link. This will include an annual internet service charge to be covered by the wind farm owner for the duration of the operation of the wind farm.

It has been agreed with 2RN that the ongoing mast rental costs for the antenna on the masts at Mullaghanish and Bantry will be paid by the wind farm owner.

The following locations along the L-3405-0 (**Appendix 15.1**) are where telegraph poles are to be removed, as mitigation measures, in order to prevent damage along the Turbine Delivery Route:

- Location 42
- Location 44
- Location 45
- Location 46
- Location 47

13.6.6 Cumulative Effects

All existing and approved projects in **Appendix 2.5** have been considered for potential cumulative effects. There are 32 No. proposed, permitted or operational wind farms within 20km of the Development (**Appendix 2.3**). Each Developer is responsible for engaging with all relevant telecommunications operators to ensure their proposals will not interfere with television or radio signals by acting as a physical barrier. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact cannot arise. There will be no cumulative impacts relating to the Development and surrounding projects in relation to telecommunications.

13.6.7 Statement of Significance

The implementation of mitigation measures will ensure no interference with communication links. Therefore, no significant effects are predicted on telecommunications or radio reception as a result of the Development.

13.7 ELECTRICITY NETWORKS

13.7.1 Introduction

This section describes the transmission network and the anticipated connection option. It is not proposed to utilise any elements of the distribution network.

The nationwide electricity transmission system allows for the transport of large volumes of electricity from generation stations, including wind farms, to bulk supply points near the main population centres where it interconnects with the distribution system.

The Grid Connection will be 27.8km in length and will be along public roads, private roads and forestry roads.

Connection will be sought from the grid system operator by application to EirGrid. The substation will connect via underground 110kV cables. At the existing Ballyvouskill 220kV substation, the cable will connect into existing infrastructure within the confines of the substation and its compound. The Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R1) of EirGrid.

13.7.2 Assessment Methodology

Punch Consulting Engineers prepared a Civil and Structural Due Diligence Report which assesses utilities along the Grid Connection Route and can be found in **Appendix 13.2**. The report assesses the impacts based on desktop study, consultation and site visit.

EirGrid was consulted about the Development and the connection to Ballyvouskill 220kV substation via an online webinar. EirGrid confirmed that it cannot determine any proposed connection methods until the formal connection application process is completed. However, their feedback was reflected on the Grid Connection Route design package included in the planning application.

ESB have responded to consultation with relevant information of their network installations, which are adjacent to and cross the cable route. There is a high voltage cable route crossing and joint bays along the Grid Connection Route (**Appendix 13.2**).

13.7.3 Assessment of Potential Effects

Due to the fact that all on-site internal cabling will be underground as will the grid connection from the onsite substation to Ballyvouskill, there will be no impact on the overhead electricity network.

The Development will contribute directly and in the long term to the electricity network by strengthening it through additional renewable energy generation.

At the existing Ballyvouskill 220kV substation, the cable will connect into existing infrastructure within the confines of the substation and its compound and thus will have a slight, short term effect.

13.7.4 The 'Do-nothing' Impact

If the development does not proceed, there will be no offset to fossil fuel usage, and no provision of additional electricity in the local area.

13.7.5 Mitigation Measures

Mitigation by design and avoidance will minimise impacts on existing electricity networks.

- Confirmatory drawings for all existing services will be sought upon consultation with ESB Networks.
- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CAT scan (sub-surface survey technique to locate any below-ground utilities) and all existing services will be verified. Temporary warning signs will be erected.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts. The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.

13.7.6 Cumulative Effects

All existing and approved projects in **Appendix 2.5** have been considered. There are 32 No. proposed, permitted or operational wind farms within 20km of the Development. There will be no cumulative impacts relating to the Development and surrounding projects in relation to electricity networks during the construction phase.

Potential negative cumulative effects on electricity networks are unlikely during the operational and decommissioning phases.

