Tullacondra Green Energy Limited

Environmental Impact Assessment Report

Volume I – Non-Technical Summary

Tullacondra Green Energy Project, Co. Cork

604162

JUNE 2024

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1 INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by RSK Ireland and other companies within the RSK Group, along with associated specialist consultants, on behalf of Tullacondra Green Energy Limited ("the Applicant"). The EIAR is submitted as part of an application for planning permission to construct and operate the Tullacondra Green Energy Project in north County Cork ("the Project"). The Project includes a nine-turbine wind farm on a site that is located at its nearest point approximately 2 kilometres (km) south of Lisgriffin Cross, Co. Cork, and an underground grid connection from the wind farm site, mainly within public roads, to the boundary of the Mallow 110 kilovolt (kV) substation located at St. Joseph's Road, Mallow. The proposed temporary accommodating works along the turbine delivery route to facilitate the delivery of large components to the site and the grid connection within the Mallow 110kV substation are considered as part of the assessment in this EIAR but do not form part of the development for which planning permission is sought.

A planning application for the wind energy development is made to Cork County Council under Section 34 of the Planning and Development Act, 2000 (as amended). The application is for a 10-year duration planning permission and a 35-year operational life from the date of commissioning of the entire wind farm.

This document is a non-technical summary of the information contained in the EIAR.

1.2 Site Location

The proposed wind farm site and the route of the proposed grid connection for which planning permission is sought (indicated by the red line planning boundary) includes a total area of 58.6 hectares (ha). The proposed wind farm is located approximately 2km south of Lisgriffin Cross, Co. Cork. The proposed grid connection includes works in and alongside public roads to install cabling approximately 13.5km to connect the wind farm to the National Grid at the boundary of the Mallow 110kV substation located in St. Joseph's Road, Mallow. The EIAR assesses two grid connection route options. Planning permission is being sought for the preferred route option. The location of the proposed wind farm site and the route of the proposed grid connection for which planning permission is sought is shown in **Figure 1**.

The blueline boundary around the site of the proposed wind farm site, indicated in **Figure 2**, encompasses lands for which Tullacondra Green Energy Limited has lease options in place.

1.3 The requirement for an EIAR

The Project exceeds the relevant Environmental Impact Assessment (EIA) threshold, as detailed in the Planning and Development Regulations, 2001 (as amended), Schedule 5, Part 2, Class 3(I), *"Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts".*

Given that the proposed wind farm will exceed the above threshold (i.e., more than five wind turbines and having a total output greater than five megawatts), an EIA is required. Where it is determined that an EIA is required, the applicant must prepare an EIAR to accompany a planning application, as part of the EIA process, in compliance with the European Union (EU) EIA Directive.

1.4 Scoping and consultations

The scoping stage of the EIA is a process to determine the content and extent of the matters which should be covered in the EIAR. To inform this process, RSK, on behalf of Tullacondra Green Energy Limited, prepared a Scoping Consultation Document that provides an overview of the Project, the Project scope, and for each environmental factor as listed in the EIA Directive, an overview of the baseline environment, proposed assessment methodology and likely potential significant effects. At an early stage and throughout the design of the Project and preparation of the EIAR, RSK's EIA consultant team and Tullacondra Green Energy Limited's Project Management team undertook consultations with key stakeholders listed below, either through correspondence via email and provision of the EIAR Scoping Consultation Document or through direct engagement:

- Department of Housing, Local Government & Heritage, Development Applications Unit (DAU)
- Department of Agriculture, Food & the Marine, Environmental Co-ordination Unit, Climate Change & Bioenergy Policy Division
- Department of Defence, Property Management Branch
- Commission for Energy Regulation
- Health Service Executive, Environmental Health and Emergency Planning
- Geological Survey Ireland
- Office of Public Works
- NM20 Project Office
- Cork National Roads Office
- National Transport Authority, Strategic Planning Section
- Transport Infrastructure Ireland, Land Use Planning Unit
- Health and Safety Authority
- Inland Fisheries Ireland, Southern Region
- Irish Wildlife Trust
- BirdWatch Ireland
- Irish Raptor Study Group

- Bat Conservation Ireland
- Southern Regional Assembly
- An Taisce
- The Arts Council
- The Heritage Council
- Fáilte Ireland
- Gas Networks Ireland
- Irish Water
- Iarnród Éireann
- ESB Networks
- Irish Aviation Authority
- Cork Airport
- Shannon Airport
- Dublin Airport
- Cork County Council Planning Authority
- Cork County Council Environment Section
- Cork County Council Roads Authority
- Cork County Council Heritage Office
- Cork County Council Ecology Office
- Cork County Council Archaeology Office

EIAR **Chapter 3 Scoping, Consultations, Community Engagement and Key Issues** provides a summary of the comments received and how they were considered in preparing the EIAR. EIAR **Chapter 3** also provides details of the three pre-planning application meetings held with Cork County Council and reference to the stakeholder engagement programme.

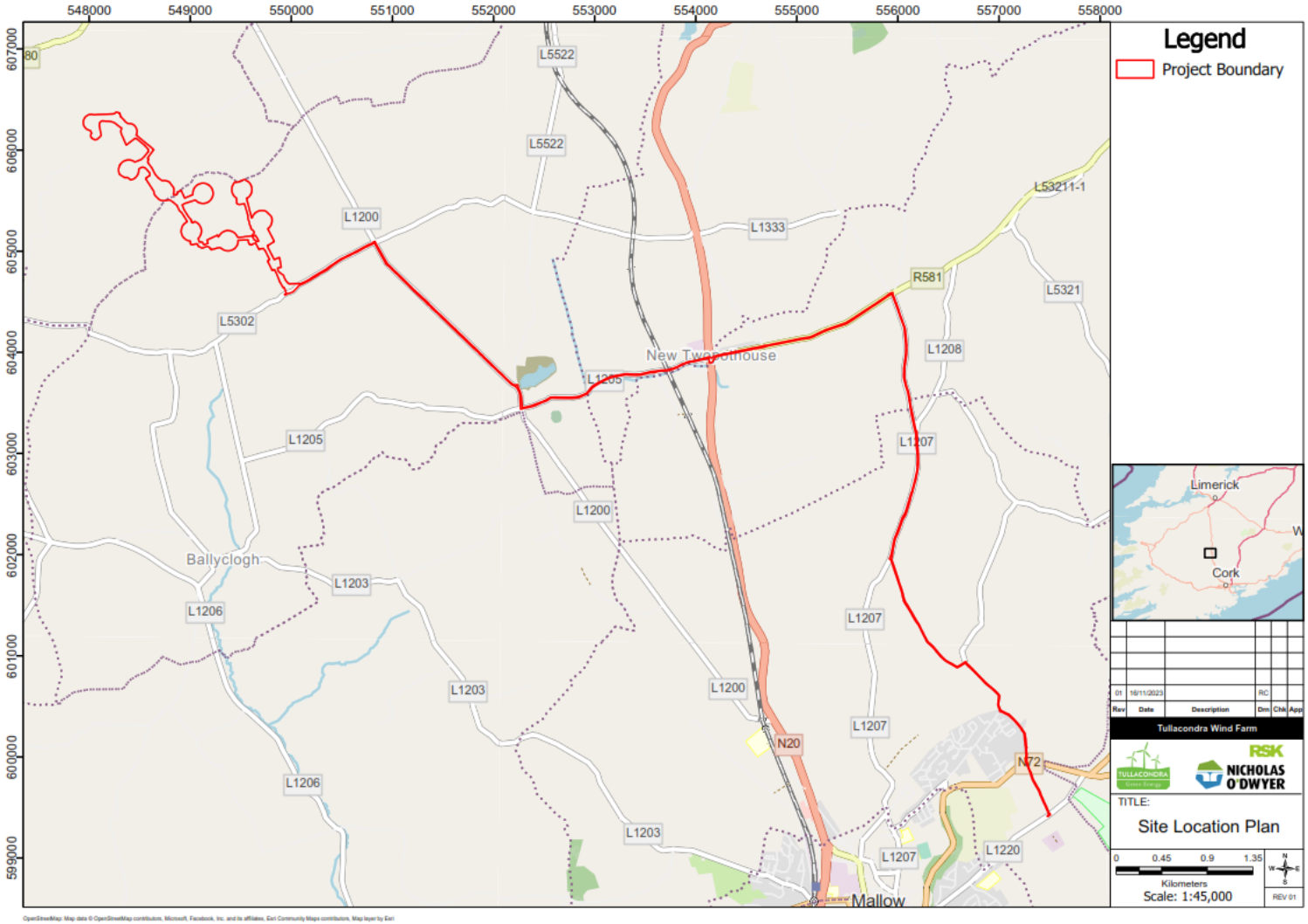

Figure 1. Project boundary

1.5 Purpose of the EIAR

The purpose of the EIAR is to present the findings of a systematic assessment of the likely significant effects of development proposals on the environment. The EIAR aims to inform the public and the Competent Authority of the findings of the assessment of potential effects and the measures for avoiding and minimising identified effects. The EIAR then reassesses potential effects post mitigation to determine residual effects (i.e., what effects remain after every effort has been taken to avoid and minimise adverse environmental effects).

1.6 EIAR Approach

Baseline surveys were carried out, involving desktop surveys, and in some cases field surveys, for environmental factors including Population and Human Health, Biodiversity, Ornithology, Hydrology and Hydrogeology, Land, Soils and Geology, Material Assets, Shadow Flicker, Noise and Vibration, Landscape and Visual, Archaeology and Cultural Heritage, Traffic & Transport, Air Quality, and Climate.

An assessment of the Project's likely impact on identified features present in and near the site, as relevant, was carried out and any potential environmental benefits were also identified for each environmental factor. Defining significance can be difficult and, in general, involves assessing the degree of change to the environment, taking into consideration the sensitivity of the environmental receptor. EIAR **Chapter 2 EIA Methodology** describes the general approach taken. Each environmental factor chapter provides added detail with reference to specific guidance used and defines criteria as relevant. The following criteria were applied in assessing effects:

- Type of impact (adverse / beneficial).
- Extent and magnitude of impact.
- Intensity and complexity of the impact.
- Direct or indirect impact.
- Duration of impact (short term / long term; permanent / temporary).
- Comparison with legal requirements, policies and standards.
- Sensitivity of receptor.
- Reversibility of impact.
- Scope for mitigation / enhancement.

Following implementation of mitigation measures, each environmental factor chapter identifies any residual effects and their significance to assist the public and the Competent Authority to understand what the impacts of the Project are. The recommended mitigation measures and residual effects are described in each environmental factor chapter (see EIAR **Chapter 6** to **Chapter 18**). **Chapter 19 Interactions and Cumulative Effects** summarises the findings of assessment of interactive effects and cumulative effects addressed in the factor chapters, and a

summary of all proposed mitigation measures is provided in **Chapter 20 Summary of Mitigation Measures** of the EIAR.

1.7 The EIAR team

Article 5(3)(a) of the amended EIA Directive (2014/52/EU) (EIA Directive) states that *"the developer shall ensure that the environmental impact assessment report is prepared by competent experts"*. The Guidelines on the Information to be contained in Environmental Impact Assessment Reports issued by the Environmental Protection Agency (EPA) in May 2022[1] highlight the need for competent experts to be involved in the EIA process and in the preparation of the EIAR.

Environmental specialists from RSK coordinated and managed the preparation of the EIAR and led a team of competent experts in preparing specialist chapters. In each environmental factor chapter, each contributing expert provides a statement of authority, and an explanation of the methods of data collection and assessments that were carried out with reference to applicable discipline or industry standards and government guidance.

Table 1 lists the competent experts who prepared each chapter of the EIAR.

