Carnbuck Wind Farm

Environmental Statement

Volume 1 - Non-Technical Summary



power for good

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Preface

This document is Volume 1 of the Environmental Statement (ES) for Carnbuck Wind Farm. The ES comprises:

- Volume 1: Non-Technical Summary (NTS)
- Volume 2: Main Report
- Volume 3: Figures (Maps & Illustrations)
- Volume 4: Technical Appendices

The aim of the NTS is to summarise the content and main findings of the ES in a clear and concise manner to assist the public in understanding what the environmental effects of the Carnbuck Wind Farm are likely to be. The full ES provides a more detailed description of the Proposed Development and the findings of the Environmental Impact Assessment (EIA) process.

The ES has been prepared by RES in consultation with Department of Infrastructure (Planning), various consultees and in collaboration with the subject specialists outlined below.

Specialism	Author
Introduction & the Proposed Development Design Evolution & Alternatives Noise Traffic & Transport Shadow Flicker	RES
Planning Policy	Turley
Landscape & Visual	Shanti McAllister Landscape Planning & Design
Archaeology & Cultural Heritage	Headland Archaeology
Vegetation & Peatland	Blackstaff Ecology
Terrestrial Fauna	Blackstaff Ecology
Ornithology	David Steele
Fisheries & Aquatic Ecology	Paul Johnston Associates
Geology & Water Environment	McCloy Consulting
Peat Slide Risk & Peat Management Plan	Natural Power
Socioeconomics	Oxford Economics

Commenting on the ES

The full ES, together with supporting documents submitted as part of the planning application, (including the Design & Access Statement and Pre-Application Community Consultation Report) will be available for viewing during normal opening hours at the address below. Electronic copies (USB memory stick) will be available free of charge.

Loughgiel Community Association
Millennium Centre
38 Lough Road
Loughgiel
Ballymena
BT44 9JN
Tel: 028 276 41389

An electronic version of the ES, and documents supporting the planning application, will be available to download free of charge from http://www.carnbuck-windfarm.co.uk/

Paper Copies of the ES can be obtained at a cost of £80 from:

RES Ltd
Willowbank Business Park
Willowbank Road
Millbrook
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Electronic copies (USB memory stick) will also be available on request to the RES address above.

Introduction

This Non-Technical Summary (NTS) has been prepared in support of a planning application by RES Ltd for the proposed Carnbuck Wind Farm, hereinafter referred to as 'the Proposed Development', which is located in the townlands of Carnbuck, Magheraboy and Moneyneagh, near Corkey, Country Antrim. The site is adjacent to the existing Gruig Wind Farm.

A planning application has been submitted to Department of Infrastructure (Strategic Planning Directorate) in accordance with the Planning (Environmental Impact Assessment) Regulations, 2017. The regulations require an EIA to be carried out and the results of the EIA to be included in an Environmental Statement (ES) to accompany the planning application. The application follows a detailed assessment of the environmental and technical aspects of the site's suitability for development.

The Proposed Development comprises up to 12 three-bladed, horizontal axis wind turbines, each up 180 m maximum height above ground level; associated external electricity transformers; underground cabling; access tracks; turning heads; crane hardstandings; control building and substation compound, energy storage containers, off-site areas of widening to the public road and all ancillary works. The Proposed Development also comprises upgrades to the existing site entrance and access tracks of Gruig Wind Farm. During construction and commissioning there would be a number of temporary works including a construction compound with car parking; temporary parts of crane hardstandings and welfare facilities. The purpose of the Proposed Development is for the generation of electricity.

The location of the Proposed Development is shown on Figure 1: Site Location.

The Applicant

RES is the world's largest independent renewable energy company. At the forefront of the industry for 40 years, RES has delivered more than 22GW of renewable energy projects across the globe and supports an operational asset portfolio exceeding 7.5GW worldwide for a large client base. RES is active in 10 countries working across onshore and offshore wind, solar, energy storage and transmission and distribution.

RES has developed 22 onshore wind farms in Northern Ireland totalling 380 MW, which equates to nearly 20% of Northern Ireland's operational onshore wind capacity. RES currently operates 7 projects totalling 159 MW of wind capacity across Northern Ireland, has secured planning permission for a further 108 MW awaiting construction and has 81 MW in the planning system.

The Application Site

There are a number of key technical and environmental factors that influence the suitability of a site for a wind farm. The following are key attributes that contribute to a viable site, which the application site possesses:

- **Wind Speeds/Energy Yields**: Sufficiently high wind speeds to ensure energy production from the wind turbines that would yield an adequate return on investment;
- **Planning**: A site which complies with planning policy and in particular, avoids unacceptable effects on areas designated by statutory agencies; maintains appropriate distances from dwellings to avoid unduly impacting local amenity and; avoids impeding or interfering with major electromagnetic transmission and airport communication systems;
- **Area of Site**: A site must have sufficient area to accommodate the number of wind turbines required for economic viability;
- **Access**: Adequate vehicular access to a site using existing roads wherever possible to minimise the amount of civil works, particularly during the construction phase;
- **Local Terrain and Topography**: Terrain and topography affect wind flow across a site and need to be considered in relation to turbine performance, specification and life-span;
- **Ground Conditions**: A site must have suitable ground conditions for the construction of wind turbine foundations, erection of the machines and the provision of access tracks and cables.

The site is located in the townlands of Carnbuck, Magheraboy and Moneyneagh, east of Corkey village, County Antrim. A small portion of the site lies within the Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB), but the majority of the site lies beyond the AONB's western boundary. The site is located on the western-facing side of the Antrim Plateau between the higher ground formed by Slievenahanaghan to the north and Skerry Hill to the south. The site is positioned adjacent to the existing Gruig Wind Farm and in close proximity to the existing Corkey Wind Farm, where a re-powering development has recently been consented. The Aghanageeragh River flows through the Site towards the south west.

The site is currently used for rough grazing of sheep and cattle.

The Need for the Development

Climate Change

The Paris Agreement establishes a framework for global climate action including the mitigation of and adaption to climate change, support for developing nations and the transparent reporting and strengthening of climate goals. The European Union signed The United Kingdom of Great Britain and Northern Ireland up to the Agreement on 22 April 2016 and it came into force on the 18 December 2016.

COP26

The 26th UN Climate Change Conference of the Parties (COP26) took place in Glasgow on 21 October – 12 November 2021, attended by the countries that signed the United Nations Framework Convention on Climate Change. At COP 26, Nations adopted the Glasgow Climate Pact, aiming to turn the 2020s into a decade of climate action and support. Key outcomes included strengthened efforts to build resilience to climate change, to curb greenhouse gas emissions and to provide the required necessary finance. Nations reaffirmed their duty to fulfil the pledge of providing $100 billion annually to developing countries. They collectively agreed to reduce the gap between existing emission reduction plans and what is required to reduce emissions in order to limit the rise in the global average to 1.5 degrees. Nations were called upon to phase down unabated coal power and inefficient subsidies for fossil fuels.

As part of the package of decisions, nations also completed the Paris Agreement's rulebook relating to market mechanisms and non-market approaches and the transparent reporting of climate actions. This set of rules lays out how countries are held accountable for delivering on their climate action promises and self-set targets under their Nationally Determined Contributions (NDCs). At COP26, Nations reached new agreements for market mechanisms, essentially supporting the transfer of emission reductions between countries while also incentivising the private sector to invest in climate-friendly solutions.

Strategic Energy Review

The Strategic Energy Review was first published in 2007 to establish a core energy policy for all of Europe (Commission of the European Communities, 2007). An agenda was agreed in order to achieve the key energy objectives of:

- Sustainability;
- Competitiveness and security of supply;
- Reducing greenhouse gas emissions by 20%;
- Obtaining 20% of energy consumed from renewable energy sources; and
- Improving energy efficiency by 20%.

The Review was updated in 2008 (Commission of the European Communities, 2008), in order to propose an Energy Security and Solidarity Action Plan, which focused on

diversification of energy supply, energy efficiency and making the best of the European Union's indigenous energy resources.

Development of renewable energy reserves, including wind, solar, hydro, marine and biomass energy are seen as the main sources of indigenous energy.

The Energy Road Map 2050

The Road Map (Commission of the European Communities) sets out a long-term vision for renewable energy sources in the European Union and it forms an integral part of the Strategic European Energy Review. The Energy Roadmap 2050 sets out the transition and cost effective pathways for key economic sectors for achieving an 80-95% reduction in EU emissions by 2050. To achieve this goal, significant investment is needed in new low-carbon technologies and infrastructure, energy efficiency and renewable energy.