13.7.7 Statement of Significance

No significant negative impacts on the grid connection or grid network are anticipated. There will be a long-term slight positive residual impact on transmission infrastructure in the area (due to the installation of new infrastructure) and no impact on distribution. It is not proposed to utilise any elements of the distribution network.

13.8 AIR NAVIGATION

13.8.1 Introduction

Operating wind farms have the potential to cause a variety of adverse effects on aviation. Rotating wind turbine blades may have an impact on certain aviation operations, particularly those involving radar. The physical height of turbines can cause obstruction to aviation and

the overall performance of communications, navigation and surveillance equipment. All structures over 150m in height are required to have lighting to warn aviation traffic. The Development's ground to blade tip height of the wind turbines will range from 179m to 185m during operation. The tallest tip height (185m) represents the largest obstacle of any turbine within the Turbine Range to air traffic (irrespective of the turbine selected and constructed within the Turbine Range, a turbine with an equal or lesser tip height will still be within that space).

Enniskeane Airstrip is 28km to the south-east. Bantry Aerodrome is 29km to the south-west of the Development. The closest regional airport is Kerry Airport, 37km to the north-west. The closest international airport is Cork, 48km to the south-east.

13.8.2 Consultation

Consultation with the relevant aviation organisations was initiated during the scoping process, to identify any potential aviation issues that could be affected by the Development. The findings are summarised in **Table 13.3**.

Table 13.3: Summary of Consultation Response

Consultee	Response Date	Response
Irish Aviation Authority The Times Building 11-12 D'Olier Street Dublin 2	17/12/2020	1. *Agree an aeronautical obstacle warning light scheme for the wind farm development.* 2. *Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.* 3. *Notify the Authority of intention to commence crane operations with at least 30 days prior notification of their erection.*
Kerry Airport Farranfore Killarney Co. Kerry V93 KHF7	12/01/2021	*"From the information received the nearest point on the site appears to be over 30km from the extended centreline of Runway 08/26 and also over 30km from the Aerodrome Reference Point. The site is, therefore, over 15km outside the Outer Horizontal Surface (which extends from the ARP out to a distance of 15km). This should not have any affect on the operations of the airport, based on the position we will not be making any submissions."*
Cork Airport Kinsale Road Cork T12P5NF	No Response	None

13.8.3 Assessment of Potential Effects

Consultation with the Irish Aviation Authority and Kerry Airport Ireland revealed that the Development is not predicted to have any effect on the operations of Kerry Airport as the Development is outside the 'Outer Horizontal Surface' (over 15km away). The Development

is over 30km from the extended centreline of Runway 08/26 (Kerry Airport) and over 30km from the Kerry Aerodrome Reference Point. No potential effects are predicted.

Cork Airport were consulted; however, no response was given. The airport is over 45km from the Development. The civil aviation guidelines for wind turbines covers a 30km radius[5]. Therefore, no potential effects to air navigation were identified.

13.8.4 The 'Do-Nothing Impact'

If the Development were not to proceed, there would be no impact on aviation operations in the area.

13.8.5 Mitigation Measures

Although no potential effects were identified, the following mitigation measures proposed by the Irish Aviation Authority (IAA) and Kerry Airport will be implemented:

- An aeronautical lighting scheme for the Development will be agreed with the IAA and will be installed.
- As-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location will be provided to the IAA.
- The IAA will be notified of intention to commence crane operations with at least 30 days prior notification of their erection.

13.8.6 Cumulative Effects

All existing and approved projects in **Appendix 2.5** have been considered. There are 32 No. proposed, permitted or operational wind farms within 20km of the Development. Each Developer is responsible for engaging with the aviation authority to ensure the proposals will not interfere with aviation radio signals by acting as a physical barrier. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact cannot arise. There will be no cumulative impacts relating to the Development and surrounding projects in relation to aviation during the construction phase.

Potential negative cumulative effects on aviation are unlikely during the operational and decommissioning phases.