[1] Environmental Protection Agency. 2022. Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

Table 1: EIA chapters and competent experts

EIA Chapter	Company	Expert
Chapter 1 - Introduction	Nicholas O'Dwyer Ltd. (part of RSK Group) / RSK Environment	Krista Farrugia / Laurie McGee
Chapter 2 - EIA Methodology		Krista Farrugia / Laurie McGee
Chapter 3 – EIA Scoping, Consultations, Community Engagement and Key Issues		Krista Farrugia / Laurie McGee
Chapter 4 – Project Need and Alternatives Considered		Krista Farrugia / Laurie McGee
Chapter 5 – Project Description		Krista Farrugia / Laurie McGee
Chapter 6 – Population & Human Health		Laurie McGee
Chapter 7 - Biodiversity	RSK Biocensus	Nick Henson
- Bats baseline	Eire Ecology	John Curtin
- Aquatic Ecology baseline	Ecology Research and Solutions Ltd.	Rory Dalton
Chapter 8 - Ornithology	RSK Biocensus	Nick Henson / George Wilkinson
- Ornithology baseline	RSK Biocensus	Nick Henson / George Wilkinson
Chapter 9 – Hydrology and Hydrogeology	RSK Ireland	Sven Klinkenbergh / Jayne Stephens / Chris Fennell
Chapter 10 –Land, Soils and Geology	RSK Ireland	Sven Klinkenbergh / Deirdre Walsh / Chris Fennell
Chapter 11 – Material Assets	Nicholas O'Dwyer Ltd.	Ursula Daly
- Telecommunication Impact Study	Ai Bridges Ltd.	Kevin Hayes
- Aviation Review Statement	Ai Bridges Ltd.	Kevin Hayes
Chapter 12 – Shadow Flicker	ADAS Ltd.	Thomas Burke
Chapter 13 – Noise and Vibration	RSK Ireland	James Mangan
Chapter 14 – Landscape and Visual	Stephenson Halliday	Ken Halliday
Chapter 15 – Archaeology & Cultural Heritage	ADAS	Diarmuid O'Seaneachain
Chapter 16 –Traffic and Transport	Nicholas O'Dwyer Ltd.	Mark Dignam
Chapter 17 – Air Quality	RSK Environment Ltd.	Phoebe Chan
Chapter 18 – Climate	RSK Environment Ltd.	Danielle King / Jamie Blunden
Chapter 19 –Interactions & Cumulative Effects	Nicholas O'Dwyer Ltd.	Krista Farrugia
Chapter 20 – Schedule of Mitigation Measures	Nicholas O'Dwyer Ltd.	Krista Farrugia

2 THE PROJECT

2.1 Background to the Project

The Project is proposed in response to international, European and national policy on climate change and reduction in carbon emissions. The Cork County Council Wind Energy Strategy (2014), as contained in the Cork County Development Plan 2022 – 2028[2], has designated areas for wind energy development outside urban areas as either 'Open to Consideration', 'Acceptable in Principle' or 'Normally Discouraged'. The site of the proposed wind farm development is located entirely within an area designated in the Cork County Development Plan, 2022 – 2028 as 'Open to Consideration' for wind energy development.

2.2 Description of the site and surrounding area

The access to the wind farm site for the Project is located along the L5302 at Croughta. The wind farm site is located in the townlands of Polnareagha and Ardskeagh (Templemary E.D.) and Tullacondra and Croughta, (Kilmaclenine E. D.). This element of the Project consists primarily of mixed farmland habitat with hedgerows and occasional areas of scrub, ponds and lakes, and man-made drains and ditches. The area in which the turbines will be located ranges in elevation from 133m above Ordnance Datum (AOD) in the south to 120m AOD in the north. The settlement pattern within approximately 2km from the proposed turbine locations is characterised by dwellings and farm buildings located mainly along the public roads, with some dwellings located down long private lanes. In some cases, newer dwellings have been built closer to the road, whilst the older dwelling remains at the end of the private lane, and apparently have been subsumed into the farmyard, being surrounded by sheds. The few commercial properties in the area comprise on-farm enterprises which are associated with the main dwelling.

The works for installation of the underground cabling to connect the wind farm site to the boundary of the Mallow 110kV substation via two option routes are predominantly within the public road corridor of local and regional roads, crossing the N20 national primary road and the N72 national secondary road.

The works for transporting turbine components to the wind farm site are proposed via two route options from ports at Foynes and Ringaskiddy. The temporary accommodating works will be within and adjacent to the public road corridors of national primary and secondary roads (N69, N20, N28, N27, N8) and local roads requiring temporary removal of street furniture, cutting through roundabouts, creation of temporary surfaces in road verges, and clearance and trimming back of vegetation.

2.3 Project Description

The Project, subject of the application for planning permission, includes:

- nine wind turbines with a blade tip height of 175m, rotor diameter of 150m and hub height of 100m.

[2] Cork County Council. 2022. Cork County Development Plan 2022-2028

- turbine foundations and crane pad hardstanding areas and associated drainage.
- upgrade of existing site tracks and construction of new site tracks and associated drainage.
- access from the local public road L5302 at Croughta consisting of a new site entrance for the construction phase and upgrade of an existing entrance for the operational phase.
- an on-site 38kV electrical substation to Electricity Supply Board Networks (ESBN) specification to include control building with electrical infrastructure, welfare facilities supplied by rainwater harvesting and storage tank, a wastewater holding tank, car parking, security fencing and lighting, and all associated infrastructure, services, and site works including a temporary construction compound.
- all associated underground electrical and communications cabling connecting the turbines to the proposed on-site electrical substation.
- a temporary construction compound and associated ancillary infrastructure including welfare services, office accommodation, parking, fencing, lighting, etc.
- areas for temporary storage of excavated materials.
- a permanent meteorological mast of 100m height above ground level on a concrete base.
- installation of 38kV underground electrical cabling, mainly within the public road, between the proposed on-site wind farm substation to the boundary of the Mallow 110kV substation at St. Joseph's Road, Mallow.
- all associated site works, including site clearance, and ancillary development including site drainage, security gates, fencing, permanent and temporary signage, and biodiversity mitigation and enhancements, including hedgerow planting.

Table 2 provides a summary of each element proposed as part of the Project. Each component is described in further detail in EIAR **Chapter 5 Project Description**.

Table 2: Overview of Project elements

Project Element	Description of the Project
Wind Turbines	The Project will encompass nine turbines. The proposed turbine used for assessments in the EIAR is the Vestas V-150, which has the following specifications: • Three bladed, horizontal axis • Light grey in colour (RAL 7035 – Light Grey) • Height of 175m from the top of the foundation to blade tip height • Rotor diameter of 150m • Hub height of 100m • Power rating of 4.5MW The total Maximum Export Capacity (MEC) of the wind farm is approximately 40.5MW. The exact MEC will be dependent on the output power of the turbine model available at procurement stage.
Turbine Foundations	Each turbine will be erected on a steel reinforced concrete foundation. The foundations will require excavation and construction bases of approximately 32m in diameter (24m foundation, a 45-degree excavation angle and 1m around for works), down to a level where the underlying soil or rock can bear the weight of a structure without shifting or compressing. This will be done by excavating soil, subsoil and rock to a depth which will vary depending on ground conditions at each turbine location. It is estimated that each foundation will have a depth of approximately 3.0m. The central part of the foundation (plinth) of each turbine will be raised from the main foundation below ground level. It will encompass a cast-in insert or bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.
Hardstanding Areas	The turbine hardstands are required to accommodate the delivery, laydown, and assembly of turbine components prior to turbine component lifting and assembly. Hardstands are needed to support the cranes during turbine construction, operation, and decommissioning phases. They will be constructed first and used to facilitate construction of the turbine foundations such as steel reinforcement delivery and pouring of concrete. For each turbine, the hardstand areas comprise a main crane hardstand, a component set down area, assist crane hardstands and vehicle parking and turning areas (each with a total combined area of approximately 4,700m^2)
Site Access	A new temporary construction entrance will be created along the L5302 local road at Croughta approximately 120m east of an existing entrance which serves farmlands of a landowner associated with the Project. The temporary entrance will be used for the duration of the 18-month construction phase for delivery of turbine components and all building materials (e.g., aggregates for access tracks, concrete for foundations, crane pads and hardstanding areas, substation building foundations, and building materials, etc.). This temporary entrance with its gate and fencing will be removed and the boundary along the

Project Element	Description of the Project
	public road at this location will be reinstated following completion of the construction phase. The access track will be reinstated with a covering of topsoil and returned to agricultural use. Over the lifetime of the Project, this temporary entrance and track will only be called into service to accommodate delivery of replacement turbine components requiring abnormal loads (e.g., blade, nacelle, tower), in the unlikely event that it would be required. The existing entrance from the L5302 at Croughta, which is currently used for access to a dwelling and farmlands of a landowner associated with the Project, will be used as the access for operational phase of the proposed wind farm. Currently, this entrance is in use by motor vehicles/vans and large farm vehicles (tractors, trailers, articulated lorries, etc.). In the interest of road safety, provision will be made for upgrading this entrance to provide visibility splays measuring 80m on both sides of the entrance set back 3m from the edge of the public road.
Site Tracks	Wind farm access tracks will consist of approximately 4.5km of permanent access tracks and 2km of temporary access tracks. All access tracks will require excavation of 300mm of existing ground and will be constructed to approximately similar finished ground level. The finished access tracks will be crushed fill surfaced using locally sourced materials. Most existing site tracks will not be suitable for use by construction traffic. If required, where existing tracks coincide with new track positions they will be excavated and re-constructed. The first 500m of existing site track from the public road entrance is of good quality and may be upgraded and widened to suit the Project needs.
Site Drainage	Constructed drainage will be provided to manage runoff from tracks, hardstanding areas and storage areas for excavated materials. These will minimise the potential for silt runoff during construction works and during the operational phase. The Project drainage design uses the principles of Sustainable Drainage, promoting on-site retention of flows and the use of buffers and other silt removal techniques. All drainage-related mitigation measures will form part of a robust Sustainable Drainage System (SuDS) on the wind farm site.
On-site electrical and communications components	A 38kV electrical control substation will be located near the entrance to the wind farm in the vicinity of an existing farm shed. The electricity from the turbines will be cabled into the substation where it will be transformed, metered and regulated for export to the national electricity system. The substation will be connected to the existing Mallow 110kV substation via underground cable over approximately 13.5km. The proposed substation contains the following: • Independent power producer (IPP) control room; • Electricity Supply Board (ESB) control room; • Switch room; • Store room; • Office; • A water connection system supplied by rainwater harvesting with storage, to supply the proposed Water Closet (WC) and wash hand basin. Potable water will be supplied by bottled water or water cooler.

Project Element	Description of the Project
	• A WC with connection to a sealed wastewater holding tank fitted with a high level alarm; • Diesel tank (bunded to 110% volume capacity) and generator; • Transformer bund and associated infrastructure (busbars, circuit breakers, cable supports and cabling); • Lighting and fencing (2.6m palisade fencing or as specified by grid operator); and • Parking for 5 vehicles. A temporary construction compound area will be located adjacent to the substation. All power, communication and control cabling on the wind farm will be installed underground in excavated trenches which will be routed from the wind turbines to the substation along the path of site access tracks where possible (approximately 5.3km of cabling in total). Cable ducts will have warning tape buried below the finished ground level. After the cables have been installed and the trench has been filled in the retained topsoil will be used to reinstate vegetative cover.
Permanent Meteorological Mast	A 100m Meteorological Mast (met mast) is proposed at the wind farm site to supply continuous, real-time wind speed, wind direction, air temperature and air pressure data. The number and heights of the instruments which measure these parameters will be agreed with the grid operator during detailed design. The proposed mast will be a free-standing lattice type structure. The met mast will be linked to the closest turbine via underground internal cabling for power and communication.
Grid Connection	Tullacondra Green Energy Limited proposes to connect into the Mallow 110kV substation at St. Joseph's Road, Mallow. The grid connection from the wind farm site to the substation will be over approximately 13.5km via a 38kV cable which will be underground and constructed primarily within the existing road corridor. The design of the grid connection and connection into the Mallow 110kV substation will comply with grid operator specifications and technical and operational requirements.
Temporary Works	In addition to the construction compound at the substation, a construction compound for the wind farm will be set up in the southern portion of the wind farm site, split in two areas alongside the access tracks in the vicinity of T9. The compound will contain temporary facilities for use during the construction phase including site offices and meeting rooms, a drying room, canteen area, storage areas, skips, a bunded refuelling area (with a Class 1 full retention oil interceptor), and a generator for compound electrics. The compound will include pedestrian barriers for safety. Staff and visitor parking will be provided in the compound area and will include parking for at least 15 vehicles. The construction phase sanitation will consist of temporary welfare unit(s) that are self-contained and will be serviced regularly. All wastewater will be collected in an enclosed holding tank and removed from site on a regular basis for final wastewater treatment by a licensed contractor. The source of a water supply will be non-potable water for the site office and service area which will be delivered and stored on site for use in the welfare facilities. Potable water will be supplied by bottled water or water cooler. It is envisaged that material excavated to construct all infrastructure elements of the wind farm (foundations, tracks,

Project Element	Description of the Project
	hardstands, etc.) will be used as backfill and for site reinstatement. Any earthen (sod) banks to be excavated will be carefully removed and stored separately for use during site reinstatement. Every effort will be made to ensure materials excavated for construction of the wind farm infrastructure will be re-used on site. Should excavations result in surplus material, the material will be managed in accordance with the relevant waste management legislation. Deliveries to the wind farm site will consist of transporting turbine components (e.g., turbine blades, towers, nacelles, hubs), steel reinforcement, stone and concrete, cables, and other construction materials and electrical components. These will be brought into the wind farm site using the local roads in the region (L1200, L5523, L5302). The turbine delivery route options are assessed in the EIAR include delivery from ports at Foynes, Limerick or Ringaskiddy, Cork.