The 2050 target will not be shifted into national targets via EU legislation but allows more flexibility for Member Countries to meet their greenhouse gas emission reduction targets in the most cost effective method with regard to their own specific circumstances.

Security of Supply

A key policy driver for the development of renewable energy in Northern Ireland is the need to increase security of supply. There are potential adverse impacts on people and the economy in Northern Ireland through high volatile fuel costs, contributing to fuel poverty and high energy costs for businesses and industry. In addition, increasing focus on renewable energy can deliver environmental and climate change gains, reductions in carbon emissions, as well as investment and employment opportunities. With a lack of indigenous fossil fuels and no nuclear power stations, Northern Ireland is keen to develop the full range of its available renewable energy resources to optimise the contribution that renewables make to the overall energy mix.

Wind is a free and inexhaustible resource which has an important role to play as part of a balanced energy mix. Wind energy enables us to generate our own electricity without reliance on imports and is not subject to sudden price fluctuations or the uncertainty of global markets. New onshore wind is now the cheapest source of electricity generation bar none. This makes onshore wind developments not only beneficial for the environment but also for bill payers in Northern Ireland.

The Proposed Development will result in a reduction in greenhouse gas emissions from the electricity generating industry by harnessing wind as an alternative to the burning of fossil fuels, in line with the government's energy goals. It is also important to highlight that energy production is not static and additional renewable generation will be required to be connected to maintain the Northern Ireland targets and subsequently achieve and maintain the UK renewable targets.

Northern Ireland Energy Strategy

The Department for the Economy published the new Energy Strategy – The Path to Net Zero Energy - in December 2021. It outlines a roadmap to 2030 aiming to deliver a 56%

reduction in energy-related emissions, on the pathway to deliver the 2050 vision of net zero carbon and affordable energy. The Energy Strategy sets three main targets to drive these changes including delivering energy savings of 25% from buildings and industry by 2030; doubling the size of the low carbon and renewable energy economy to a turnover of more than £2bn by 2030; and meeting at least 70% of electricity consumption from a diverse mix of renewable sources by 2030. Such provisions would be in alignment with the Republic of Ireland's aim of 70% renewable electricity by 2030 as set out within the Region's Renewable Electricity Support Scheme (RESS). The Energy Strategy recognises that meeting this 70% target likely means doubling renewable energy capacity in order to meet new demands from heating our homes and powering our vehicles. A more ambitious target under the Climate Change (No.2) Bill of 80% renewable energy by 2030 and achieving carbon net zero by 2050 was passed in the Northern Ireland Assembly in March 2022.

In addition, other relevant frameworks and reference points apply, including the Climate Change Act 2008, under which the UK committed itself to reducing greenhouse gas emissions by at least 80% of 1990 levels by 2050. Included in this target is the reduction of emissions from the devolved administrations, including Northern Ireland.

Description of the Development

Planning permission is being sought for the Proposed Development comprising the following:

- Up to 12 three-bladed horizontal axis wind turbines of up to 180 m tip-height
- Associated external electricity transformers
- Upgrades to an existing site entrance
- New access tracks and upgrades to existing tracks at Gruig Wind Farm
- Turning heads
- Control buildings and substation compound
- Battery energy storage containers and associated infrastructure
- Off-site areas of widening to the public road and all ancillary works
- Turbine foundations
- Hardstanding areas at each turbine location for use by cranes erecting and maintaining the turbines
- Electricity transformers
- Approximately 7.4 km of new access track and 2.6 km of upgraded, existing access track
- On-site electrical, control and communications network of underground (buried) cables
- Temporary construction compound
- Permanent and temporary drainage works
- Associated ancillary works

The wind farm layout is shown in **Figure 2: Infrastructure Layout**.

Land take

The turbines need to be spaced a suitable distance apart (taking into account the prevailing wind direction), so as not to interfere aerodynamically with one another. However the actual land developed is limited to the substation, wind turbine towers, transformers, crane hardstandings, battery energy storage hardstanding and the access tracks. The actual land developed totals 7.36 hectares of permanent hardstanding and 0.76 hectares of temporary hardstanding used during construction and reinstated following construction. This permanent hardstanding accounts for approximately 6.24% of the total area within the Planning Application Boundary.

Micrositing

Prior to construction the locations of the proposed wind turbines would be subject to micrositing, which allows for a small degree of flexibility in the exact locations of turbines and routes of tracks and associated infrastructure (50 m deviation in plan from the indicative design). Any repositioning would not encroach into environmentally constrained

areas. Therefore, 50 m flexibility in turbine positioning would help mitigate any potential environmental effects: e.g. avoidance of unfavourable ground conditions or archaeological features not apparent from current records. The micrositing allowance has been taken into account in the EIA and is shown on **Figure 2: Infrastructure Layout**.

Wind Turbines

The wind turbine industry is evolving at a remarkable rate. Designs continue to improve technically and economically. The most suitable turbine model for a particular location can change with time and therefore a final choice of machine for the Proposed Development has not yet been made. The most suitable machine will be selected before construction, with a maximum tip height of 180 m.

Exact tower and blade dimensions vary marginally between manufacturers. Exact megawatt capacities also vary between manufacturers. For economic assessment purposes, a suitable candidate turbine currently available in the market place of 4.2 MW (with an overall tip height of 180 m) has been assumed.

Each turbine would have a transformer and switchgear. Depending on the turbine supplier, the transformer and switchgear may be located inside or outside each turbine.

The wind turbines would be erected on steel re-enforced concrete foundations. During the erection of the turbines, crane hardstanding areas would be required at each turbine base consisting of both permanent and temporary elements. After construction is complete, the temporary crane pad areas will be reinstated.

Site Tracks

The site entrance for the Proposed Development is the existing site entrance for Gruig Wind Farm, which is located on the Altnahinch Road.

Approximately 7.4 km of new access tracks and 2.6 km of upgrades to existing access tracks are proposed to access the various turbine locations.

The on-site access track layout has been designed to minimise environmental disturbance by maximising the use of the existing site entrance and existing site track at the operational Gruig Wind Farm; avoiding sensitive habitats where possible; and keeping the length of track commensurate with the minimum required for operational safety. The track route also takes cognisance of the various identified environmental constraints.

13 watercourse crossings will be required as part of the track layout. These crossings would be designed to ensure that fish movements are not restricted (where applicable) in addition to ensuring the crossing size is adequate for potential flood flows.

Electrical Connection, Control Building & Substation

Assuming the use of the currently available models, each wind turbine would generate electricity at low voltage and would have an ancillary transformer located either within or

outside the base of the tower to step up the voltage to the required on-site distribution voltage. Each turbine would be connected to any adjacent turbines by underground cables.

The wind farm substation is proposed to be located on the central part of the site as shown in **Figure 2: Infrastructure Layout**. All power and control cabling on the wind farm will be buried underground in trenches located, where possible, along the route of site access tracks.

The wind farm control building will be designed and constructed to the standard required by NIE for the accommodation of NIE substation equipment and wind farm equipment. Where possible, local building materials and finishes will be used to ensure that the appearance is in keeping with other buildings in the area.

Battery Energy Storage

Energy Storage is a means of storing electrical energy just like a rechargeable battery, mobile phone or electric car. These are means by which power can be stored and released. The application is of course of a larger scale but the basic principle is the same.

Energy provision in Northern Ireland is undergoing a transition from one designed primarily around a number of large thermal power stations such as Kilroot, Ballylumford and Coolkeeragh to one which now includes a number of renewable generators such as wind farms. Renewable generation is now supplying over 40% of the total annual electrical requirement in Northern Ireland. With the Minister of the Economy announcing in 2021 that the Renewable Energy target for Northern Ireland will be 70% by 2030, increasing to 80% by 2030 if the Climate Bill amendment receives royal assent, this transition will be even more important.

There are, however, technical constraints on the transmission network which are limiting the amount of renewable energy which can be delivered from these renewable generators to the main demand centres in the east of the province.

Energy Storage is an innovative solution, which is being deployed across the world, to facilitate the shift from traditional thermal generation to low/zero carbon generation. The energy storage containers will help match generation produced from intermittent renewable generation with the peaks and troughs in electricity demand.

The Battery Energy Storage (BESS) will comprise 22 permanent containers housing energy storage devices, associated inverters and ancillary equipment. Permanent fencing will enclose the containers. The BESS will be positioned adjacent to the control building and substation compound on hardstanding used originally for the temporary construction compound.