[5] Safeguarding of Aerodromes, Safety and Airspace Regulation Group, UK Civil Aviation Authority, 2020. https://publicapps.caa.co.uk/docs/33/CAP738%20Issue%203.pdf [Accessed online: 07/03/2022]

13.8.7 Statement of Significance

No significant impacts are predicted in terms of air navigation. In adherence to IAA Safety Regulations and ICAO Annex 15, aeronautical obstacle warning light schemes will be installed as requested by IAA. Co-ordinates of ground and tip height elevations at each wind turbine location as constructed will be provided to the IAA. IAA will be notified of the provision of the intention to commence crane operations within a minimum of 30 days prior to erection.

13.9 QUARRIES

13.9.1 Introduction

While sub-base and base course materials for the Access Track and Turbine Hardstand construction will be sourced on site from borrow pits, crushed stone will be imported for the final running layer. The crushed stone (16,912m^3) for construction of the Development will come from licenced quarries in the locality such as:

- McGroup Keim Quarry
- Coppeen Concrete, Enniskeane
- Mid-Cork Quarries, Gortnadiha
- McSweeney Bros, Kilmichael
- Keohane Readymix, Ballygurteen
- Murray Bros Tarmacadam Ltd, Ardcahan

These quarries will also be the source of crushed stone and concrete for widening works to the turbine haul route (N22 turnaround location, temporary bridge over Sullane River, L-3405-0 and L-7405-0), Turbine Foundations and for grid connection works. The locations of these quarries in relation to the Development can be seen in **Figure 15.3**.

13.9.2 Assessment of Potential Effects

The construction of the Development will impact on natural resources such as aggregates which will be sourced from the quarries in proximity to the Site (section 13.9.1).

It is likely that a small amount of granular material may be required to maintain access tracks during operation which could impact the source quarry. However, the decommissioning phase will have no impact on the source quarry.

The use of imported materiel will have a slight, permanent negative impact on non-renewable resources of the area. This impact is considered to be imperceptible in the long-term.

13.9.3 The 'Do-Nothing Impact'

If the Development were not to proceed, there would be no impact on quarry operations in the area and quarrying activities would continue.

13.9.4 Mitigation Measures

- Existing tracks have been used where possible and the layout was designed to minimise the length of new track required in order to reduce the requirement for such stone material.
- Two on-site borrow pits will provide a total volume of 59,053m^3. The quarry will only be used where the material won onsite is not suitable (16,912m^3).
- Local quarries have been identified to reduce impact on transportation (Please see **Chapter 15: Traffic and Transportation)**.
- The source quarry will be chosen based on stone which is chemically simar to that occurring at the Development. This will reduce hydrogeochemical impacts. (Please see **Chapter 8: Soils and Geology**)

13.9.5 Cumulative Effects

All existing and approved projects in **Appendix 2.5** have been considered.

The very nature of a quarry is that it will be subjected to cumulative effects as a it is the source of stone for almost all developments in the area.

Therefore, there will be cumulative impacts relating to the Development and surrounding projects in relation to quarries during the construction phase.

Potential negative cumulative effects on quarries are imperceptible/unlikely during the operational and decommissioning phases.

13.9.6 Statement of Significance

No significant negative impacts on local quarries are anticipated. There will be a slight, permanent negative residual impact on natural resources in the area.

This impact is considered to be imperceptible in the long-term.

13.10 UTILITIES

13.10.1 Introduction

In order to assess the potential for significant effects on built services gas, water and waste in the vicinity of the Development, scoping requests were made to Irish Water and Cork County Council including Water Services and Environment departments. Refer to **Chapter 1: Introduction** of this EIAR for details in relation to the EIA scoping exercise. In addition to this, Punch Consulting Engineers prepared a Civil and Structural Due Diligence Report (**Appendix 13.2**) which assesses utilities along the Grid Connection Route.

13.10.2 Assessment Methodology

In order to assess the potential for impacts to electricity and water infrastructure and waste services, a scoping exercise was carried out to a number of key consultees, including ESB, Irish Water and Local Authorities. Full details of the scoping exercise that was carried out is provided in **Chapter 1: Introduction**.