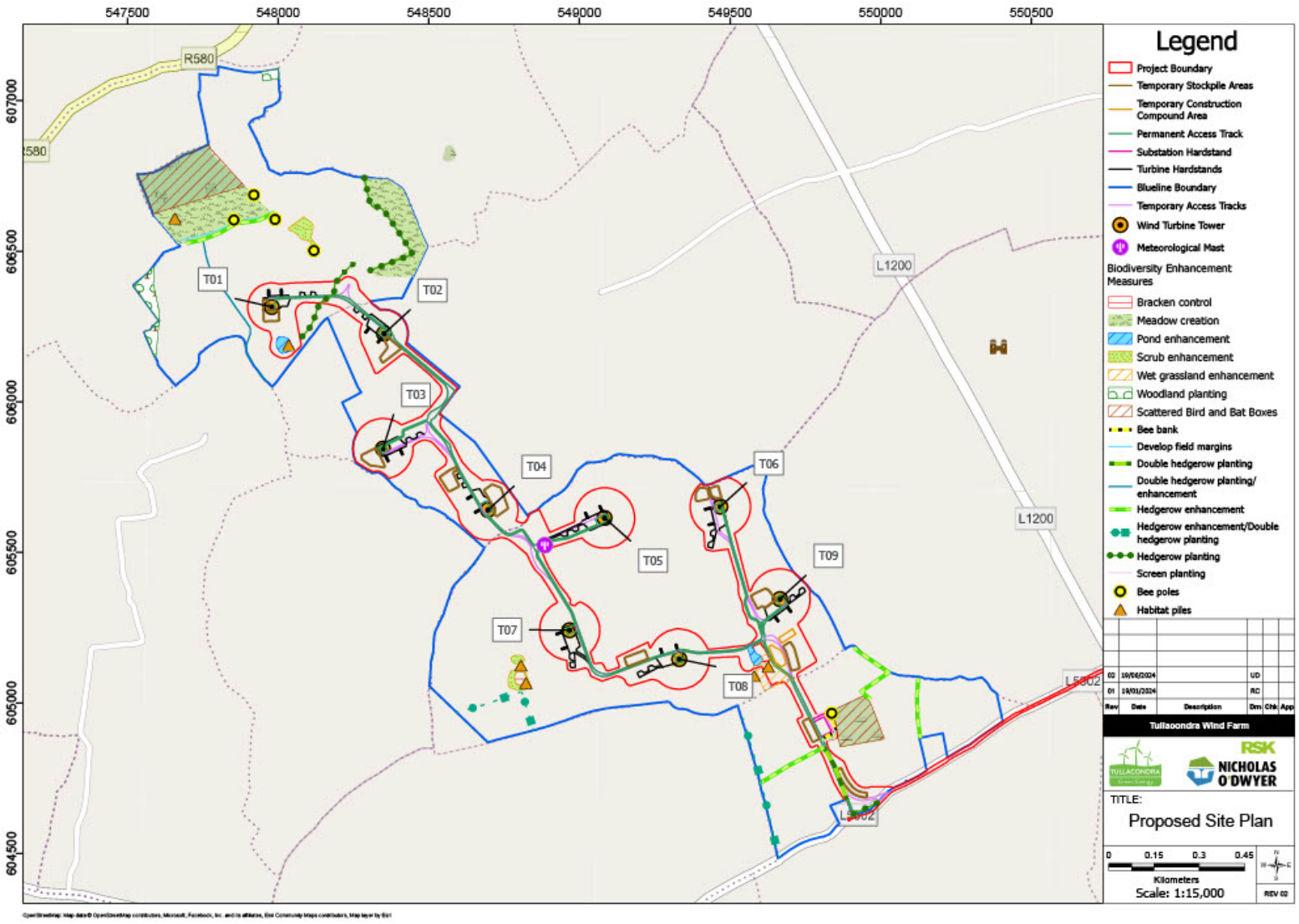

Figure 2: Tullacondra wind farm layout

2.3.1 Alternatives

When designing the Project, alternative locations, alternative technologies, alternative design approaches and alternative access routes were all considered, including the do-nothing scenario. The alternatives assessed during the design process are described in detail in EIAR **Chapter 4 Project Need and Alternatives Considered**.

2.3.2 Construction Phase

A Construction and Environmental Management Plan (CEMP) has been prepared for the Project and is included in EIAR **Volume III, Appendix 5.1** of this EIAR. The CEMP sets out the key environmental management measures associated with the construction phase of the Project, to ensure that during these phases of the Project, the environment is protected, and any potential effects are minimised.

A separate Construction Traffic Management Plan (CTMP) has been prepared and is included in EIAR **Volume III, Appendix 5.2** of this EIAR.

The CEMP and CTMP are live documents, for use during the construction phase, which will be developed further upon planning approval, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Planning Authority.

The construction phase of the Project will take approximately 18 months in total, excluding testing and commissioning of the turbines. Working hours for construction will generally be from 07:00 to 19:00 on weekdays, with reduced working hours from 08:00 to 14:00 on a Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Similarly, earlier working hours may be required in the case of turbine assembly to allow works within suitable weather conditions, along with turbine deliveries that will generally be delivered to site during early morning and under license.

2.3.3 Operational Phase

The operational lifespan for the Project is anticipated to be 35-years. During the operational phase of the development, turbine and infrastructure scheduled and unscheduled maintenance will be ongoing on a regular basis.

During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding to anemometry equipment (measuring wind force, speed and direction) to changes in wind speed and direction. The wind turbines will be connected via electrical and communications cables and data will be relayed from the wind turbines to an off-site control centre.

The turbines will be subject to a scheduled maintenance programme involving visits to undertake a number of checks and change consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance which could include resetting alarms to major component changes requiring a crane.

2.3.4 Decommissioning Phase

Decommissioning of the wind farm elements will involve the complete removal of above ground components. Cranes will be used to disassemble each turbine section and they

will be removed from the wind farm site. The upper sections of the foundations projecting above ground will be removed, and the remainder of the foundations will be covered by soils typical of the surrounding environment and then reseeded or left to re-vegetate according to ecological requirements. Leaving the turbine foundations in-situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise, vibration and dust. Underground cables will be cut back at the turbine termination points and will be recycled. It is proposed that site access tracks will remain to allow access through the wind farm site for farm access, as considered appropriate at the time. Decommissioning the Project will take approximately 2 months to complete.

3 ENVIRONMENTAL FACTORS

3.1 Population and Human Health

Chapter 6 of the EIAR was prepared by RSK Environment and is concerned with the likely significant effects of the Project on the population in the area together with the effects of the Project on human health. The assessment methodology is presented within the chapter.

3.1.1 Baseline Environment

The Electoral Divisions (EDs) of Templemary, Kilmaclenine, Buttevant, Caherduggan and Mallow Rural encompass the study area which includes the proposed wind farm site and grid connection route options. The study area as defined for this EIAR chapter encompasses the area immediately adjacent to local roads in each of the turbine delivery route options.

The sensitive receptors identified include occupied dwellings, unoccupied dwellings (excluding dilapidated properties), planning permission sites (validated and granted up to 20th March 2024), and a school. The few commercial properties in the study area comprise on-farm enterprises (e.g., equine) which are associated with a dwelling. The following summarises the sensitive receptors identified in the assessments for the EIAR:

- There are no sensitive receptors within 500m.
- There are forty-six (46) sensitive receptors within 1km.
- There are eighty-seven (87) sensitive receptors within 1.5km.
- There are one hundred and forty-nine (149) sensitive receptors within 2km.
- There are eight (8) sensitive receptors just outside 2km (i.e., within 30m).

Four of the properties identified as sensitive receptors are associated with the Project. These associated properties are outside the 700m setback buffer[3].

3.1.2 Potential Effects of the Project

3.1.2.1 Construction Phase

It is likely that there will be direct employment for people living in the study area who may be qualified for construction related roles, and indirect employment opportunities for the many retail and service establishments in Mallow, Buttevant and New Twopothouse. Materials will be sourced in the general locality where possible. This will assist in sustaining employment in the local construction related trades and businesses for the 18-month construction phase of the Project. The construction phase of the Project will therefore have a short-term significant positive effect on the employment profile of the study area, and a short-term slight positive effect on local businesses and services in the nearby towns and villages in the study area.

[3] A setback distance of four times the blade tip height of the proposed turbines (700m) to the nearest point of curtilage of non-financially involved dwellings subject to a mandatory minimum distance of 500m for all dwellings (per Section 6.18 of the 2019 Draft Revised Wind Energy Guidelines);

During the 18-month construction phase, farming activities of the landowners associated with the Project will be temporarily disrupted during site clearance and preparation including setting up temporary compounds, construction of access tracks, construction of the substation, and construction and installation of wind farm infrastructure. The construction works are confined to the lands within the Project boundary. This is likely to have a temporary moderate adverse effect on agricultural land use at the wind farm site.

The grid connection will be installed in sections within the public road corridor. There will be rolling road closures in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will allow for the works to be completed efficiently and minimise disruption time for residents and businesses over the anticipated five-month duration of the works. This will likely result in brief slight adverse effects to residential, agricultural, and commercial land use where access will be restricted along the route.

Temporary accommodating works for the turbine delivery route options include temporary removal of street furniture, temporary surfacing at roundabouts, road verges and the site entrance, and trimming of trees and vegetation. There is a likelihood of effects on land use in proximity to the works. Land uses along the turbine delivery route options may be affected due to access restrictions which are likely during the transportation of turbine components over the public roads. This is likely to have a brief slight adverse effect on land-use in the study area.

There are no major tourism attractions within 10km of the proposed wind farm site and therefore no impact on tourism numbers or revenue is likely. The effects on notable recreation and tourism resources of the study area (e.g., Kilguilkey House Equestrian Centre, the Donkey Sanctuary located at Liscarroll, Ballybeg Augustinian Priory near the town of Buttevant and tourist accommodation at New Twopothouse and Mallow) and amenity during the construction phase for all elements of the Project will be not significant. Trenching works associated with the grid connection route have the potential to exceed the daytime construction noise criteria. However, the duration of exposure of trenching is brief, with works occurring directly outside of any single dwelling or premises lasting typically for less than one day. This will result in a adverse but brief effect. As with any premises along the turbine delivery route and grid connection route options, Ballybeg Augustinian Priory and Springfort Hotel are likely to be affected temporarily by traffic management measures and during trenching works. This is likely to have a brief slight adverse effect on these tourism resources but will be not significant.

There is potential for adverse effects on human health during the wind farm construction phase. These include emissions to water of hydrocarbons and release of silt-laden runoff into watercourses which could potentially pollute water supplies; and release of dust and exhaust emissions to air which could increase air pollution causing increased risk of stroke, heart disease, lung cancer, and chronic and acute respiratory conditions.

Accommodating works along the public roads and the delivery of heavy/bulky goods and components on narrow roads and works for the grid connection may lead to temporary limited access to farmlands, and residential and commercial properties, creating a potential hazard along the route and at identified pinch points. This would have a temporary moderate, adverse effect on public safety along the turbine delivery and grid connection routes during the construction phase.

The summary of effects prior to mitigation of noise and/or vibration from construction works for the Project is provided in **Table 3**.

Table 3: Summary of likely significant construction noise/vibration effects

Works	Summary of Effects		
	Quality	Significance	Duration
Turbine + Substation Construction	Adverse	Not significant	Temporary
Grid Connection	Adverse	Not significant	Brief

EIAR **Chapter 16 Traffic and Transpor**t assesses the effects of the Project on Traffic and Transport. During construction, there is the potential for the Project to lead to an adverse effect on the existing road network arising from delivery of turbine components and building materials and for the installation of the grid connection including, in respect of amenity, delay and disruption to road users and access to properties. These effects were found to be not significant with mitigation measures in place.