Construction Management

An Outline Construction Environmental Management Plan (OCEMP) is included within the Environmental Statement and a final CEMP will be prepared and agreed with the relevant statutory consultees prior to construction commencing. This will describe the detailed methods of construction and working practices, work to reinstate the site following completion of construction activities and methods to reinstate the site post operation. The CEMP will:

- Provide a mechanism for ensuring that measures to prevent, reduce and where possible offset potentially adverse environmental impacts identified in the ES are implemented;
- Ensure that good construction practices are adopted and maintained throughout the construction of the Proposed Development;
- Provide a framework for mitigating unexpected impacts during construction;
- Provide a mechanism for ensuring compliance with environmental legislation and statutory consents;
- Provide a framework against which to monitor and audit environmental performance.

The runoff drainage system will be designed to mimic natural conditions to mitigate against increased flashiness in water courses and reduced groundwater recharge. The SuDS will protect the status of water courses and ground waters.

Construction will be carried out according to Department of Agriculture, Environment & Rural Affairs (DAERA) and Construction Industry Research and Information Association (CIRIA) guidance for site works. Pollution control measures during the construction phase will be included in the Construction & Decommissioning Method Statement (CDMS), which will be agreed with the Planning Authority before starting construction work on site.

It is anticipated that the construction would take approximately 18 months. Construction work will take place between the hours of 0700-1900 Monday to Friday and 0700 – 1300 on Saturdays. Outside these hours, work at the site shall be limited to turbine erection, testing/commissioning works and emergency works. Deliveries may occur outside these times to minimise disruption to local residents.

A programme of reinstatement would be implemented upon completion of construction. This would relate to the construction compound, temporary areas of the crane hardstandings, cable trenches and track shoulders where appropriate. There remains a potential to use cranes during the operational phase of the Proposed Development, therefore the main crane hardstanding will remain uncovered.

Operation

The expected operational life of the wind farm is 35 years from the date of commissioning.

Each turbine at the Proposed Development would be fitted with an automatic system designed to supervise and control a number of parameters to ensure proper performance (e.g. start-up, shut-down, rotor direction, blade angles etc.) and to monitor condition (e.g. generator temperature). The control system would automatically shut the turbine down should the need arise. Sometimes the turbines would re-start automatically (if the shut-down had been for high winds, or if the grid voltage had fluctuated out of range), but other shut-downs (e.g. generator over temperature) would require investigation and manual restart.

The Proposed Development itself would have a sophisticated overall Supervisory Control and Data Acquisition system (SCADA) that would continually interrogate each of the turbines and the high voltage (HV) connection. If a fault were to develop which required an operator to intervene then the SCADA system would make contact with duty staff via a mobile messaging system. The supervisory control system can be interrogated remotely. The SCADA system would have a feature to allow a remote operator to shut down one or all of the wind turbines. This is monitored 24 hours a day, 7 days a week.

An operator would be employed to operate and maintain the turbines, largely through remote routine interrogation of the SCADA system. The operator would also look after the day-to-day logistical supervision of the Development and would be on-site intermittently.

Routine maintenance of the turbines would be undertaken approximately twice yearly to ensure the turbines are maintained to Industry Standard. This would not involve any large vehicles or machinery.

Habitat Management

A Habitat Management Plan will be implemented during the construction and operational phases of the Proposed Development, working with the site landowners, which will provide for the restoration and enhancement of blanket bog and heathland habitats on site.

Decommissioning

One of the main advantages of wind power generation over other forms of energy production is the ease of decommissioning and the simple removal of components from the site. The residual impact on the site is limited to the continued presence of the foundations and access tracks. All above ground structures can be removed from the site.

If the Proposed Development obtains planning approval it is expected that a planning condition would be set to provide for the decommissioning and restoration of the site in accordance with a scheme agreed in writing with Department for Infrastructure (DfI), which would consider the long term restoration of the site at the end of the lifetime of the Proposed Development.

The Proposed Development will be decommissioned in accordance with best practice at that time and/or in compliance with any planning conditions. Current best practice includes the removal of all above ground structures (e.g. turbines, substation etc); the removal of certain underground structures where required (e.g. cables); and

reinstatement of disturbed areas all of which will be subject to any necessary consents. Consideration will be given to the retention of wind farm access tracks if they utilise pre-existing farm infrastructure or are not located on sensitive habitats if such continued use could lead to the long term degradation of these habitats.

The EIA Process

The purpose of EIA is to provide adequate environmental information to enable stakeholders to understand the potential environmental effects of a project. The EIA identifies and assesses the potential environmental effects associated with the construction, operational and decommissioning of the Development. The assessment and potential effects are recorded in the ES.

Consultation

Public Consultation

RES is committed to finding effective and appropriate ways of consulting with all its stakeholders, including local residents and community organisations, and believes that the views of local people are an integral part of the development process. RES began the engagement process with the local community in February 2022 to facilitate a constructive consultation process which helped RES to understand and address any concerns as the project developed.

An online public exhibition was held in March 2022 which included detailed maps and information about the proposals, including: a map of the proposed layout; photomontages representing how the proposed layout would appear from a range of viewpoints, and; Zone of Theoretical Visibility (ZTV) drawings. (A ZTV is a map-based diagram of where and how many wind turbines, or wind farms, would theoretically be visible from all parts of a given area.) RES staff were available for telephone/video conference meetings to answer questions and feedback was encouraged.

A second public exhibition was held on Thursday 26th January 2023 from 4pm-8pm in The Millennium Centre, Loughgiel, BT44 9JN. The venue had been previously identified through background research and it was selected for its proximity to the Proposed Development and its accessibility for local people. RES staff members were present during the public event to discuss the proposals with attendees, covering a range of specialisms, including technical, construction, environmental, development and community relations.

A Pre-Application Community Consultation (PACC) Report has been produced and is available for viewing at the locations listed in the Preface.

EIA Consultation

RES and the various chapter authors have undertaken pre-application consultation with relevant consultees, which has informed the EIA process and is detailed in each of the technical chapters within the Volume 2 (Main Report) of the ES.

Wind Farm Design Evolution & Alternatives

In accordance with EIA process and best practice the project team employed an iterative approach to the design of the Proposed Development. The design evolved throughout the EIA process as different constraints and adverse/ beneficial effects were identified and evaluated. This approach allowed mitigation measures to be integrated into the design in order to alleviate or remove significant effects of the Proposed Development. It also allowed measures to enhance beneficial effects of the Proposed Development to be incorporated into the design.

Following consultation and baseline characterisation of the Site, the following key topics were identified:

- Landscape and visual;
- Archaeology and cultural heritage;
- Vegetation and Peatland;
- Terrestrial Fauna;
- Ornithology;
- Fisheries;
- Geology and water environment;
- Noise;
- Traffic and Transport;
- Shadow flicker; and
- Socioeconomics.

The topics listed above were considered through the design with the aim of designing out significant effects. Where it was not possible to mitigate by design, the issues were considered further as part of the EIA.

A key tool in this process was the combined constraints drawing, which identifies constraints to development and sensitive features on the site. This drawing was iteratively updated as new information from surveys, site visits and consultation was received.

Initial Turbine Layout (Feasibility Stage)

At the beginning of the development process an initial layout was produced to show the maximum potential extent of the development within the space available and in accordance with the design principles and preliminary environmental information, prior to baseline surveys being completed. The layouts were informed by the following constraints:

- Preliminary ecological constraints;
- Preliminary watercourse buffers;
- Slope;

- 1000m separation from housing; and
- Tip height + 10% to public roads, in accordance with the Best Practice Guidance to PPS 18[2].

This identified that the Site could potentially accommodate 12 turbines, to be further refined throughout the EIA process.

Primary Turbine Layout (EIA Baseline Stage)

Combined Constraints

Detailed environmental and technical surveys were completed to characterise the baseline environmental conditions on the Site and associated study areas, as described in more detail in Chapters 4 to 13 of this ES. Any constraints to development, or avoidance areas, resulting from the baseline surveys were used to build up the combined constraints drawing.

Water Environment and Fisheries

Following the baseline survey the hydrology consultant recommended watercourse buffers of 50 m and 10 m depending on the sensitivity of the watercourse, which were agreed as appropriate by the fisheries consultant. Potential private water supplies in the area were also identified and buffer of 250 m applied.

Terrestrial Fauna

A 25 m buffer was applied to a badger setts identified through the baseline surveys.

Bat buffers of 57 m were added to major watercourses, as advised by the ecological consultant. The 57 m distance is in plan, and achieves a 50 m buffer between the blade tip and the watercourse feature, in line with Bat Conservation Trust guidance. This is based on an assumed blade length of 69 m, hub height of 111 m and maximum feature height of 5 m.

Locations of devils bit scabious, food plant of the marsh fritillary butterfly, were mapped and avoided.