A desk study of available information from the EPA did not identify any waste facilities, illegal waste activities, chemical monitoring points or industrial EPA licensed facilities within a 2km radius of the wind farm site. The nearest waste facility to the Development is Macroom Civic Amenity Site (W0142-01).

13.10.3 Assessment of Potential Effects - Gas, Water Utilities

There are no gas mains located within the Site Boundary. There is therefore no potential for impact. Gas Networks Ireland have responded to a consultation request illustrating there are no existing services along the Grid Connection Route or Turbine Delivery Route and there does not appear to be any visible gas infrastructure along the route (**Appendix 13.2**).

Given that no detailed information has been provided by Irish Water or Cork County Council in relation to water services within the Site Boundary, it has been assumed that there is the potential to encounter local water services within the Development.

During Punch Consulting Engineers survey of the Grid Connection Route, the locations of watermains, fire hydrants, metres and sluice valves were recorded and can be found in **Appendix 13.2**.

Potential impacts arising from the Development relating to existing water services have been assessed and are detailed in **Chapter 9: Hydrology and Hydrogeology** and referred to in **Chapter 4: Population and Human Health** with accompanying mitigation measures.

13.10.4 Assessment of Potential Effects - Waste

Staff Facilities

During the construction, operational and decommissioning phases of the Development, there will be the typical waste generated in an office such as left-over food and sandwich wrappers. This is a non-hazardous waste. All such waste will be stored appropriately and safely from wind, rain and wild animals that often tear apart rubbish bags. The effects of this waste will be not significant.

Waste generated on site is estimated to range between 0.005 kg and 0.189kg per person per day.[6]

Sewage

The self-contained port-a-loo units at the construction/decommissioning phase which will be managed and serviced regularly (by removal of the contents by tanker to a designated sewage treatment plant such as Ballyvourney/Ballymakeera Wastewater Treatment Plant) and removed off site on completion of construction. Toilet waste is a non-hazardous waste and effects will be slightly significant.

The maximum wastewater production during construction is estimated to be the same as the maximum water consumption (2,000 litres per day)[7].

All wastewater will be tankered off-site by a licensed waste collector to the nearest wastewater treatment plant, Ballyvourney/Ballymakeera. There will be no on-site treatment of wastewater and effects will be not significant.

Concrete

The use of concrete (construction of Turbine Foundations, Substations etc.) onsite will have slight and permanent effects. It is expected that 20 L – 30 L of concrete washout will be produced during the construction phase.

There will be no need for the use of concrete during the operational phase and effects are imperceptible.

[6] Based on 1 hour a day within communal facilities. Worldwide, waste generated per person per day averages 0.74 kilogram but ranges widely, from 0.11 to 4.54 kilograms. (World Bank) Available Online: https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html [Accessed 24/08/2022]

[7]Table 3 of the EPA WW treatment Manual (Treatment systems for Small Communities, Business, Leisure Centres and Hotels), Environmental Protection Agency, 1999. Quarry (Excluding Canteen) best reflects a construction site. [Available online: https://www.epa.ie/publications/compliance--enforcement/wastewater/EPA_water_treatment_manual_-small-comm_business.pdf]

Concrete structures will be left in place during decommissioning and allowed to naturally revegetate over time. This is the least impactful process of decommissioning. As the Site will have already been altered, the impacts are imperceptible and permanent.

Chemicals, Fuels and Oils

Oil waste and diesel are classified as hazardous waste/dangerous substance. There is no expected chemical/fuel/oil waste other than from rags and residual amounts in containers. Without mitigation, the effects would be slight and medium-term in duration. However, through the implementation of the mitigation measures set out in section 13.10.7, the residual effects will be not significant in the construction/decommissioning phase. The storage/use of such liquids is not seen necessary on site during the operational phase; thus, the effects are imperceptible.