3.1.2.2 Operational Phase

Once it is operational, the Project will bring direct and indirect employment to the study area. There is potential for the Project to make a substantial contribution to creating jobs, supporting the rural community and investing in the Cork economy. This would result in long term significant positive effects of this Project on the local and wider economy of County Cork over the lifetime of the Project.

Once operational, all infrastructure, except for permanent wind farm infrastructure, (e.g. permanent access tracks and the substation area) will be grassed over and will return to agricultural use in the operational phase. It is envisaged that the land will continue to be used for agriculture throughout the 35-year lifetime of the Project and, as a result, there will be minimal impact on existing land uses for the operational phase. The biodiversity mitigations and enhancements proposed for the Project (as contained in the Habitat Management Plan in EIAR **Volume III, Appendix 7.3**) are essential features and land management measures which will enhance biodiversity within the farmlands and improve sustainability of farming operations. The effect of land use change resulting from the Project is considered permanent, slight, and positive.

Though it is unlikely, there is potential for the grid connection to require repair and/or for accommodating works being undertaken for the transport of replacement turbine components during the 35-year operational life of the Project. However, these works will be brief, and therefore slight and neutral in effect.

In the worst-case scenario, the potential for shadow flicker to impact sensitive receptors would be moderate to significant, adverse and long-term (i.e., for the 35-year operational period).

Noise prediction modelling was undertaken for all noise sensitive locations (receptors) both downwind and upwind of the proposed turbines. Based on a worst case, there will be a slight exceedance of the criteria at 6m/s (v_{10}) wind speed, during daytime periods, at one of the noise sensitive receptors. The next stage of modelling was a directional analysis to identify the wind speed and direction for when this exceedance is likely to

occur. At the noise sensitive receptor, potential significant effects have been identified at 6m/s (v_{10}) wind speed, during daytime periods (07:00 to 23:00hrs), when wind directions are 220 to 340 degrees from north (i.e., broadly westerly winds).

When the available existing views from communities are considered together with the nature of likely views of the Project, no significant landscape and visual effects on communities are predicted.

3.1.2.3 Decommissioning Phase

The potential effects of decommissioning are like those associated with the construction phase, however, reduced in magnitude – this phase is anticipated to be carried out within two months.

3.1.3 Mitigation and Residual Effects (Post-Mitigation)

As described in EIAR **Chapter 9**, to protect groundwater quality, the pouring of concrete within the works areas will be prepared and controlled, including shuttering and the use of geotextile membrane to minimise escape of material. Once it is set, concrete is effectively inert. Once mitigated, release of cement material during construction with potential for impacting ground water quality will be minimal and temporary, if it occurs at all.

EIAR **Chapter 16 Traffic and Transport** concludes that following mitigation, adverse effects on the receiving environment associated with the construction works on the main wind farm site and the grid connection route options will be short-term in duration and slight in significance, whilst the works associated with the turbine delivery route options will be temporary in duration and slight following mitigation. Traffic management measures will be put in place as detailed in EIAR **Chapter 16 Traffic and Transport** and in the CTMP as contained in EIAR **Volume III, Appendix 5.2**. This will result in limited disruption to land use along the grid connection route for an anticipated duration of five months. Once good practice is followed, the residual adverse effects on public health and safety are expected to be temporary and not significant.

In relation to air quality, all construction effects were assessed as not significant provided that the recommended dust control and exhaust mitigation measures for construction, and to a lesser extent decommissioning phase as set out in EIAR **Chapter 17 Air Quality**, are applied. Residual effects are therefore not significant.

In relation to climate (EIAR **Chapter 18**), following the implementation of mitigation measures, due to the emission of Greenhouse Gases (GHGs) during the construction (and decommissioning) activities, the Project is likely to result in a direct, long-term minor adverse effect on global climate (with emissions remaining in the atmosphere for a long period of time (years, decades and beyond). However, this minor adverse effect is largely outweighed by the direct, long-term significant beneficial effect of operation of the wind farm upon the global climate, such that the overall net effect of the Project, following the implementation of mitigation measures, is likely to be a significant beneficial effect. This is because the net GHG effects of the Project will be below zero and it will result in a reduction in atmospheric GHG concentration. This reduction will be brought about by the displacement of fossil fuel energy sources by the renewable electricity produced as a result of the Project. This will contribute to overall positive effects on human health and wellbeing of the population.

In relation to shadow flicker, with the application of mitigation, it is considered that the residual effects on all sensitive receptors (including those outside the study area) would be short in duration and negligible resulting in no significant adverse residual effects. The effect on amenity arising from operation of the turbines is therefore imperceptible.

In relation to noise and vibration during construction, recommended mitigation measures include community notification and best practicable means in the selection and use of equipment, work practices, and noise reduction measures at construction works sites. Following the application of mitigation measures as set out in EIAR **Chapter 13 Noise and Vibration**, it is concluded that the residual noise and vibration effects from construction at the wind farm site are temporary slight adverse, whilst along the grid connection route options, the noise and vibration effects from the proposed works are considered significant, adverse but brief.

During the operational phase, noise mitigation measures will be implemented to ensure that turbine noise levels will comply with the criteria at all noise sensitive receptors. Curtailment is proposed only during daytime periods (07:00 – 23:00hrs), and only during particular wind directions (220 -340 degrees from north) and at a single wind speed (6m/s $_{v10}$) and to 3 turbines only (T6, T8 and T9). Following application of the proposed noise mitigation measures during the operational phase, the calculated turbine noise levels will comply with the noise criteria at all noise sensitive receptors. There will be no residual effects.

3.2 Biodiversity

Chapter 7 of the EIAR was prepared by RSK Biocensus. It presents an assessment of the current ecological baseline characteristics of the Project, including the determination of the importance of ecological features present; evaluation of the potential significance of effects from the Project on ecological features, including potential effects during the construction, operational, and decommissioning phases; and identification of mitigation and enhancement measures. The assessment methodology is presented within the chapter.

3.2.1 Baseline Environment

The desk study identified two internationally designated sites within the study area, which is broadly considered to extend across the wind farm site and up to 15km from it where sensitive habitats that are hydrologically linked to the wind farm site may be present. The sites comprise two Special Areas of Conservation (SACs). In addition, there are seven proposed Natural Heritage Areas (pNHAs) located within the study area. One Annex I priority habitat was identified during the desk study within 5km of the site boundaries, namely residual alluvial woodland occurring approximately 4.8km to the southwest of the wind farm site. There are records for seven protected species identified within 10km of the wind farm site boundary, including species of bats, pygmy shrew, badger, red squirrel, otter and hedgehog.

The wind farm site is comprised predominantly of modified habitat types associated with intensive farming systems and includes improved agricultural grassland, tilled earth and arable land, although semi-natural habitat such as hedgerows and treelines, emerging scrub and wet grassland occur to a lesser extent throughout the wider landholding.

3.2.2 Potential Effects of the Project

3.2.2.1 Construction Phase

There are no viable pathways between the SACs, pNHAs and the wind farm site and therefore there would not be a likely significant effect on these sites as a result of the Project.

During construction, it is envisaged that there will be direct habitat loss and fragmentation, especially in the development of site access tracks, turbines, substation buildings and other associated construction. However, the majority of such losses are restricted to agricultural lands which are highly modified and are of low ecological value. Furthermore, no rare or protected flora were recorded within the wind farm site boundary, with no documented records of notable vascular plants recorded as part of the desk study. Consequently, likely effects from habitat loss and fragmentation are considered not significant, with the exception of hedgerows, where a significant adverse effect at the Local level (slight effect) is predicted.

The high-risk invasive species, Japanese knotweed, was recorded within the site in two different locations and at two locations along the turbine delivery route options. Given the location of the wind farm site with, albeit limited hydrological connection to adjacent areas, the potential effect from the spread of non-native invasive plant species in the absence of mitigation during the construction phase of the Project would be considered a significant adverse effect at the Local level (slight effect) and could affect habitats on site as well as within adjacent areas. The effects from habitat loss and fragmentation on invertebrates, aquatic ecology, badgers and other mammals, are deemed not significant.

There is a significant adverse effect of habitat loss and fragmentation to bat species and it is deemed likely at a Local level (slight effect) during the construction phase, persisting for the long-term throughout the lifetime of the Project.

3.2.2.2 Operational Phase

There will be no additional removal of habitat during the operational phase of the Project. As a result, there is no potential for direct adverse effects to habitats arising from the operational phase of the Project. Therefore, effects from habitat loss and fragmentation are not significant. Operational phase maintenance work is highly unlikely to disturb or displace any stands of Japanese knotweed, thus additional effects from invasive non-native species are considered not significant.

For bats, effects from habitat loss will continue to persist throughout the operational phase in the absence of mitigation, resulting in a significant adverse effect at the Local level (slight effect). In the presence of embedded mitigation, disturbance/displacement effects from the operational phase of the development are considered not significant. There is still a risk of collision and based on risk assessments, collision related effects on bat species are considered to result in a significant, adverse effect at the Local level (slight effect) in the absence of mitigation.

The potential disturbance/displacement effects on invertebrates, badgers, pygmy shrew, hedgehogs, other mammal species and aquatic ecology as a result of the operational phase of the Project are considered to be not significant.

3.2.2.3 Decommissioning Phase

Decommissioning activities are assumed to be similar to construction activities, having similar type risks and sensitive features associated with them. Likely effects on ecological features from habitat loss and fragmentation during the decommissioning of the Project are deemed not significant.

3.2.3 Mitigation and Residual Effects (Post-Mitigation)

3.2.3.1 Construction Phase

Minimisation of the extent of habitat loss during construction as much as is possible was facilitated through the development design. Replacement hedgerow habitat will be created in proportion with the type and extent of habitat loss during construction.

The reinstatement and replacement of hedgerows along with the creation of pockets of woodland to overall increase the commuting, foraging, and roosting habitats on site for bat species, will achieve a net gain for biodiversity The installation of bat boxes in strategic locations will provide further roosting opportunities for bat species.

3.2.3.2 Operational Phase

Commencing in the first year of operation of the wind farm, the status of habitats created, enhanced, and controlled will be checked following a monitoring regime. Bat activity will be measured within monitoring years continuously between April and October at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be recorded at the nacelle height of each turbine. Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed.

3.2.3.3 Decommissioning Phase

No significant effects were identified for the decommissioning phase of the Project.

3.2.3.4 Residual effects

Considering the scope for effects from the Project, and the importance and sensitivities of the ecological features, it is deemed that the proposed mitigation measures will be sufficient to avoid significant effects with no adverse residual effects anticipated. Additionally, further enhancements laid out within a Habitat Management Plan (EIAR **Volume III, Appendix 7.3**) will ensure that the Project has an overall positive effect on those sensitive ecological features identified within the assessment as well as on biodiversity as a whole. This would represent a significant positive effect in the long-term.

3.3 Ornithology

Chapter 8 of the EIAR was prepared by RSK Biocensus. It presents an assessment of the current ornithological baseline characteristics of the Project, including determination of the importance of ornithological features, and an evaluation of the potential significance of impacts from the Project on ornithological features, including potential impacts during the construction, operational and decommissioning phases. Also, it identifies mitigation and enhancement measures to minimise the potential for impacts from the Project on

ornithological features and delivers ornithological enhancements where possible. The assessment methodology is presented within the chapter.

3.3.1 Baseline Environment

The wind farm site is primarily mixed farmland habitat with hedgerows and occasional areas of scrub, ponds and man-made drains and ditches. The desk study identified two international statutory sites designated for features of ornithological interest within 20km of the wind farm site boundary. Targeted bird surveys within the site recorded an assemblage of breeding and non-breeding birds.

3.3.2 Potential Effects of the Project

3.3.2.1 Construction Phase

During construction, there will be no removal of suitable roosting or nesting sites for barn owl, and land take for the proposed turbines and associated infrastructure will not significantly reduce the availability of barn owl foraging habitat within the wind farm site. Thus, likely effects from habitat loss and fragmentation on barn owl are deemed not significant. As the nearest confirmed nesting location is approximately 1.8km to the east of the wind farm site boundary, the wind farm site is outside of the core foraging range of this pair. Considering this, and the limited extent and quality of suitable barn owl foraging habitat within the wind farm site, likely effects from disturbance and displacement are considered not significant.