Vegetation and Peat Stability Assessments

Areas of potentially active peat and species rich grassland were mapped as initial avoidance areas, as recommended by the vegetation and peatland consultant.

Following baseline peat probing and peat slide risk assessment, areas of deeper peat were avoided to limit excavation and spoil generation. Areas identified as medium and high peat instability were identified and avoided. One turbine (T11 on Layout 1) was moved from its location to avoid an area of peat instability.

Public Roads and Overhead Electricity Lines

Buffers were applied to nearby public roads in line with the Best Practice Guidance to PPS18 which recommends a setback distance of at least tip height plus 10% between turbines and roads.

In keeping with the Energy Networks Association (ENA) L44 Issue 1 dated 2012 "Separation of Wind Turbines- Principles of Good Practice" a buffer of tip height plus 10% was applied to a 33kV overhead line crossing the Site.

Landscape & Visual

Zone of Theoretical Visibility (ZTV) visualisations were prepared in order to indicate where all, or part of, the Proposed Development is likely to be visible from. The ZTV is first used to assist the identification of areas with theoretical visibility and the location of viewpoints as part of the baseline landscape and visual assessment. It is then used to aid the assessment of visual effects because the turbines would be the most visible element of the Proposed Wind Farm Development, particularly during the operational period. As described in earlier sections they are also useful in considering alternative turbine heights and geometries.

At an early stage of the EIA process a provisional list of viewpoints was created, from which provisional wirelines were generated, which were used to identify any potential landscape and visual issues with the turbine layout, as well as from the effects of the wind farm as a whole.

The presence of outlying turbines was addressed in the iterative design process and efforts were made to minimise instances where turbines were located at some distance or at noticeably different heights from the main grouping of turbines in order to create a compact layout that minimised the geographical extent and variable height within the Proposed Development whilst also maintaining an evenly spaced layout where turbine heights instances of stacking where also minimised. This process resulted in the refinement of turbine positions, most notably a turbine in an elevated position on top of Skerry Hill was moved from its location to reduce landscape and visual effects, in additional to peat stability concerns at this location.

Collaborative Site Walkover

A multidisciplinary site walk-over was arranged by RES, involving engineering, ecology, peatland, geology and water environment specialists to collaboratively review the layout in response to the combined constraints, discuss interrelationships and mitigation, resolve potential conflicts and agree actions for further assessment.

Final Turbine Layout

The final turbine layout is shown in **Figure 2** and consists of 12 turbines of 180m tip height. The final layout, including turbines and infrastructure along with the combined constraints is shown in **Figure 3**.

A 50 m micrositing radius was applied to each of the turbines. The extent of this micrositing area was then reduced such that the micrositing avoids any of the combined constraints. The final micrositing areas are included in **Figure 2: Infrastructure Layout.**

Using design principles agreed with environmental, engineering and technical disciplines, the infrastructure layout was developed and used to undertake baseline assessments.

Key adjustments in response to constraints made through the design evolution are summarised in the following sections.

Infrastructure Design Evolution

The infrastructure design has evolved through the EIA process. The following general principles were taken into consideration when designing the supporting infrastructure:

- Maximise use of existing infrastructure to reduce land take;
- Avoidance of environmental and technical constraints (as shown in Figure 3);
- Design of the track layout to follow natural contours as far as possible, in order to avoid unnecessary amounts of excavation and reduce adverse hydrological impacts;
- Minimisation of the overall length of access track;
- Minimisation of the number of watercourse crossings, as far as possible;
- Avoidance of steep slope areas to minimise earthworks; and
- Incorporation of measures to improve the visual appearance of the scheme, including reinstatement of some elements of temporary infrastructure following the construction period, reinstatement of road widening areas, and consultation with the landscape consultant on the position of the control room and substation building and energy storage area.

Key adjustments in response to constraints made through the design evolution are summarised in the following sections.

Vegetation and Peatland

Following the advice of the vegetation and peatland specialist a number of refinements were made to the track layout in order to minimise impacts to blanket bog habitats, including the following:

- Re-alignment of track to T2 to avoid peat habitat; and
- Realignment of crane pad at T7 to avoid peat habitat.

Water Environment

The location and nature of watercourse crossings were reviewed with the hydrology and fisheries consultants. Following the mitigation detailed in **Chapter 9: Fisheries and Chapter 10: Geology & Water Environment**, a number of refinements were made to avoid and reduce potential effects as far as possible, including the following:

- Location of watercourse crossing west of T7 moved downstream to occupy a flatter area of ground to reduce flood risk;
- A bottomless culvert will be installed at the watercourse crossing west of T7 to reduce fisheries impacts; and
- Crane pads at T4, T5, T6, T8 and T12 adjusted to avoid a watercourse buffers.

Site Entrance Location and existing Gruig Wind Farm tracks

In order to minimise impacts existing infrastructure from Gruig Wind Farm was used where possible. The existing site entrance for Gruig Wind Farm will be utilised by Carnbuck. Visibility splays of 160 m are already in place in both directions for vehicles exiting the site. Approximately 2.6 km of the existing Gruig Wind Farm access tracks will be used to access Carnbuck turbines T1, T2, T3 and T7. No widening works are envisaged on this existing track but the track will be upgraded/maintained as required throughout construction.

Control Building, Substation and Energy Storage

The control building, substation and energy storage compounds have been located in a part of the site that is not clearly visible from most parts of the Study Area, outwith of any identified constraints or buffers. The buildings will be designed in a manner that is sensitive to the immediate landscape character with regards to location, scale, colour, and choice of materials.

Temporary Construction Compound / Battery Energy Storage

The temporary construction was initially located close to the site entrance for logistical reasons. However through the course of the design evolution the location of the temporary construction compound was moved out of the AONB to a flatter area of ground in order to reduce excavation and spoil generation, whilst remaining outside environmental constraints.

Environmental Effects

The following sections summarise the technical chapters of the ES.

Planning Policy

This Planning Policy section demonstrates how energy and planning policy considerations have been addressed in the development proposal. It describes the high level policy context within which the project has been conceived and falls to be determined. It then assesses the project's compliance with operational planning policy on a policy by policy basis. There is a raft of policy and guidance that informs the consideration of wind farm proposals such as this which together form a complex matrix of considerations.

In part due to the recognition that the 40% target set in the existing Strategic Energy Target has been met, the Department for the Economy published a new Energy Strategy 'The Path to Net Zero' in December 2021 which aims to deliver a 56% reduction in energy-related emissions on the pathway to deliver the 2050 vision of net zero carbon and affordable energy.

As part of this target the Energy Strategy sets the targets of doubling the size of the low carbon and renewable energy economy to a turnover of more than £2bn by 2030 and meeting at least 70% of electricity consumption from a diverse mix of renewable sources by 2030.

The rationale for the project is clear. Making an energy infrastructure contribution of the scale proposed (indicatively 50.4 MW) will assist in the achievement of NI strategic energy targets and objectives, consistent with a wide range of International, European, UK and Regional level priorities.

There is a strategic qualified national presumption in favour of developing renewable energy projects of this type.

The established approach to decision making advocated in planning policy is to balance the wider environmental, economic and social benefits of the project against the environmental impacts, attaching significant weight to the former.

The SPPS changes this approach insofar as the PPS18 direction to attach significant weight to the benefits is replaced by a discretion for the decision maker to determine the appropriate weight to be attached to the benefits. This must mean that the large scale social, environmental and economic benefits associated with this project are attached significant weight. In weighing the acceptance of the proposals the following must be considered:

- The proposal will offer job creation and economic activity to the regional economy providing catalytic benefits to investment within Northern Ireland.
- Given the 35 year lifetime of the development it is expected that direct operational impacts equate to 35 job years, £1.27 million direct wages and £9.37 million of direct Gross Value Added over the operational phase.

- Both the construction and operational phases will generate increased tax and business rates revenue and the proposal is estimated to involve a capital spend of approximately £64.9 million.
- Based on rateable values of £7,100 per MW— it is calculated that the Proposed Development will increase rateable value by £0.4 million each year, or by £12.52 million over the project life.
- The amount of electricity that could be produced by the Proposed Development is estimated at 206.4gWh per year[1] which is equivalent to the electricity needs of 54,800 homes each year, or almost 85 percent of the current housing stock in Causeway Coast & Glens Borough Council area.
- The Proposed Development is also estimated to reduce CO_2 emissions by 90,800 tonnes each year, when compared against equivalent generation from non-renewable sources.

The landscape and visual impact of the wind farm is not unacceptably adverse for the purposes of the SPPS and PPS18 Policy RE1 because the inherent characteristics of the landscape provide the capacity to absorb it. The effects – relative to the qualities that underpin the designation – would not undermine the overall AONB or compromise wider landscape and visual amenity to an unacceptable degree.