Refuelling

As this has been mitigated by design, the residual effects are not significant.

There will be no need for refuelling during the operational phase and effects are imperceptible.

The quantity of waste produced from refuelling is imperceptible.

Packaging

Packaging will be brought on site during the construction, operational and decommissioning phases and can include cardboard, wood and plastics used to package turbine components. Packaging waste will be dealt with in accordance with the European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014).

'A producer who supplies to another producer packaging material, packaging or packaged products shall comply with any reasonable request from the latter producer for data on the weight of the material or packaging concerned sufficient to enable the latter producer to comply with these Regulations.'

The occurrence of 10kg of plastic per turbine blade, between 40 and 50 pallets and 50 to 60 cable drums are expected. This will be removed from site for re-use by an authorised person(s).

This waste is non-hazardous, and the effects of this waste are not significant.

Metals

During decommissioning, it is expected that 100 tonnes of steel will be removed from turbine bases. This waste is non-hazardous, and effects will be not significant.

Excavated Materials

Excavated materials will be required for habitat and ecological restoration, reprofiling and backfilling in accordance with the **Appendix 2.1**. As such, excavated materials will not be classified as waste except along the Grid Connection Route.

An estimated 28,092m^3 of material will be excavated along the Grid Connection Route and will be transported by an authorised waste permit holder to a licensed facility.

The effect of this will be not significant.

13.10.5 The 'Do-Nothing Impact'

If the Development were not to proceed, there would be no impact on the utilities or waste in the area.

13.10.6 Mitigation Measures - Utilities

Mitigation measures relating to existing water services have been assessed and are detailed in **Chapter 9: Hydrology and Hydrogeology** and referred to in **Chapter 4: Population and Human Health**.

13.10.7 Mitigation Measures - Waste

Staff Facilities

Provision for separation of waste streams will be provided so that e.g., paper, and cardboard waste and bottles may be recycled.

Sewage

It is proposed to install a rainwater harvesting system as the source of water for toilet facilities for the operational phase. Wastewater from the staff welfare facilities in the control building will be collected in a sealed storage tank, fitted with a high-level alarm. This is a device installed in a fuel storage tank that is capable of sounding an alarm, during a filling operation, when the liquid level nears the top of the tank.

Concrete

During the construction phase:

- Precast concrete will be used wherever possible i.e., formed offsite. Elements of the Development where precast concrete will be used have been identified and are indicated in the CEMP. Elements of the Development where the use of precast concrete will be used include structural elements of watercourse crossings (single span / closed culverts) as well as Cable Joint Bays. Elements of the development where the use of precast concrete is not possible include turbine foundations and joint bay pit excavations. Where the use of precast concrete is not possible the following mitigation measures will apply.
- The acquisition, transport and use of any cement or concrete on site will be planned fully in advance and supervised at all times.
- Vehicles transporting such material will be relatively clean upon arrival on site, that is; vehicles will be washed/rinsed removing cementitious material leaving the source location of the material. There will be no excess cementitious material on vehicles which could be deposited on trackways or anywhere else on site. To this end, vehicles will undergo a visual inspection prior to being permitted to drive onto the proposed site or progress beyond the contractor's yard. Vehicles will also be in good working order.
- Any shuttering installed to contain the concrete during pouring will be installed to a high standard with minimal potential for leaks. Additional measures will be taken to ensure this, for example the use of plastic sheeting or other sealing products at joints.
- Concrete will be poured during metrological dry periods/seasons. This will reduce the potential for surface water run off being significantly affected by freshly poured concrete. This will require limiting these works to dry meteorological conditions i.e. avoid foreseen sustained rainfall (any foreseen rainfall event longer than 4 hour duration) and/or any foreseen intense rainfall event (>3mm/hour, yellow on Met Eireann rain forecast maps), and do not proceed during any yellow (or worse) rainfall warning issued by Met Eireann. This also will avoid such conditions while concrete is curing, in so far as practical.
- Ground crew will have a spill kit readily available, and any spillages or deposits will be cleaned/removed as soon as possible and disposed of appropriately.
- Pouring of concrete into standing water within excavations will be avoided. Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place.
- Temporary storage of cement bound sand (if required) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been bunded e.g., using sand-bags and geotextile sheeting or silt fencing to contain any solids in run-off.
- No surplus concrete will be stored or deposited anywhere on site. Such material will be returned to the source location or disposed of off-site appropriately. A concrete washings area can be seen on Drawing 6225-PL-803.