Although the wind farm site is assessed as being of Local (Higher value) importance for raptors including buzzard, kestrel, merlin (winter only) and peregrine, direct loss of suitable foraging habitat for these species will be minimal and highly unlikely to significantly affect prey availability for raptors. There will be no significant loss of suitable nesting habitat for such species. As such, effects on populations of these raptor species as a result of habitat loss and fragmentation during construction are considered not significant. The area of potentially suitable habitat that would be subject to disturbing activities will be small, particularly in the context of retained areas of suitable foraging and commuting habitat within the wind farm site and the wider landscape. Considering this, and the levels of activity recorded for raptor species within the wind farm site, potential disturbance and displacement effects from construction are considered not significant.

Direct loss of suitable habitat for golden plover and other wader species will be minimal, particularly in the context of retained habitat within the wind farm site and the wider landscape. Habitat loss and fragmentation effects from construction are therefore considered not significant. Given the lack of roosting golden plover recorded within the wind farm site, the absence of breeding by any wader species (e.g., lapwing, snipe) and relatively low level of roosting activity (by snipe only), there is limited potential for disturbance of these species during construction of the Project and, as such, disturbance effects from construction are considered not significant. Considering the very low level of whooper swan activity recorded (two records with a peak count of four birds flying over the wind farm site during the three winter seasons surveyed), there is no potential for significant construction impacts on whooper swan, either through direct habitat loss or disturbance/displacement. Construction effects on whooper swan would therefore be not significant.

The wind farm site is assessed as being of Local (Higher value) importance for the assemblage of notable non-target bird species such as linnet, meadow pipit, redwing, skylark, starling, stock dove and yellowhammer. In the absence of additional mitigation measures, it is likely that the construction of the Project would have a significant adverse effect on these farmland bird species at a Local level (slight effect) through direct habitat loss and fragmentation.

There is potential for disturbance and displacement of farmland bird species during the construction of the Project. This includes potential disturbance of birds when nesting and may cause birds to vacate territories close to works. Additional impacts may occur during the construction due to required road works along the turbine delivery route, the laying of cabling, the placement of underground cabling, and excavation of materials. Considering the potential extent of disturbance, and the importance of the bird populations present, it is possible that the construction of the Project could have a significant adverse effect on these farmland bird species at a local level (slight effect) through disturbance and displacement, in the absence of additional mitigation.

3.3.2.2 Operational Phase

No significant effects on ornithological features in terms of barn owl, raptors, golden plover and whooper swan from direct habitat loss and fragmentation, disturbance and displacement, and collision risk are anticipated during the operational phase. Collision risk on pomarine skua were also considered not significant (N.B. The wind farm site is not suitable for pomarine skua, therefore, potential likely effects assessed for this species relate to collision risk). Effects on other species that were considered include species such as linnet, meadow pipit, redwing, skylark, starling, stock dove and yellowhammer. The assessment found that effects from habitat loss and fragmentation during operation, operational disturbance and displacement, and collision risk are not significant.

3.3.2.3 Decommissioning Phase

Decommissioning works would likely result in short-term disturbance as a result of increased noise and human presence, which could lead to energetic stress and a reduction in breeding success of certain bird species. However, such impacts would be experienced on a temporary basis only and would not be expected to affect the population status of any bird populations within the Zone of Influence. Disturbance effects on birds from decommissioning are considered not significant.

3.3.3 Mitigation and Residual Effects (Post-Mitigation)

3.3.3.1 Construction Phase

Habitats will be created in proportion to the type and extent of habitat loss during construction. All temporary habitat loss will be reinstated on a like-for-like basis, including along the turbine delivery and grid connection route. A range of bird boxes will be provided in suitable retained habitats to provide additional nesting opportunities for various species.

3.3.3.2 Operational Phase

During the operational phase, to confirm the accuracy of collision risk modelling, an avian fatality monitoring programme will be implemented within the operational wind farm, as detailed within the Habitat Management Plan (EIAR **Volume III, Appendix 7.3**).

3.3.3.3 Decommissioning Phase

Any habitat temporarily cleared during the decommissioning phase to accommodate the planned works will be reinstated on a like-for-like basis. Following reinstatement, the wind farm site will be monitored regularly to determine the progress of re-vegetation and if necessary to look at introducing supplementary planting with native species. A reassessment of the wind farm site will be carried out at the end of the first-year post-decommissioning to assess the site's progression over the previous year in relation to vegetation status, drainage management, and general site appearance, to ensure the wind farm site remains favourable to ornithology and wider biodiversity.

3.3.3.4 Residual effects

Considering the scope for effects from the Project, and the importance and sensitivities of the ornithological features, it is deemed that the proposed mitigation measures will be sufficient to avoid significant effects with no significant residual effects anticipated. Additionally, further enhancements laid out within the Habitat Management Plan (EIAR **Volume III, Appendix 7.3**) will ensure that the Project has an overall positive effect on those sensitive ornithological features identified within the assessment as well as biodiversity as a whole.

3.4 Hydrology and Hydrogeology

Chapter 9 of the EIAR was prepared by RSK Ireland. This Chapter of the EIAR presents an assessment of the potential effects of the Project on hydrology and hydrogeology during the construction, operational and decommissioning phases. The assessment methodology is presented within the chapter.

3.4.1 Baseline Environment

The wind farm site and both grid connection route options are situated within the Blackwater (Munster) Catchment (ID: 18; Area: 3,308km^2). Historic maps indicate that a stream 'rises' approximately 90m southwest of the proposed location of turbine T4. All surface waters draining from the site eventually combine in the Blackwater (Munster) River_170, from which waters eventually flow to the Upper and Lower Blackwater Estuary, the Youghal Estuary through to Youghal Bay and into the Celtic Sea. The grid connection route (Option 1) is located to the north of the Ballyclogh Stream_010. Both grid connection route options cross the Blackwater (Munster) River_140 (locally known as Caherduggan South).

The northern portion of the wind farm site is underlain by the Mitchelstown groundwater body (classed as a regionally important aquifer). The southern portion of the wind farm site is underlain by the Kilmaclenine groundwater body (classed as a locally important aquifer).

The wind farm site is characterised generally by a network of historical drainage, and historical features non-mapped natural and artificial drainage channels, and some connections to groundwater southwest of the Project. Many of the drains on the wind farm site are “dry drains” that contain no water for much of the year.

Karst features identified within the vicinity of the wind farm site include a swallow hole and enclosed depression (also indicated as a disused quarry in historic maps) in relative proximity to T1 and T5, respectively. There are no identified karst features within 15m of the grid connection route options.

Based on site specific data and publicly available mapping, groundwater vulnerability at the wind farm site and along the grid connection route options ranges from moderate to extreme.

3.4.2 Potential Effects of the Project

3.4.2.1 Construction Phase

Potential impacts of the Project leading to likely significant effects during the construction phase include:

- Impacts on water quality via:
    - Release of suspended solids.
    - Release of nutrients.
    - Release of hydrocarbons and storage.
    - Release of horizontal directional drilling material.
    - Release of wastewater sanitation contaminants.
    - Release of construction or cementitious material.
- Impact on hydrological / hydrogeological regimes via:
    - Diversion and enhancement of drainage and watercourse crossings.
    - Excavation dewatering and construction water.

3.4.2.2 Operational Phase

The Project has the potential to result in increased rates of runoff during the operational phase relative to baseline conditions. The installation of constructed drainage and clean water interception drains for the purposes of collecting either clean water or construction runoff has the potential to alter the natural hydro morphology of the wind farm site.

3.4.2.3 Decommissioning Phase

No new unique or additional effects are anticipated to arise during the decommissioning phase of the Project on the hydrological and hydrogeological environment. All anticipated effects are similar in nature to those already highlighted during the construction phase (i.e., release of hydrocarbons, wase water / sanitation and suspended solids).

3.4.3 Mitigation and Residual Effects (Post-Mitigation)

3.4.3.1 Construction Phase

Avoidance of sensitive hydrological or hydrogeological receptors wherever possible was facilitated through the development design. A series of buffers around mapped surface water features, non-mapped drainage features, historic surface water features and karst features were applied where possible. In order to reduce the likely potential impacts on the hydrological environment, the following mitigation measures will be adopted as part of the construction works on site:

- Implementation of a Construction & Environmental Management Plan (CEMP), including a Spoil Management Plan.
- Surface water management during construction using sediment fencing and use of in line stilling ponds and check dams to regulate the speed of runoff within the drainage network.
- Only temporary stockpile locations.
- Earthworks will not occur during sustained or intense rainfall events.

The main risk to groundwater posed by the development is the use, storage and transfer of hydrocarbons (fuel) on the wind farm site for plant equipment, and wastewater contaminants. In the unlikely event of a spill, the contaminant will be contained, managed and removed in good time.

The residual effect on the surface water receiving environment resulting from the construction phase of the Project is anticipated to be limited to a neutral to slight and not significant effect on hydrology and hydrogeology. The potential for release of elevated suspended solids is likely to be exacerbated following heavy rainfall events which occur after sustained dry periods. Any localised reduction in water quality will be mitigated against by the control measures outlined in the chapter and also by natural dilution as distance from the point or diffuse source of contamination increases with distance from the site.

Mitigation by avoidance and the implementation of physical control measures will ensure that contaminant concentrations, particularly elevated suspended solids entrained in run-off are reduced to below the relevant legislative screening criteria for salmonid waterbodies.

3.4.3.2 Operational Phase

The principles of the mitigation measures described (check dams, stilling ponds, etc.) are based on the control and management of runoff discharge rates, which ensure regulation of the speed of runoff within the drainage network, buffering the discharge from the drainage network where possible, and maintaining the natural hydrological regime. These measures ensure potential pollutants are also attenuated and will likely provide beneficial effects in terms of both runoff and water quality.

The finalised drainage design results in attaining net beneficial effects through Sustainable Drainage Systems (SuDS) and Nature Based Solutions (i.e., a net reduction in runoff rates at the wind farm site) beneficial effects to water quality and reducing flood

risk to downstream flood risk areas. Coupling SuDS with ecology and biodiversity mitigation also provides opportunities to attain net biodiversity gain. This is considered a direct, neutral to beneficial and permanent effect of the development, and is considered to be not significant.

3.4.3.3 Decommissioning Phase

The works required for decommissioning the Project pose similar hazards and risks associated with the construction phase but to a far lesser extent. For example, the potential for fuel spills from vehicles is valid but there will likely be fewer vehicles required. Mitigation measures outlined for the construction phase will also be applied to the decommissioning phase. The decommissioning works will be similar to the construction phase but over a shorter time period, and the potential effects are neutral to slight and not significant.

3.5 Land, Soils and Geology

Chapter 10 of the EIAR was prepared by RSK Ireland. This Chapter of the EIAR presents an assessment of the potential effects of the Project on land, soils and geology features, receptors or attributes during the construction, operational and decommissioning phases. The assessment methodology is presented within the chapter.

3.5.1 Baseline Environment

Land use maps indicate that the landcover at the wind farm site is predominantly comprised of ‘agricultural pastures’ and ‘non-irrigated arable lands’. Similar land cover exists along the grid connection route options which also traverse areas of ‘discontinuous urban fabric’.

Soil cover on the wind farm site, according to the National Soil database (GSI, 2022) is primarily ‘Acid Brown Earths’. Grid connection route options have similar soil composition to that of the wind farm site with mainly ‘Acid Brown Earths and ‘Surface water Gleys, Ground water Gleys’ underlying it. The predominant subsoil underlying the wind farm site are shales and sandstones tills with small areas of identified bedrock at or close to surface. The majority of the grid connection route is underlain by shale and sandstone till, with some sandstone till. Areas of bedrock at or close to surface also occur along the grid connection route.

The underlying bedrock of the proposed wind farm site consists of several lithologies including limestone, shale, sandstone, mudstone and conglomerate. The underlying geology of the grid connection route is similar to that of the wind farm site, with a number of geological formations comprised of limestones, siltstones, mudstone and sandstones.

One location within the wind farm site boundary has been classified as a 'County Geological Site'. No mineral extraction has occurred at this location. According to historic mapping, a small (disused) quarry is located to the east of T5. A rock face was marked to the east of the quarry. In addition, a lime kiln is also marked to the south of T7. Anecdotally, neither the quarry nor the lime kiln are known to have been in use since the 1960s, however, they are referred to locally as “the quarry”. The feature corresponds to the location of an enclosed depression (GSI, karst database).

3.5.2 Potential Effects of the Project

3.5.2.1 Construction Phase

Potential effects of the construction activities associated with the Project include:

- Land take.
- Ground or soil sealing.
- Compaction, erosion and degradation of soils.
- Subsoil and bedrock removal.
- Soil contamination.
- Slope, ground and geological stability issues.