With the discretion to attach significant weight to the wider environmental, economic and social benefits arising from the proposal, and having regard to how the project demonstrates that it will have limited adverse impacts, the project is considered to meet the requirements of planning policy because there are no unacceptable adverse effects which are not outweighed by the local and wider environmental, economic and social benefits of the Proposed Development.

Landscape and Visual

An LVIA is a formal part of the EIA process and the methodology used to prepare the LVIA is defined by the requirements of the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (hereinafter referred to as the 'EIA Regulations') and best practice guidance publications relating both to the LVIA process in general and in specific relation to wind farm developments (refer to ES Volume 4 Technical Appendix 4.1 for further details).

[1] This figure has been calculated by multiplying the Proposed Development's indicative capacity (50.4MW) by the number of hours in a year and a load factor. This load factor accounts for wake and electrical losses using typical wind speeds/directions etc., and so provides a realistic prediction of electricity output (rather than using a theoretical maximum level whereby it is assumed that wind blows for 24 hours a day 365 days a year on every wind farm site). For the Proposed Development, RES has provided Oxford Economics with a load factor of 0.47. RES calculates the site-specific load factor considering all known information on wind resource, topography (including terrain and forestry), choice of turbine, and losses expected for the Proposed Development. The number of homes is calculated by dividing the estimated amount of electricity produced by the Proposed Development, by the UK average domestic household electricity consumption (temperature adjusted). The latter is taken from figures published by the Department of Business, Energy and Industrial Strategy (BEIS).

The Proposed Development comprises 12 three-bladed turbines each with overall heights to blade tip of 180 m. It would be located in the townlands of Carnbuck, Magheraboy and Moneyneagh, approximately 1.8 km to the east of Corkey village, County Antrim. The majority of the site is located beyond the western boundary of the Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB) although a very short section of track on the north eastern site boundary would be located within the AONB. The Proposed Development would be located on upland grazing land between the existing Gruig wind farm and Skerry Hill and is also in close proximity a number of other existing and consented wind farms which are, for ease of reference, referred to throughout this LVIA as the 'Gruig cluster'. The Study Area for this LVIA covers an area that extends to a 30 km radius from the Proposed Development. The relationship between the Proposed Development, the AONB and other wind farms in the 'Gruig cluster' are key issues that are considered throughout the LVIA. Ancillary works associated with the turbines are also considered briefly in the LVIA. A detailed description of these elements is contained in section 2 of the NTS.

The Purpose of the LVIA

The aims of an LVIA are to:

- Present an objective analysis of the landscape and visual character of a defined area (i.e. the baseline conditions within the Study Area) in so far as they relate to the Proposed Development;
- Identify the potential effects of the Proposed Development on these baseline conditions including direct, indirect, permanent, temporary and cumulative effects;
- Clearly distinguish between landscape effects and visual effects which although closely related are also distinct from each other. The former relates to the effects on the physical landscape as a resource in its own right. The latter relates to the effects on specific views and general visual amenity as experienced by people (hereinafter referred to as visual receptors);
- Propose appropriate mitigation measures to address likely significant effects, where possible, and to assess any residual effects that would remain following the implementation of these measures;
- Present all information clearly and objectively with a well-reasoned methodology that is in accordance with best practice guidance and in a manner that will inform the decision-making process.

All information presented in the LVIA has been prepared in accordance with a methodology that is derived from a suite of best practice guidance (see ES Volume 4, Technical Appendix 4.1). A summary of the LVIA process and the key elements of this methodology are described in full detail in Technical Appendix 4.2. The identification and objective analysis of the landscape and visual effects of the Proposed Development is made using professional expertise and impartial judgement. The conclusions of the LVIA are based on whether or not the Proposed Development is likely to result in significant effects on the landscape and visual elements of the Study Area. The appropriate weight to be attached to these effects,

when weighed against the other effects analysed in the ES, is the responsibility of the relevant planning authority, which in this case is the Strategic Planning Division (SPD) of the Department for Infrastructure (DFI).

Feasibility Appraisal and Design Iterations

The nature of the Proposed Development has evolved through an iterative design process that has been informed by a careful analysis of the constraints and opportunities presented by the site location and the characteristics of the Proposed Development itself. This process is further detailed in section 3 of the NTS, describing the design evolution process. The final choice of turbine model for the Proposed Development will be selected before construction, with a maximum tip height of 180 m. In this LVIA assessment turbine hub heights of 111 m and rotor diameters of 138 m have been assumed for the purpose of preparing visualisations but the application as a whole relates to the overall height above ground level only (180 m).

Establishing Baseline Conditions and Analysing Effects

The Baseline Assessment considers statutory landscape designations covering the Study Area which are contained within current planning policy. The primary policy guidance on the assessment of landscape and visual effects of wind farm development is the Strategic Planning Policy Statement for Northern Ireland (SPPS) which should be read in conjunction with Planning Policy Statement 18: Renewable Energy (PPS 18) and its accompanying Best Practice and Supplementary Planning Guidance (BPG and SPG). In addition there are a number of guidance documents and extant Development Plans, which contain some relevant statutory planning designations. These are analysed in the Baseline Assessment where applicable.

It is noted that changes in planning policy and updates to Development Plans are expected to take place over the coming months and years as Planning Policy Statements, supplementary guidance and existing Development Plans become superseded by emerging Local Development Plans. These must be primarily informed by the SPPS. The site falls partly within Causeway Coast and Glens Council area (CCG) and partly within Mid and East Antrim Council area (MEA) and neither Council currently have adopted Local Development Plans in place. The SPPS is clear that a transition period will operate until the adoption of a Plan Strategy and, until the adoption of such, the planning authority (in this case DfI) will apply existing regional policies and those contained in the SPPS.

The Baseline Assessment also considers non-statutory landscape classifications and the information gleaned through driving and walking surveys of the Study Area to amplify and enhance the understanding of its landscape and visual character.

Twenty-six viewpoints have been shortlisted for detailed analysis in the LVIA as a result of the viewpoint selection process which identifies parts of the Study Area and key groups of visual receptors that may be potentially affected by the Proposed Development. A detailed description of this selection process and a full list of Provisional Viewpoint Locations (PVPs) are provided in ES Volume 4 Technical Appendix 4.4. Detailed

descriptions of the final Viewpoints are an integral part of the Visual Impact Assessment section of this LVIA. Viewpoint locations are indicated on all map-based Figures (Volume 3 Figures 4.1 – 4.9). Visualisations to accompany the detailed written analysis of these Viewpoints are provided in Volume 3 Figures 4.10 – 4.31.

Overall Significance of Landscape and Visual Effects

In terms of both landscape and visual effects the Proposed Development conforms to the general principles laid out in the policy and best practice guidance which are broadly promotive of renewable energy developments as a means of mitigating against the effects of climate change. It also conforms to the majority of the landscape and visual character issues that are the relevant policy guidance documents require consideration of. The Proposed Development is not located within a designated landscape and would have very limited visibility from either of the two AONBs which are located within the Study Area. Furthermore, its visibility from key parts of the Study Area such as the coast and within glens, and also from locations beyond approximately 5 km is particularly limited.

In relation to landscape character the Proposed Development is located in conformance with planning policy guidance for the Landscape Character Area (LCA) within which it is located. The proposed site location is within part of the LCA which is noted as being of least sensitivity due to the convex nature of the topography, the current land uses, the limited extent of visibility and physical influence on the AONB, elevated upland areas and coastline and also its capacity to utilise the existing infrastructure of the adjacent Gruig wind farm. Therefore, whilst the Proposed Development would have a direct physical effect on the part of the LCA within which it is located, it would be well located and its overall effect on landscape character would not be significant. Furthermore, the Proposed Development may have indirect effects on the landscape character of some other parts of the Study Area amounting to small areas of seven other LCAs which are in proximity to it, or which contain viewpoints used in this LVIA. However, with the exception of the LCAs which form the central pastoral lowlands directly to the south and west of the Proposed Development, the majority of these LCAs are located beyond 10 – 15 km away and are unlikely to experience any discernible effects on their physical landscape character resulting from the Proposed Development. In no instances are the physical effects on landscape character deemed to be significant.

The Proposed Development is located on the western-facing side of the Antrim Plateau between the higher ground formed by Slievenahanaghan and Skerry Hill directly to the north and south. These topographical features would effectively prevent views of the turbines from the majority of the AONB. The higher ground of Long Mountain Ridge on the western side of the Study Area has a similar effect by preventing visibility further to the west. Areas of clear visibility are typically located in the central part of the Study Area on upland areas adjacent to the Proposed Development and in the pastoral lowlands between the two upland areas to the east and west.