Upon implementation of the above mitigation measures, the effects of the construction of the Development are considered to be not significant.

Chemicals, Fuels and Oils

All storage containers of over 200 litres will have a secondary containment of 110% capacity to ensure that any leaking oil is contained and does not enter the aquatic environment.

A **Chemical and Waste Inventory will be kept**. This inventory will include:

- List of all substances stored on-site (volume and description)
- Procedures and location details for storage of all materials listed
- Waste disposal records, including copies of all Waste Transfer Notes detailing disposal routes and waste carriers used
- Any tap or valve permanently fixed to the mobile unit through which oil can be discharged to the open or when delivered through a flexible pipe which is fitted permanently to the mobile unit, will be fitted with a lock and locked shut when not in use
- Sight gauges will be fitted with a valve or tap, which will be shut when not in use Sight gauge tubes, if used will be well supported and fitted with a valve
- Mobile units must have secondary containment when in use/out on site

Under the EU Directive 95/55/EC all such dangerous substances will be conveyed in a container that compiles with the ADR. As such the manufacturer of each bowser will provide certification to contractors that the following:

- A leak-proof test certificate
- A copy of the IBC approval certificate
- An identification plate attached to the container

Where mobile bowsers are used on site, guidelines will be followed so that:

- Any flexible pipe, tap or valve will be fitted with a lock where it leaves the container and be locked shut when not in use;
- Flexible delivery pipes will be fitted with manually operated pumps or a valve at the delivery end that closes automatically when not in use. Where possible, a nozzle designed to dispense oil is used;
- The pump or valve will have a lock and be locked shut when not in use.

For loads in excess of 1000 litres (220 gallons), the bowser vehicle driver will have undergone training and hold a special license.

Refuelling

During construction/decommissioning, where possible all refuelling on site will be within the temporary compound within the re-fuelling area (see Drawing No. 6225-PL-803). Only essential refuelling (e.g., cranes) will be carried out, outside of this area, but not within 65m of any watercourse. In such cases a non-permeable High-density Polyethylene (HDPE) membrane will be provided beneath connection points to catch any residual oil during filling and disconnection. This membrane will be inspected and if there is any sign of oil contamination, it will be removed from site by a specialist licensed waste contractor. All vehicles will be well maintained and free from oil or hydraulic fuel leaks.

Packaging

In accordance with the waste hierarchy, packaging will be returned to the originator ahead of re-use or recycling. Where this is not possible, waste will be separated as appropriate and safely stored on site appropriately in anticipation of recycling.

Metals

Waste metals from concrete reinforcing during construction and removal of metals during decommissioning etc. will have commercial value and will be re-used or recycled with the appropriate licensed waste contractor.

13.10.8 Statement of Significance

There are no gas mains located within the Site Boundary. There is therefore no potential for impact.

It has been assumed that there is the potential to encounter local water services within the Development. Potential impacts arising from the Development relating to existing water services have been assessed and are detailed in **Chapter 9: Hydrology and Hydrogeology**

There are no EPA-licensed or local authority-authorised waste facilities or activities located within the EIAR Site Boundary. The closest, authorised municipal waste facility is located approximately 13.8km east of the Development in the townland of Codrum, Macroom, Co. Cork. A list of waste facilities within the vicinity of the Development has been included in **Appendix 2.1**. Please see **Figure 15.5** for mapped facilities.

The residual effects of waste produced as a result of the construction, operational and decommissioning phases of the Development are considered to be not significant.