3.5.2.2 Operational Phase

Potential effects of the operational phase of the Project include:

- Land take.
- Soil compaction and subsidence.
- Soil contamination.

3.5.2.3 Decommissioning Phase

The potential effects associated with decommissioning will be similar to those associated with construction but of reduced magnitude because excavations will be limited, and wet concrete handling will not be required. The potential environmental effects of soil storage and stockpiling and contamination by fuel leaks will remain during decommissioning.

No new effects are anticipated during the decommissioning phase of the Project in comparison to the construction phase. However, the decommissioning of major infrastructure including proposed turbines poses similar hazards and risks to the environment compared to that of the construction phase.

3.5.3 Mitigation and Residual Effects (Post-Mitigation)

3.5.3.1 Construction Phase

Avoidance of geotechnical constraints (e.g., karst features) wherever possible was facilitated through the development design. The proposed turbines and infrastructure layout was dictated to a large degree by the existing infrastructure (tracks), geophysical surveying and the site topography. Similarly, engineered cut and fill extents have been designed to minimise the volume of subsoils to be removed either directly by excavation (turbine foundations) or as a function of cut and fill requirements (hardstands).

In order to reduce the likely potential effects, the following mitigation measures will be adopted as part of the construction works on site:

- Implementation of a Construction & Environmental Management Plan (CEMP), including a Spoil Management Plan.
- Geotechnical testing to confirm the ground properties at the wind farm site will be carried out at detailed design stage.
- Reinstatement of hardstand areas, crane pads, etc. after the construction phase to reduce land take and to reverse soil sealing effects, returning the land to agricultural use as far as possible.
- Management of excavated soils and subsoils during construction phase in temporary stockpiles limited in height and slope, and minimisation of the amount and duration of exposure.
- Reuse of excavated subsoil and bedrock onsite wherever possible in the wind farm site.
- Management of vehicular movements.
- Storage and handling of hydrocarbons/chemicals using best practice methods.

Mitigation measures outlined will reduce the potential effects of the Project on geological receptors. The unavoidable residual effects on the soils and geology environment as a function of the Project, is that there will be a change in ground conditions at the wind farm site with natural materials such as soil, subsoil and bedrock being replaced by concrete, subgrade and surfacing materials.

The residual effects after implementation of all mitigation measures for the construction phase of the development on the land, soils and geology are considered to be generally short-term (length of construction) to long-term, localised to the footprint of the development and partially reversible through reinstatement. The mitigated residual effects are considered to have a significance level of slight and are therefore not significant.

3.5.3.2 Operational Phase

No further effects are anticipated during the operational phase of the Project on the geological, geomorphological and geotechnical environment, therefore, no additional mitigation measures are required.

Maintenance and monitoring during the operational phase of the Project pose similar hazards and risks associated with the construction phase but to a far lesser extent. The operational team will carry out maintenance works (to site tracks, onsite substation and wind turbines) and will put in place control measures to mitigate the risk of hydrocarbon or oil spills during the operational phase of the wind farm. Any vehicles utilised during the operational phase will be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected.

Regular monitoring, similar to the construction phase but on a less frequent basis, will be required. For example, the Project will be inspected on a routine quarterly basis and following storm events. Any potential issues arising will be noted and remedial action taken in line with construction phase mitigation.

The likely effects on the land, soil and geology during the operational phase of the work will be mitigated through good site practice, management of vehicular movements, and hydrocarbon controls. The mitigated residual effects from the operational phase are considered to have a significance level of slight and therefore not significant.

3.5.3.3 Decommissioning Phase

Mitigation measures for the decommissioning phase are the same as those outlined for the construction phase. Residual effects after the decommissioning phase are complete include all effects classified as being long-term to permanent effects of the development, that is, there will remain a change in ground conditions at the wind farm site with the replacement of natural materials such as subsoil and bedrock by concrete, subgrade and surfacing materials.

The residual effects associated with decommissioning include waste generation, potential hydrocarbon leakage and erosion of soil and rock. In general, effects will be similar to those at construction and operation, but of a greatly reduced magnitude and are therefore considered to have a significance level of slight and therefore not significant.

3.6 Material Assets

An assessment has been made of the effect of the Project on material assets, such as waste, utilities, telecommunications and aviation by Nicholas O'Dwyer and Ai Bridges and is presented in **Chapter 11**. The assessment methodology is presented within the chapter.

3.6.1 Baseline Environment

A desktop study was undertaken to review the licensed waste facilities in relative proximity to the Project. There are twelve licensed waste management facilities in proximity to the Project. Within the wind farm, there are electricity and water services present to the southeast within the blueline boundary, in close proximity to a landowner's house and farmstead. No other utilities have been identified within the blueline boundary. In addition, there are five telecommunication mast sites that could be potentially impacted by the Project. The closest airport to the wind farm site is the Cork International Airport, which is approximately 42km to the southeast of the Project.

3.6.2 Potential Effects of the Project

3.6.2.1 Construction Phase

During the construction phase, the Project will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. In the absence of mitigation to reduce waste generated and ensure waste management as high up the hierarchy as possible, the effect on the local and regional environment is likely to be short-term, significant and adverse.

During construction, contractors will require power for onsite offices, and construction equipment/plant. A temporary power supply will be established via generators. All waste waters will be collected in an enclosed holding tank and removed from site by a licensed contractor on a regular basis for final wastewater treatment. Potable and non-potable

water will be delivered to the wind farm site. Therefore, the effect on utilities will be neutral and not significant.

There are no potential electromagnetic interference effects associated with the construction phase of the Project on telecommunications and broadcasting in the area. Ahead of the transport of turbine components, the applicant will liaise with the relevant telecommunications and utilities providers to ensure that appropriate mitigation measures are applied such that there is minimal disruption to telecommunications and utilities services. Therefore, the effect on telecommunications will be neutral and not significant.

As the nearest airport is ca. 42km away, the potential impact on aviation for the construction phase is neutral, imperceptible and short-term.

3.6.2.2 Operational Phase

During the operational phase, it is anticipated that very small amounts of waste will be generated from staff during inspections and maintenance works. Wastewater from the staff welfare facilities will be collected in a sealed storage tank. All wastewater will be tankered off-site by an authorised waste collector to a wastewater treatment plant. The potential effects on waste infrastructure for the operational phase is neutral, imperceptible, and long-term.

No impact is anticipated on utilities for the operational phase of the Project as there will be no significant requirement for gas or electricity services. The potential effects on utilities for the operational phase is neutral, imperceptible, and long-term.

The rotating blades of wind turbines can occasionally scatter electromagnetic signals causing interference to a range of communication systems. One microwave link (Vodafone Ireland licenced point-to-point (PTP) microwave radio link from Mt Hillary to Shinanagh) could potentially be impacted by the Project. There are no anticipated impacts to the other links assessed. In the absence of mitigation, the effect on telecommunications is likely to be long-term, significant and adverse.

Should planning consent be granted for the Project, liaison will be undertaken with the Irish Aviation Authority to ensure all aviation requirements, such as a warning lighting scheme, are implemented. The potential impact on aviation for the operational phase is neutral, imperceptible and long-term and there will be no significant effect on aviation from the Project during the operational phase.

3.6.2.3 Decommissioning Phase

During decommissioning of the Project, effects will be similar to those assessed for the construction phase. Turbine foundation plinths will be dismantled to below existing ground level and covered over with topsoil, the underground sections will be left in place during decommissioning and allowed to naturally revegetate over time. As the wind farm site will have already been altered, the impacts are neutral, imperceptible, and long-term.

All infrastructure including turbine components will be separated and removed off-site for re-use and recycling where practicable or disposed of in accordance with waste legislation and best practice guidelines at the time of decommissioning. Waste produced during the decommissioning phase will likely have a moderate adverse effect on the capacity of the licenced waste facilities used at the time of decommissioning.

No significant effects are anticipated on utilities, telecommunications or aviation during the decommissioning phase of the Project.

3.6.3 Mitigation and Residual Effects (Post-Mitigation)

3.6.3.1 Construction Phase

A Resource and Waste Management Plan (RWMP) (EIAR **Volume III, Appendix 5.1**) will be prepared during the construction phase and will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the Project.

Ongoing consultation with Uisce Éireann, Bord Gáis, EirGrid, ESB Networks and other relevant service providers within the locality will continue, and all works will be in compliance with any requirements or guidelines they may have. The works contractor will be obliged to ensure that there are no interruptions to these utility services unless this has been agreed in advance.

Extensive field survey and software modelling analysis was carried out to determine viable mitigation measures to offset the impact on the delivery of service to the Vodafone base station site at Shinanagh. As mitigation, a proposal to re-route the service into Shinanagh from an alternative Vodafone site was agreed with Vodafone.

Should planning consent be granted for the Project, the applicant will liaise with the Irish Aviation Authority to ensure that all aviation requirements, such as a warning lighting scheme, are implemented.

The implementation of the mitigation measures outlined in EIAR **Chapter 11 Material Assets** will ensure that there are no significant adverse residual effects on the material assets during the construction phase.

3.6.3.2 Operational Phase

The implementation of the mitigation measures outlined in EIAR **Chapter 11 Material Assets** will ensure that there are no significant adverse residual effects on the material assets during the operational phase.

3.7 Shadow Flicker

A shadow flicker assessment for the Project was carried out by ADAS Ltd. and is presented in **Chapter 12**. Shadow flicker is the effect that occurs where the blades of a wind turbine cast a shadow over a window in a nearby sensitive receptor, and the rotation of the blades may result in a flickering effect. This effect happens only in certain specific combined circumstances, and at distances greater than 10 rotor diameters (the width of the circle that the wind turbine blades make) from a wind turbine, the potential for shadow flicker to occur is very low.

The shadow flicker assessment was undertaken following consultation with the Cork County Council Planning Authority and considering current legislation and guidance. A study area of 1,500m (equal to 10 rotor diameters) was defined around each of the proposed wind turbines. Modelling was then carried out to predict shadow flicker at all sensitive receptors within this study area. The assessment methodology is presented within the chapter.

3.7.1 Baseline Environment

Eighty-eight sensitive receptors were modelled in the shadow flicker assessment. Sensitive receptors include any occupied or unoccupied properties (including a school), and sites where planning permission has been granted for a new dwelling but excludes dilapidated and uninhabited properties that could not be lived in without substantial renovation works.

3.7.2 Potential Effects of the Project

3.7.2.1 Construction Phase

Shadow flicker can only occur when the blades of a wind turbine are moving. This means that the turbine needs to be installed and operational. Because of this, there will be no shadow flicker effects during the construction phase of the Project.

3.7.2.2 Operational Phase

In a 'worst-case' scenario and in the absence of mitigation, of the 88 sensitive receptors in the study area, 25 are predicted to experience no shadow flicker and 49 are predicted to experience effects more than the threshold limits (as set out in the Department of Environment, Heritage and Local Government Wind Energy Development Guidelines, 2006) of 30 hours per year or 30 minutes per day in the worst case scenario.

This ‘worst-case’ scenario assumes that:

- The sun is shining from sunrise to sunset (cloudless sky).
- The turbine blades are turning 100% of the time.
- The turbine rotor is oriented directly between the sun and the sensitive receptor.
- There is no screening between the turbine and the receptor (excluding topography).

Due to predicted shadow flicker effects at 49 sensitive receptors exceeding 30 minutes per day or 30 hours per year, it is considered that in the absence of mitigation, the shadow flicker that would be experienced at these sensitive receptors is significant and adverse.

Shadow flicker can only occur when the sun is shining. Historical weather data was therefore also used to also provide a more realistic prediction of potential annual shadow flicker duration when taking into account the frequency of clear skies when shadows may be cast. With the incorporation of average annual sunshine and in the absence of mitigation, the number of sensitive receptors that are predicted to experience more than 30 hours of shadow flicker per year is 11.

3.7.2.3 Decommissioning Phase

As mentioned, shadow flicker can only occur when the blades of a wind turbine are moving. This means that the turbine needs to be installed and operational. Due to this, there will be no shadow flicker effects during the decommissioning phase of the Project.

3.7.3 Mitigation and Residual Effects (Post-Mitigation)

3.7.3.1 Construction and Decommissioning Phase

Shadow flicker effects can only occur when the turbine blades are moving. This requires the turbine to be operational. As such, there will be no shadow flicker effects during the construction and decommissioning phase of the Project.