Of the 26 Viewpoints which have been selected to represent typical views of the Proposed Development within the Study Area only four would experience significant visual effects

resulting from the Proposed Development. All of these are located within approximately 5 km and from where the Proposed Development would be both prominent and visible in its entirety or near-entirety from rural roads and areas of settlement. These viewpoints are also all located to the west of the Proposed Development in the uplands adjacent to the site of the Proposed Development. There are no significant effects from close range Viewpoints located to the south or east of the Proposed Development, although this includes locations within and adjacent to the Antrim Coast and Glens AONB. From the majority of the Study Area and the majority of the AONB the Proposed Development would either have no visibility or no significant visual effects.

In relation to cumulative effects the overall magnitude of cumulative effects on landscape character is deemed to be of low magnitude and not significant and this is due to the existing character of the site and immediate surroundings which are already largely characterised by a number of man-made influences. The Proposed Development would have a significant cumulative visual effect on three Viewpoints arising from its relationship with other wind farms in the Gruig cluster. These viewpoints are located within approximately 5 km of the Proposed Development where it, and other wind farms in this cluster, would be clearly visible and prominent. The Proposed Development would have no significant cumulative visual effect on the remaining 23 representative viewpoints in this LVIA. This includes several other viewpoints within 5 km of the Proposed Development and all four representative viewpoints within the Antrim Coast and Glens AONB. Across the majority of the Study Area and from the majority of representative viewpoints the Proposed Development's location as an integral part of an established cluster of wind farms means that its effects on the wider Study Area and in conjunction with other wind farms would not be significant. It is also noted that wind farms are not an uncommon feature in approaches to the AONB and there is already a repeating pattern of wind farms and single turbines across other parts of the Study Area and around the edges of other AONBs.

The Proposed Development would have no significant effects on landscape character and limited visibility across the wider Study Area as a whole. This is expressed by only four of the 26 representative viewpoints experiencing significant visual effects, and only three experiencing significant cumulative visual effects. Therefore, the LVIA concludes that the Proposed Development is acceptable in landscape and visual terms.

Archaeology and Cultural Heritage

The Cultural Heritage and Archaeology assessment considers the likely significant effects on the historic environment (Archaeology and Cultural Heritage) associated with the construction, operation and decommissioning of the proposed Carnbuck Wind Farm (the Proposed Development).

There are 11 known heritage assets within the development boundary (referred to in the chapter as the Inner Study Area (ISA). These include assets of possible Medieval or post-medieval date including four possible shieling huts (HA2, HA3, HA4 and HA4) and a possible livestock pen (HA5). Post-medieval assets within the ISA comprise a sheepfold (HA1), an

enclosure bank (HA7), two areas of ridge and furrow (HA8 and HA12), an enclosure (HA13), and a structure (HA14).

A total of 13 heritage assets within the Outer Study Area have been retained for detailed setting assessment. These include:

- ANT023:009 Gruig, standing stone;
- ANT023:010 Scotchomerbane, standing stone;
- ANT018:085 Corkey North, standing stone;
- ANT018:088 Ballyveely Upper, standing stone;
- ANT018:015 Corkey North, standing stone;
- ANT018:095 Corkey North, standing stone;
- AN-049 Lissanoure;
- HB04/07/010 Lissanoure Castle;
- ANT027:010 Dundermot, motte (and site of bailey);
- ANT027:036 Dungall, motte;
- ANT022:012 Ballymacaldrack, 'Dooey's Cairn', court tomb;
- ANT018:019 Knockaholet, motte and bailey; and
- ANT027:022 Doonbought, fortification.

Potential effects of the Proposed Development upon cultural heritage assets resulting from its construction, operation including cumulative effects, and decommissioning have been considered.

Direct effects of negligible significance are predicted upon two heritage assets within the ISA: HA8 and HA12 and a direct effect of minor significance is predicted on HA13. It is recommended that all heritage assets within the ISA are fenced off with a suitable buffer throughout construction to prevent accidental damage.

Any direct effect upon archaeological remains discovered during the construction phase is unlikely to be of greater than minor significance. Construction phase setting effects would be temporary and are not considered to be significant in EIA due to their very short duration.

A residual effect of minor significance, which is not significant in EIA terms, is predicted on ANT 022:012 Ballymacaldrack, 'Dooey's Cairn', court tomb throughout the operation of the Proposed Development. Dooey's Cairn', is a single ended court tomb with a deep U-shaped forecourt, which leads to a stone chamber beyond a long stone lined 'cremation passage' with three circular pits, one at either end and one in the middle. The nearest turbine in the Proposed Development, Turbine 2, is located 9.06 km to the east-north-east (ENE). The Proposed Development would introduce visual change to ENE views from this area, but it would not fundamentally change how 'Dooey's Cairn' is understood, appreciated and experienced. It is considered the Proposed Development would not

adversely affect the integrity of this heritage asset's setting resulting in a significance of effect of minor adverse effect which is not significant in EIA terms.

Cumulative impact assessment, considering all other operational, consented and submitted applications for wind farms in the vicinity has identified no significant effects in EIA terms as a result of the Proposed Development.

No direct residual decommissioning effects have been identified. On decommissioning the operational effects of minor significance on ANT 022:012 Ballymacaldrack, 'Dooey's Cairn', court tomb would be reversed.

No significant effects arising from the Proposed Development are predicted.

Vegetation and Peatland

This chapter assesses the potential effects of the Proposed Development on vegetation and peatland.

The following specialist surveys were undertaken:

- JNCC Phase 1 Habitat Survey; and,
- NVC Phase 2 Habitat survey.

The Proposed Development will result in permanent and temporary habitat loss of 6.13 ha of heath and blanket bog habitats. This loss is a permanent and direct effect of medium to high magnitude on receptors of high value and sensitivity.

The proposed Habitat Management Plan will ensure compensation for areas of NI Priority Habitat lost under the footprint of the Proposed Development and should also result in enhancement of the local site ecology.

The proposed habitat management prescriptions will be implemented on an area of land almost 13-times greater than the 6.13 ha of combined priority habitat loss for the entire Proposed Development.

Therefore, the potential effects of the Proposed Development on ecological receptors have been assessed and it is concluded that with the implementation of appropriate mitigation measures the effects would be reduced to a neutral or beneficial effect that would not adversely affect the ecological integrity of the site and the wider area.

An assessment of cumulative impacts on the habitats was also undertaken, and it was concluded that there is no significant impact.

Terrestrial Fauna

The study methodology included consultation, desktop and field survey methods in order to assess the potential impact on the local ecological and nature conservation interest.

The purpose of an ecological survey is to identify 'valued ecological receptors', those species and habitats that are especially valued in some way for their ecological function,

their contribution to biodiversity or are protected by specific legislation. The following specialist surveys were undertaken:

- Bat (*Chiroptera spp*) survey
- Otter (*Lutra lutra*) survey
- Badger (*Meles meles*) survey
- Common Lizard (*Zootoca vivipara*) survey
- Marsh Fritillary (*Euphydryas aurinia*) habitat survey

Features of conservation interest and importance were recorded and their locations are one of the key criteria that affect the wind farm layout. The location of the wind farm infrastructure avoids species of conservation interest where possible, and where this is not possible, mitigation and/or enhancement measures have been incorporated into the design to balance any detrimental impact.

Ecological constraints determined from extensive site surveys have been used to evolve the layout and design of the Proposed Development. The impact assessment is therefore based on a wind farm design that already includes a number of important mitigation measures.

Bats

Construction

Construction activities have the potential to remove foraging habitat or reduce its value, and to disrupt flight-lines. Low numbers of bats were recorded foraging over the site, while the main bat foraging and commuting routes have all been avoided during the emplacement of infrastructure. A few watercourse crossings will be required during construction, and therefore this may cause some limited disruption to foraging areas. However, most bat activity will likely continue as the main areas of better foraging along the wooded escarpment edges will remain untouched during construction activities and key commuting routes will therefore be unaffected.

The other main potential impact on bat populations that may arise due to construction is the loss of roost sites. However, no roosts were identified on the site during survey, and the nearest potential roosting location is 450 m away from the nearest turbine. Therefore, this impact will not arise at the Proposed Development. The magnitude of construction activities on bats is likely to be neutral, and the significance of the impacts will be neutral.

Operation

Overall, the site is identified as being of Low-risk due to the presence of largely low-quality foraging habitat (and limited opportunity for roosting) for bats; with even the areas normally described as moderate quality foraging habitat (i.e., rivers and streams) located in a fairly isolated upland context with no trees (or sheltered areas) and limited invertebrate prey. The turbines have been located away from the habitat features that many species of bat use as flightlines or as a focus for foraging.

Static monitoring for bats was carried out across the three seasons (spring, summer and autumn during 2019) for 30 nights at (or in the vicinity of) each of the proposed turbines on the site (estimated total hours = 3360 hours (based on an average of eight hours recording per night (although night length varies across the survey season)). Overall, there were 360-nights with either negligible or low levels of bat activity. On two nights, moderate levels of bat activity were experienced. Therefore, a Bat Monitoring and Mitigation Plan (BMMP) was recommended as a precautionary measure. In conclusion, and based on current knowledge, this should ensure that the Proposed Development will not have a significant impact on the local bat population.

Otter

Disturbance of otters is possible during the construction phase, but the shy species is likely to avoid areas of intense human activity, particularly when this involves significant noise. The likely sporadic nature of any use by otters of the site, indicates that there is highly unlikely to be any significant impact on the species as a result of construction activities. Magnitude of impacts is likely to be negligible to neutral and of neutral significance.

The level of potential disturbance to otters is less during wind farm operation as compared with the construction phase, as the site reverts to minimal human presence. There is likely to be neutral impact on magnitude and significance during the operational phase on otter.

Badger

There are numerous of badger setts located within the site and thus there is the potential for disturbance to occur during the construction phase. There is also the potential risk of displacement of sensitive animals unaccustomed to high levels of anthropogenic activities. However, the location of known badger setts has been identified and taken into consideration during the design of site infrastructure such that there are no sett entrances within 25m of any infrastructure. In addition, the majority of setts near to areas of infrastructure are close to existing tracks and any disturbance impact is likely to be ameliorated by this fact. A pre-construction badger survey will be completed to ensure any new setts are identified and buffered before works commence. As a result of these mitigation measures, the magnitude of impact during construction is of neutral significance.

The level of potential disturbance to badger is less during wind farm operation as compared with the construction phase, as the site reverts to minimal human presence. There is likely to be neutral impact on magnitude and significance during the operational phase on badger.

Common Lizard

The surveys revealed that parts of the site had a good population, however, given the location of the records, it is also likely that much of the site is sub-optimal habitat for this species. This is likely a consequence of over-grazing. Construction of infrastructure will remove habitat for this species and cause disturbance leading to displacement of animals over a limited area of the site. It also has the potential to impact the habitat

feature/requirements that lizards need within suitable habitat. Therefore implementation of species-specific mitigation to off-set potential significant effects will be performed, including phased mowing of the vegetation within the construction corridor. With this mitigation the impact significance is reduced to negligible to neutral.

The additional likely impacts on this species as a result of the operation of the Proposed Development will include species specific habitat management and enhancement measures contained in the Habitat Management Plan. Overall, the successful implementation of these measures during the operational lifetime of the wind farm is likely to be of minor positive magnitude and of beneficial significance.

Summary

There is no regular usage of the area by smooth newt or marsh fritillary butterfly, therefore no impacts to these species are likely.

A series of generic and specific mitigation measures including a Bat Monitoring Mitigation Plan (BMMP), Habitat Management Plan and mitigation for common lizard have been proposed to mitigate effects on NI Priority Habitats and Species. All badger setts have been buffered by the required 25 m from any infrastructure.

The proposed outline Habitat Management Plan will ensure compensation for areas of NI Priority Habitat lost under the footprint of the Proposed Development and should also result in enhancement of the local site ecology.

The mitigation measures will be adhered to, ensuring that any potential impacts to bats will be negligible. In conclusion and based on current knowledge this would appear to be a site posing little risk to bats or bat populations, however a BMMP has been recommended as a precaution.

Therefore, the potential effects of the Proposed Development on ecological receptors have been assessed and it is concluded that with the implementation of appropriate mitigation measures the effects would be reduced to a negligible-neutral adverse, neutral or beneficial effect that would not adversely affect the ecological integrity of the site and the wider area.

An assessment of cumulative impacts on the habitats and fauna of the area was also undertaken, and it was concluded that this is not significant impact.

Ornithology

This chapter assesses the potential effects of the Proposed Development on bird populations and has been informed by a programme of baseline ornithology surveys commissioned by the Applicant and completed during a three year period from April 2018 to March 2022. The surveys have included breeding bird surveys, winter surveys, vantage point surveys, winter roost surveys and wider area surveys. All surveys have been completed in line with the relevant current guidance for bird surveys at onshore wind farms.

Red Grouse

The baseline surveys have indicated three red grouse territories (or pairs) within the study area (within a 500 m extent) with one additional territory located in the wider surrounding area (within a 1 km extent). The observations also indicate some overlap of the territory boundaries. The assessment of effects indicates there are unlikely to be significant adverse effects on the local red grouse population.

Curlew

During the baseline surveys there was one observation of a curlew within the study area. The observation was within a minimum distance of 1.1 km from the Proposed Development (turbine locations) and was of a single bird flying and calling before settling on the ground. There were no subsequent observations and the presence of a territory was not confirmed. The assessment of effects indicates there are unlikely to be significant adverse effects on the local curlew population

Snipe

The baseline surveys indicated three snipe territories (or pairs) within the study area with one additional territory located in the wider surrounding area (within a 1 km extent). The assessment of effects indicates the potential displacement of up to two pairs of snipe due to disturbance by the construction works and this is likely to be significant for the local snipe population.

The provision of long term habitat management via the Habitat Management Plan to compensate for this potential displacement is proposed. In addition, there is to be an Ornithology Mitigation Strategy (OMS) to protect breeding birds during the construction phase and an Ornithology Management and Monitoring Plan (OMMP) to ensure implementation of the long term habitat management and to monitor the effects of the Proposed Development on local bird communities. Assuming implementation of the proposed mitigation measures as described then there are no remaining residual effects and no likely cumulative effects have been identified.

Moorland Passerines

The baseline surveys found 20 passerine species breeding within the survey area and an additional ten transient species. All the passerine species were also found in the wider surrounding area and are also widely distributed locally and at a regional level and the assessment of effects indicates there are unlikely to be significant adverse effect on the local populations of breeding moorland passerines.

Winter Birds

The baseline surveys found a total of 30 bird species during the winter and migration surveys however most of these species are very widespread in distribution locally and regionally and were recorded within the survey area in relatively small numbers. Some larger flocks of birds (e.g. flocks of starlings and fieldfares) were occasionally observed however these were not typical of the average numbers present and are not exceptional

within the wider local or regional context. The assessment of effects indicates there are unlikely to be significant adverse effects on the local populations of wintering birds.

Hen harrier

The baseline surveys indicated a low level of hen harrier activity within the study area including during the breeding period. A total of 18 hen harriers were observed. The desk study indicated former hen harrier nests at two historical locations within the study area. These were last occupied in 2007 and 2010. The assessment of effects indicates there are unlikely to be significant adverse effects on the local hen harrier population or on the regional conservation status of the species.

Merlin

During the baseline period there were seven merlin observations within the study area however it is recognised that activity by this species (due to its behaviour and small size) is likely to be underestimated by vantage point surveys. Merlins were confirmed breeding at two locations within the study area during the baseline period. The assessment of effects indicates there are unlikely to be significant adverse effects on the local merlin population or on the regional conservation status of the species.

Peregrine

During the baseline surveys there were 12 observations of peregrines within the study area. No peregrine breeding activity was observed within the study area however the desk study has indicated breeding by peregrines at a working quarry located c. 2.2 km from the Proposed Development (so just outside the study area). The assessment of effects indicates there are unlikely to be significant adverse effects on the local peregrine population or on the regional conservation status of the species.

Kestrel

Observations indicated the presence of two pairs of kestrels within the study area however breeding was not confirmed and may not have taken place within the study area (within a 2 km extent). The estimated collision risk for kestrel is equivalent to one bird every six years and the assessment of effects indicates there are unlikely to be significant adverse effects on the local kestrel population or on the regional conservation status of the species.

Buzzard

Observations indicated the presence of four pairs of buzzards within the study area and breeding was confirmed at two locations. The estimated collision risk for buzzard is equivalent to one bird every eight years. This needs to be assessed in the context of breeding productivity and also the favourable conservation status and very widespread distribution of this species and the assessment of effects indicates there are unlikely to be significant adverse effects on the local buzzard population and highly unlikely to be significant adverse effects on the regional conservation status of the species.