3.7.3.2 Operational Phase

To mitigate shadow flicker effects, a shadow flicker control system will be used to shut down responsible turbines when shadow flicker has the potential to occur. In this system, one or more light sensors measure the intensity of sunlight and in combination with a calculation of the position of the sun, the wind turbine(s) are curtailed when the conditions for shadow flicker are met. When the conditions for shutdown are identified, the turbine will come to a stop. It is recognised that there will be a short period of time before the turbine(s) stop rotating once the conditions above are met.

With the application of mitigation measures, it is concluded that residual shadow flicker effects would avoid adverse impacts on residential amenity in respect of shadow flicker (in accordance with objective ET 13-7 of the Cork County Development Plan), align with the requirements of the Draft Revised Wind Energy Development Guidelines 2019 and would be well below the Wind Energy Guidelines (2006) threshold limits, and would therefore be not significant.

3.8 Noise and Vibration

An assessment of potential noise and vibration effects from the Project on local residential amenity was carried out by RSK Ireland and is presented in **Chapter 13**. The assessment methodology is presented within the chapter.

3.8.1 Baseline Environment

The baseline noise environment was surveyed to determine typical background noise levels in the vicinity of the noise sensitive receptors in closest proximity to the wind farm site. This was done through installing unattended sound level meters at four locations in the surrounding area for approximately a four-week period between 28th June and 27th July 2022 and measuring wind speeds and direction at the wind farm site over that same period.

The relevant assessment guidelines recommend that the study area for the background noise surveys and noise assessment should, as a minimum, be the area within which noise levels from the proposed, consented and existing wind turbines may exceed 35dB L_{A90}.

The noise monitoring locations were identified by preparing a preliminary noise contour map at an early stage of the assessment to identify areas within the 35dB L_{A90} study area. The selection of monitoring locations was supplemented by reviewing aerial images of the study area and other online sources of information (e.g., Google Earth) and verified on the ground by site survey.

3.8.2 Potential Effects of the Project

3.8.2.1 Construction Phase

A variety of items of construction plant and equipment will be in use for the purposes of site preparation, groundworks, construction of turbines, substation, temporary construction compound and other works. There will also be vehicular movements to and from the wind farm site over public roads. All of these activities will generate construction noise to some degree.

Reference has been made to BS 5228 2009+A1 2014 *Code of practice for noise and vibration control on construction and open sites. Part 1* to set appropriate construction noise limit thresholds for works at the wind farm site.

Upon review of baseline noise levels and the relevant guidelines, the predicted noise levels associated with turbine construction and substation compounds are within the daytime construction noise criteria of 65dB $L_{Aeq,T.}$ Thus, the effects are not likely to be significant. The predicted construction noise levels from grid connection trenching work exceeds 65dB $L_{Aeq,T}$ at noise sensitive receptors for a brief period.

Due to the distance of the proposed works at the wind farm site from sensitive locations, the vibration effects are considered to be neutral, not significant and temporary.

3.8.2.2 Operational Phase

The predicted downwind noise levels for all turbines operating in standard mode indicate that noise levels will comply with the criteria, with the exception of one sensitive receptor, where there will be a slight exceedance of the criteria at 6m/s (v_{10}) wind speed, during daytime periods. The predicted noise level from the substation (when designed to meet the target sound power level) is within guidelines limits for industrial plant noise emissions to sensitive receptors and will not contribute significantly to the overall noise levels associated with the operation of the proposed turbines.

3.8.2.3 Decommissioning Phase

The decommissioning phase will involve similar plant and equipment, with similar noise ratings to that of the construction phase, albeit over a shorter duration. Potential noise/vibration effects during decommissioning will be generally lesser for this reason, as well as reasons that concrete foundations will typically remain in place, as will the substation and grid connection cabling. Thus, there will be lesser effects due to noise/vibration during decommissioning compared to the construction phases.

3.8.3 Mitigation and Residual Effects (Post-Mitigation)

3.8.3.1 Construction Phase

A suite of mitigation measures has been proposed for the construction phase in line with the guidance contained within BS5228: 2009 + A1 2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1 Noise*. Various mitigation measures, including community notification and selection of the quietest reasonably available equipment will be applied during the construction of the Project to minimise the noise and vibration impacts where required.

Following mitigation, it is predicted that an adverse, temporary and not significant effect will occur at noise sensitive locations during turbine and substation construction works, whilst during grid connection construction, it is predicted that an adverse, brief and not significant effect will occur.

3.8.3.2 Operational Phase

Mitigation measures are outlined below to ensure that turbine noise levels will comply with the criteria at all noise sensitive receptors. The mitigation measures will be implemented at 6m/s (v_{10}) wind speed, during daytime periods (07:00 to 23:00hrs) and when wind directions are 220 to 340 degrees from north (i.e., broadly westerly winds). The proposed mitigation consists of the operation of Turbines T6, T8 and T9 in the reduced power "Mode L02", under these specific conditions.

The implementation of the specified mitigation measures, will ensure that the predicted operational noise levels will be in accordance with the guidelines. Therefore, effects associated with the operational phase of the Project are considered not significant.

3.9 Landscape and Visual

A Landscape and Visual Impact Assessment (LVIA) of the Project (has been undertaken by Stephenson Halliday Chartered Landscape Architects) and is reported in **Chapter 14** of the EIAR. The assessment methodology is presented within the chapter.

3.9.1 Baseline Environment

This assessment defines the existing landscape and visual baseline environments; assesses their sensitivity to change; describes the key landscape and visual related aspects of the Project; describes the nature of the anticipated changes; and assesses the likely significant effects arising during construction, operational and at decommissioning phases. The assessment findings have been informed by desk study, visualisations and Zone of Theoretical Visibility (ZTV) studies and a number of site visits.

The Project will introduce wind turbines, a met mast and substation into a large-scale working landscape of farmland with undulating topography, dispersed and low-density settlement pattern and a prevalence of hedges and woodland throughout the study area.

3.9.2 Potential Effects of the Project

3.9.2.1 Construction and Decommissioning Phases

Construction and decommissioning phase effects would be substantively the same. They would involve short-term activities and effects which would not be significant. The greatest effects during the construction phase would arise from the standing turbines, and large cranes used to erect these, during the final phases of construction – by which point the effects would be the same as those during the operation phase.

3.9.2.2 Landscape effects – Operational Phase

No significant effects on landscape character would arise given the limited effects on landscape fabric, the large-scale landscape and its characteristic working farmland context. The effects of the Project on landscape character would occur within a localised

area of LCT5 Fertile Plain with Moorland Ridge. Effects on other landscape character types would be small or less and not significant due to limited potential visibility and/or the existing influence of operational and consented wind energy developments.

There would be no significant effects on designated landscapes.

3.9.2.3 Visual effects – Operational Phase

The turbines will be positioned more than 700m (4 x tip height) from the nearest sensitive receptors. Beyond this distance, communities have a low density, dispersed settlement pattern. Mature hedges and woodland are prevalent throughout the farmland plain in which the majority of communities are located and provide screening such that views of the Project would vary, being largely intermittent and on occasion highly visible although not overly dominant. In summary, when the available existing views from communities are considered and the nature of likely views of the Project, no significant effects are predicted on communities.

The key recreational routes of the Ballyhoura Way and the Blackwater Way Trail are influenced by operational wind farms. While the Project would be visible from both routes, the separation distance to the Project and screening by intervening vegetation are mitigating factors that reduce effects and no significant effects are predicted on these routes.

From the key route of the N72 Scenic Route 14 the Project would barely be discernible due to the screening effects of landform and vegetation Thus no significant effects are predicted on this route. There would be no significant effects on other Scenic Routes due to the distance to the Project and the screening effects of intervening vegetation. The Project would be visible from short stretches of the N20 seen in the large-scale farmland plain landscape fitting its immediate context. It would be visible for a short duration in oblique views and the effects would be not significant.

3.10 Archaeology and Cultural Heritage

This archaeological and cultural heritage chapter was prepared by ADAS Ltd and is presented in **Chapter 15**. The chapter presents an assessment of the likely significant effects of the Project on the surrounding archaeological, architectural, and cultural heritage landscape. The assessment is based on both a desktop review of the available cultural heritage and archaeological data and a comprehensive programme of field walking of the study area. The assessment methodology is presented within the chapter.

3.10.1 Baseline Environment

There are no National Monuments within the wind farm site boundary. There are six National Monuments (one of which has three separate components) within 10km of the wind farm site and the nearest National Monument is located at 3.3km south-west of the nearest turbine. No monuments subject to statutory protection as defined in the Record of Monuments and Places or Sites and Monument Record are located with the wind farm site boundary, however, unregistered historic assets are present.

There are seven monuments recorded on the Sites and Monuments records (SMRs) and four structures recorded by the National Inventory of Architectural Heritage (NIAH) within 100m of the grid connection route (Option 1). For the grid connection route (Option 2),

there are five monuments recorded on the Sites and Monuments record and five NIAH structures within 100m of grid connection route (Option 2).

No built heritage structures and their curtilages which are subject to legal protection as Protected Structures are located within the wind farm site boundary or immediately adjacent to the wind farm site. There are twenty-one protected structures located within 5km of the wind farm site.

There are no NIAH Structures recorded within 1km of the wind farm site. However, forty-one structures on the NIAH are located within 5km of the nearest proposed turbine

3.10.2 Potential Effects of the Project

3.10.2.1 Construction Phase

Direct impacts to National Monuments and World Heritage Sites were not identified, with an effect of neutral significance.

It is assessed that the Project will have a likely neutral effect on recorded monuments in the wind farm site. There will also be a likely neutral effect on recorded monuments located proximal to the grid connection route Options 1 and 2.

In addition, it is assessed that the Project will result in direct impacts on unregistered historic assets varying in significance from not significant to significant in the wind farm site, the grid connection route and turbine delivery route options.

No indirect effects on unregistered historic assets within the wind farm site were identified for the construction phase.

3.10.2.2 Operational Phase

The overall significance of effects on the setting of National Monuments ranges from imperceptible adverse to slight adverse.

The overall significance of effects on the settings of Protected Structures ranges from imperceptible adverse to moderate adverse.

The overall significance of effects on NIAH structures is assessed as imperceptible adverse to not significant adverse.

3.10.2.3 Decommissioning Phase

There will be no significant direct or indirect effects, including setting effects, on the archaeological, architectural and cultural heritage assets during the decommissioning phase of the development.

3.10.3 Mitigation and Residual Effects (Post-Mitigation)

3.10.3.1 Construction Phase

During the construction phase, part of the mitigation measures proposed are that no groundworks, construction vehicle movements or storage of materials will be carried out within the buffer zones around the recorded monuments and unregistered 19th century-built heritage structures identified within the wind farm site boundary. The buffer zones,

which were applied during the initial design phase, will be fenced off as agreed with the Cork County Archaeologist prior to the start of the construction works.

As part of an advance works programme prior to construction, advance archaeological test trenching will be carried out within the areas of major groundworks proposed on the wind farm site around each turbine location, the location of the proposed substation and along the parts of the site tracks that are located in agricultural fields closest to areas of highest archaeological potential. If any significant buried archaeological remains are identified during this testing, further mitigation in the form of targeted archaeological strip, map and sample excavation will be agreed with Cork County Council and the National Monuments Service to preserve by record any buried archaeological remains which cannot be preserved in situ by detailed design mitigation/micro siting.

There will also be a likely neutral to not significant effect on buried archaeology, upstanding earthworks and upstanding structures of historic and architectural interest.

3.10.3.2 Operational Phase

There are no mitigation measures proposed for the operational phase of the Project. There will be no effects on National Monuments, Architectural Conservation Areas, Protected Structures or NIAH Structures.

3.11 Traffic and Transport

This chapter of the EIAR evaluates the Project in the context of traffic and transportation within the study area. The assessment examines potential effects and identifies mitigation measures for construction, operation and decommissioning of the Project. The chapter was prepared by Nicholas O'Dwyer Ltd and is presented in **Chapter 16**. The assessment methodology is presented within the chapter.

3.11.1 Baseline Environment

The nearest motorway to the site is the M20 which connects to the N20 and the M7. The M7 is the arterial route for traffic connecting Limerick to Dublin. The M20 is located approximately 44km to the north of the wind farm site. For the turbine delivery route originating at Foynes (Option 1), it is proposed to utilise the M20 motorway for approximately 10km. There are also National primary and secondary routes, regional roads and several local roads in the vicinity of the Project. The turbine delivery route Option 1 proposes the use of two of the local roads to the south of the wind farm site, the local road which connects Kilmaclenine to the N20 (L5523) and the local road which connects the proposed site entrance to Kilmaclenine at Croughta (L5302). The turbine delivery route Option 2 from Ringaskiddy Port proposes the use of two of the local roads to the south of the wind farm site, the local road which runs through Knockane from the N20 (L1200) and the local road which connects the proposed site entrance to Kilmaclenine at Croughta (L5302).

Existing traffic volumes on roads within the study area were collated from publicly available sources (TII) and traffic count surveys were conducted for local roads.

3.11.2 Potential Effects of the Project

3.11.2.1 Construction Phase

During the construction phase for the main wind farm site, it is estimated that there will be 7,768 additional HGV trips (two-way) over the 18 months duration of the construction works. Based on this, in the absence of mitigation, adverse effects on the receiving environment associated with the construction works at the main wind farm site are considered to be short-term in duration and slight to moderate in significance.

The grid connection construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route. It is estimated that the construction phase for the grid connection cable works will lead to 249 additional HGV trips (two-way) over the duration of the construction works. The impact of the rolling traffic diversions and lane closures on public roads will depend on the location of the grid connection works and active traffic at the time of installation. Effects associated with the grid connection works are considered to be short-term in duration and slight to moderate in significance without appropriate mitigation.

Impacts along the turbine delivery route will be limited to specific locations where temporary accommodation works are required and on occasions where large turbine component deliveries are brought to the wind farm site. Temporary accommodation works are required at isolated locations and will not generate high levels of construction traffic. Adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary in duration and slight to moderate in significance without appropriate mitigation.

3.11.2.2 Operational Phase

The vehicle movements for the Project once operational is anticipated to be minimal as both the wind farm and substation will be operated remotely primarily with occasional maintenance visits by personnel traveling in vans, and, if required for emergency turbine repairs, cranes may be brought to site. Effects on the receiving environment associated with the operational phase of the Project are considered to be neutral in terms of quality, long-term in duration and imperceptible in significance. For unforeseen or unplanned works, it is predicted that adverse effects on the receiving environment will be slight without appropriate mitigation and temporary in duration.

3.11.2.3 Decommissioning Phase

] A decommissioning plan will be prepared at the end of operation. The decommissioning plan will include details on material recycling/disposal and a Traffic Management Plan. This will be prepared for agreement with the Local Authority prior to decommissioning of the wind farm.

3.11.3 Mitigation and Residual Effects (Post-Mitigation)

3.11.3.1 Construction Phase

The Construction Traffic Management Plan (CTMP) that is appended to the EIAR will be updated and agreed with the road's authority and An Garda Siochána prior to commencing construction. Mitigation measures are proposed for the grid connection

works and turbine delivery routes within section 16.7.1.3 and 16.7.1.4 of EIAR **Chapter 16 Traffic and Transport**.

Overall, adverse effects on the receiving environment associated with the construction works on the main wind farm site and grid connection route options are considered to be short-term in duration and slight in significance following mitigation. Similarly, adverse effects on the receiving environment associated with the turbine delivery route options are considered to be temporary in duration and slight following mitigation.

3.11.3.2 Operational Phase

The permanent site entrance at the wind farm site will be maintained continually to ensure conditions at these entrances do not deteriorate. Hedgerow maintenance will be required to ensure visibility is maintained at the entrance. Effects on the receiving environment associated with the operational phase of the Project are considered to be neutral in terms of quality, long-term in duration and imperceptible in significance. For unforeseen or unplanned works such as emergency turbine repair works, it is considered that adverse effects on the receiving environment will be temporary in duration and not significant to slight following appropriate mitigation.

3.11.3.3 Decommissioning Phase

To be assessed at decommissioning phase in line with decommissioning plan.

3.12 Air Quality

This chapter of the EIAR was prepared by RSK. It details the findings of an assessment of the likely significant effects of the Project upon air quality and is presented as **Chapter 17**. The assessment methodology is presented within the chapter.

3.12.1 Baseline Environment

The principal air quality pollutants relevant to this assessment are considered to be nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). A desk-based study was undertaken using data obtained from the Environmental Protection Agency website. The Mallow, Co. Cork monitoring site (Station 82) is the nearest air quality monitoring station to the Project, which is located approximately 9km to the southeast. The next nearest one is Macroom, Co. Cork monitoring site (Station 67), which is approximately 35km to the southwest of the Project. Air quality data from Mallow, Co. Cork and Macroom, Co. Cork monitoring stations were used in the assessment, which saw no exceedances to the relevant air quality standards (AQS) in 2022. Background air quality concentrations at the wind farm site are anticipated to be below the relevant AQS.

3.12.2 Potential Effects of the Project

3.12.2.1 Construction Phase

The risk of dust impacts from construction activities (before mitigation) is identified as ranging between low and medium risk (equivalent to slight to moderate effect).

The predicted construction phase traffic generation does not exceed the Design Manual for Roads and Bridges (DMRB) screening criteria. The short-term increase in vehicle emissions during construction phase is considered to be not significant.

The operation of construction site equipment and machinery will result in emissions to atmosphere of exhaust gases, but with suitable controls and site management such emissions are considered short-term and not significant.

3.12.2.2 Operational Phase

The main potential air quality impact once the Project is complete and operational is likely to be emissions from road traffic associated with the Project. A qualitative screening level assessment against the DMRB screening criteria has been undertaken to assess the additional road traffic exhaust emissions during the operational phase. The increased road traffic emissions resulting from the Project on air quality during the operational phase is not significant.

Furthermore, considering the electricity to be generated by the wind farm, which is a clean, sustainable source of energy, the Project will help reduce the energy requirements from fossil fuels which emit harmful air emissions, such as carbon dioxide, nitrogen dioxide, sulphur dioxide and particulate matter. A major beneficial effect on national air quality is anticipated.

3.12.2.3 Decommissioning Phase

A qualitative assessment of decommissioning phase impacts has been undertaken. Based on the temporary nature of the decommissioning activities and low background pollutant concentrations in the vicinity of the wind farm site, it is considered unlikely that the effect of dust and particulate matter emissions and exhaust emissions from plants and vehicles during the decommissioning phase will result in a significant effect on local air quality.

3.12.3 Mitigation and Residual Effects (Post-Mitigation)

3.12.3.1 Construction Phase

Detailed dust mitigation measures are outlined in **Chapter 17**, which are incorporated into the CEMP for the site to ensure that the potential for adverse environmental effects on local receptors is minimised. With the implementation of the recommended mitigation measures, the effect of dust and particulate matter generated by construction phase activities is considered to be not significant.

3.12.3.2 Operational Phase

The Project is not anticipated to have a significant impact on local air quality. Therefore, no specific operational phase mitigation measures are required. The residual effects of the development on air quality whilst it is in operation are considered to be not significant. Furthermore, a moderate beneficial effect on national air quality is anticipated as the Project will help reduce the energy requirements from fossil fuels, which emit harmful air pollutants.

3.12.3.3 Decommissioning Phase

Any effects on air quality will be temporary during the decommissioning phase. Mitigation measures suggested for the construction phase are also relevant for the decommissioning phase to control potential fugitive emissions from the decommissioning works and exhaust emissions from plants and vehicles. With the implementation of the recommended mitigation measures, the residual effects are considered to be temporary and not significant.

3.13 Climate

The climate assessment for the Project was carried out by RSK. and is presented in **Chapter 18**. The assessment methodology is presented within the chapter.

3.13.1 Baseline Environment

Habitats onsite vary in their carbon storge and sequestration potential. Given the age of the improved grassland and arable land onsite, they are important carbon stores but are unlikely to be sequestering further carbon.

The scrub habitat and wet grassland are both important carbon stores. The hedgerows will be sequestering carbon to varying degrees, depending on their management intensity. Treelines will also sequester carbon, but the amount will vary depending on the age and species of the trees.

3.13.2 Potential Effects of the Project

3.13.2.1 Construction Phase

Average annual construction emissions across an anticipated 18-month construction period are estimated as 69,145 tCO_2e. This accounts for approximately 0.02% of Ireland's 2021-2025 carbon budget of 295 $MtCO_2e$. This would constitute as a minor, not significant, adverse effect.

3.13.2.2 Operational Phase

Excluding emissions associated with maintenance and monitoring of the Project, which is considered to be insignificant, the total greenhouse gas (GHG) emissions estimated to arise from the operation of the proposed scheme is $0tCO_2e$.

By displacing approximately 125,947MWhs per annum, equal to more than $47,495tCO_2e$ of fossil fuel-based electricity each year, the Project will contribute a major beneficial, significant effect.

3.13.2.3 Decommissioning Phase

The total GHG emissions estimated to arise from decommissioning is approximately $3,773tCO_2e$. This constitutes 5% of the overall lifecycle emissions of the Project, and constitute a negligible, not significant, adverse effect.

3.13.3 Mitigation and Residual Effects (Post-Mitigation)

3.13.3.1 Construction and Decommissioning Phase

As referenced above the potential effect on climate change and CO_2 emissions from the construction of the Project is deemed to be minor, not significant and adverse. Nevertheless, measures to mitigate the impacts of GHG emissions generated during the construction and decommissioning phase include the maximisation of reuse of materials onsite, maximisation of the recycled content of construction materials such as concrete and steel and also the use of local suppliers with a view to shorten project supply chains and environmental footprint. For this reason, there is likely to be a direct, long-term minor not significant adverse effect upon the global climate, following the implementation of mitigation measures, due to the emission of GHGs during the construction and decommissioning activities (with emissions remaining in the atmosphere for a long period of time (years, decades and beyond).

3.13.3.2 Operational Phase

The minor adverse effect during construction and decommissioning phases is likely to be largely outweighed by the direct, long-term (significant) beneficial effect of operation of the Project upon the global climate, such that the overall net effect of the Project, following the implementation of mitigation measures, is likely to be a significant beneficial effect. This is because the net GHG effects of the Project will be below zero and the Project will result in a reduction in atmospheric GHG concentration. This reduction will be brought about by the displacement of fossil fuel energy sources by the renewable electricity produced by the Project.

3.14 Interactions & Cumulative Effects

Chapter 19 summarises the potential for interactions between impacts on different environmental factors arising from the Project on the receiving environment as identified in the EIAR. It also includes a summary of the assessment of potential cumulative effects in combination with other projects that was carried out for each environmental factor in the respective chapters in Part II of this EIAR.

Chapter 6 to **Chapter 18** of this EIAR identify the likely significant environmental effects that may occur in terms of Population and Human Health, Biodiversity, Ornithology, Land, Soils and Geology, Hydrology and Hydrogeology, Material Assets, Shadow Flicker, Noise and Vibration, Landscape and Visual, Archaeology and Cultural Heritage, Traffic and Transportation, Air and Climate because of the Project as described in **Chapter 5** of the EIAR.

In addition, for any development with the potential for significant environmental effects there is also the potential for interaction between effects. The result of interactive effects may exacerbate the magnitude of the effects or improve them or have a neutral effect. A matrix is presented in **Chapter 19** to summarise potential interactions of effects between specific environmental aspects.

No significant adverse cumulative effects are predicted as a result of the Project and other existing and/or approved projects. A significant beneficial effect is anticipated as reliance on fossil fuel generated electricity will be reduced. The cumulative impact of the

Project is likely to be significantly beneficial in the long term when considered with other existing and/or approved renewable projects.

3.15 Summary of Mitigation & Next Steps

3.15.1 Mitigation Measures

Chapter 20 of the EIAR presents a summary of mitigation measures identified in each environmental factor assessment chapter. The mitigation measures are the environmental commitments for construction and implementation of the Project. The CEMP will be a live document that will take account of all the mitigation measures and any conditions of a planning consent if granted.

3.16 Next Steps

This EIAR and documentation associated with the planning application will be available for viewing on Cork County Council's website under the relevant planning reference number once assigned by the Planning Authority on lodgement of the planning application. The EIAR may be inspected free of charge and copies of same purchased by any member of the public at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority during normal opening hours at the following address:

Planning Department

Cork County Council

County Hall

Carrigrohane Road

Cork, T12 R2NC

The EIAR can also be accessed via the Department of Housing, Local Government and Heritage's EIA Portal, which will provide a link to the planning application on the Planning Authority's website. The EIA Portal can be accessed at https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1.

Information about the Project, including updates on the consenting process, will be provided at www.tullacondragreenenergy.ie.

Submissions and observations on the Project must be made to the Cork County Council Planning Authority in accordance with the procedures and timelines specified in the Planning and Development Regulations, 2000 (as amended).