Sparrowhawk

During the baseline period there were six sparrowhawk observations within the study area however (as with merlins) it is noted that activity by this species is likely to be underestimated by vantage point surveys. Observations indicated one pair of sparrowhawks within the study area and breeding was confirmed. Considering the likely low survey efficiency for this species then the observations indicate that sparrowhawks are likely to occur within the study area throughout the year

Antrim Hills SPA

The assessment of effects indicates there are unlikely to be significant adverse effects on the hen harrier or merlin population within the local part of the SPA and by extension on the SPA population as a whole.

Summary

With the exception of the potential displacement of up to two pairs of breeding snipe there are no likely significant effects on bird communities. Assuming implementation of the proposed mitigation measures as described then there are no remaining residual effects and no likely cumulative effects have been identified.

Mitigation is to include a programme of long term habitat management over an extensive area (in total 80.25 ha, of which 28.11 ha is beyond 400 m from turbines) to compensate for the potential displacement of up to two pairs of snipe – full details of these measures are provided in ES Volume 4 Appendix 6.2: OHMP. In addition, there is to be an Ornithology Mitigation Strategy (OMS) to protect breeding birds during the construction phase and an Ornithology Management and Monitoring Plan (OMMP) to ensure implementation of the long term habitat management measures and to monitor the effects of the Proposed Development on local bird communities.

Fisheries

This chapter outlines the potential effects of the Proposed Development on the fish stocks and fish habitats of the receiving watercourses in the sub-catchments of the Killagan, Cloghmills and Clogh rivers within the River Main catchment, and the Flisk Burn within the Upper River Bush catchment. It provides relevant baseline information on fisheries and aquatic ecological status enabling the potential effects to be identified and evaluated.

It has been determined that potential impacts are primarily related to sediment run-off and the release of other pollutants to the receiving watercourses with related effects on fish stocks and the wider stream ecosystem. Additionally, where the site access tracks cross the Flisk and eastern Killagan tributaries, the installation of culverts will cause the loss of a small area of habitat but the lack of fish means that the impact will be of negligible magnitude. Without mitigation it is considered that the impacts of sediment run-off and the release of other pollutants have the potential to be of Moderate Magnitude

and of Large/ Very Large Significance depending on the sensitivity of individual watercourses.

A series of specific mitigation measures have been designed to avoid adverse effects on fisheries with regard to both construction and operational phases of the project.

Hydrology and site drainage issues have been considered in detail in Chapter 10, which outlines a surface water management system and drainage (SuDS) designed to control drainage and silt management on the Site.

It is concluded that, provided the mitigation measures are implemented as specified, construction and operation of the Proposed Development will have a neutral impact on the fish stocks and aquatic ecology of Site drainage streams and the main downstream receiving watercourses.

Geology and Water Environment

An assessment of the likely effects of the Proposed Development on geology and the water environment has been undertaken. The impact assessment involved a combination of desk study, site visits and consultation with various stakeholders including; Department of Agriculture, Environment & Rural Affairs; Causeway Coast & Glens Borough Council, Mid and East Antrim Borough Council, Northern Ireland Water; Department for Infrastructure, and Department for Economy.

The assessment identifies the potential impacts on geology, hydrology and hydrogeology, including surface water, groundwater, abstractions, the potential for pollution of watercourses and flooding. It summarises the relevant legislation and guidance and provides appropriate baseline information enabling potential effects to be identified.

The assessment determined that the site is located on 'moderate quality agricultural land' and 'poor quality agricultural land', and the loss (or partial loss), of agricultural function is not significant and does not constrain the Proposed Development. The underlying geology is predominantly a mixture of clay, sand, gravel, and boulders varying widely in size and shape, with extensive peat cover over much of the site. Bedrock underlying the site is composed of basalt. Groundwater flow within the bedrock is expected to be fractured with occasional localised conduit flow, discharging mainly to the local surface water network.

The current hydrology of the site consists of a number of natural source watercourses and streams and artificially modified drainage ditches and peat drains. The majority of on-site surface water features drain in a westerly direction to the Cloghmills Water catchment (via Aghanageeragh River which is the largest watercourse in the site) and Killagan Water catchment. Both catchments discharge to the River Maine and ultimately to Lough Neagh c. 42 km downstream (south-west) of the Site. The eastern section of the site drains to the River Bush catchment, ultimately discharging to the North Channel at Bushfoot Strand, Portballintrae c. 42 km downstream (north-west) of the Site.

Aspects of the design, construction, operation, and decommissioning of the Proposed Development that may impact on the receiving geological and water environment have been identified and the pathways of potential effects assessed. It has been determined that without mitigation, the Proposed Development would likely cause adverse effects on the water environment due to its hydrological link to watercourses with significant fisheries interests within and downstream of the Site. Mitigation measures integrated as part of outline design, and others to be implemented throughout the lifetime of the Proposed Development to minimise potential adverse effects include:

- Design of site elements to minimise impact on the geological and water environment (e.g., careful consideration of the positioning of wind turbines, foundations, and areas of hard standing);
- Avoidance of significant water features based on baseline constraints mapping (i.e., establishing zones around watercourses where construction works are to be avoided);
- Careful management of water features where they come into contact with new infrastructure or upgraded access tracks, and ensuring that the watercourses bed is unaffected by any culvert where a track crossing is required where there is fishery habitat, by using a bridge rather than culvert structure.
- Implementation of a comprehensive surface water management plan comprising the use of SuDS (drainage) and silt management to prevent pathways for pollution reaching the wider environment as well as reducing any increased risk of flash flooding downstream; and
- Establishing pollution prevention procedures in accordance with NIEA requirements and guidance to minimise the risk to the wider environment posed by construction, operation and decommissioning-phase activities (e.g., spillage of oils or chemicals).

Implementation of the mitigation proposed would result in no significant residual effects to the receiving geology and water environment as a result of the Proposed Development. Monitoring the effect of the Proposed Development on the water environment and fisheries habitat will be provided through water quality monitoring.

An assessment of cumulative impacts was also undertaken, and it was concluded that there are no predicted significant water environment or geological effects arising from the Proposed Development in conjunction with any other pre-existing or consented development.

Peat

A Peat Slide Risk Assessment was undertaken and concluded that there is predominantly shallow peat at the Proposed Development. The peat depths across the site are in the majority <1m. The peat slide risk assessment cites key control measures which are required to ensure the risk of peat slide remains at residual (low) levels.

Noise

An assessment of the acoustic impact from both the construction and operation of the proposed Carnbuck Wind Farm was undertaken taking into account the identified nearest residential properties.

The operational noise impact was assessed according to the guidance described in the 'The Assessment and Rating of Noise from Wind Farms', referred to as 'ETSU-R-97', as recommended for use in relevant planning policy. The methodology described in this document was developed by a working group comprised of a cross section of interested persons including environmental health officers, wind farm operators and independent acoustic experts. It provides a robust basis for assessing the noise impact of a wind farm and has been applied at the vast majority of wind farms currently operating in the UK.

ETSU-R-97 makes clear that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that would arise through the development of renewable energy sources. The assessment also adopts the latest recommendations of the Institute of Acoustics 'Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'.

Representative baseline conditions (the "background noise level") at nearby residential properties were established by undertaking noise surveys. These measured levels were then used to infer the background noise levels at other nearby residential properties as the ETSU-R-97 document recommends. As background noise levels depend upon wind speed, as indeed do wind turbine noise emissions, the measurement of background noise levels at the survey locations were made concurrent with measurements of the wind speed and wind direction. These wind measurements are made at the wind turbine site rather than at the survey locations, since it is this wind speed that would subsequently govern the wind farm's noise generation.

A sound propagation model was used to predict the noise levels due to the proposed wind farm at nearby residential properties over a range of wind speeds, taking into account the position of the proposed wind turbines, the nearest residential properties, and the candidate wind turbine type. The model employed (which considered downwind conditions at all times) took account of attenuation due to geometric spreading, atmospheric absorption, ground effects and barriers. It has been shown by measurement-based verification studies that this model tends to slightly overestimate noise levels at nearby residential properties.

The relevant noise limits were then determined through analysis of baseline conditions and the criteria specified by the ETSU-R-97 guidelines. The general principle regarding the setting of noise criteria is that limits should be based relative to existing background noise levels, except for very low background noise levels, in which case a fixed limit may be applied. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest residential properties and the impact that the wind farm may have on this environment. Different limits are applicable depending upon the time of

day. The daytime limits are intended to preserve outdoor amenity, whilst the night-time limits are intended to prevent sleep disturbance.

The predicted operational noise levels are within noise limits at nearby residential properties at all considered wind speeds with the adoption of a noise management strategy. The Proposed Development therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby properties would be regarded as acceptable.

A construction noise assessment, incorporating the impact due to increased traffic noise, indicates that predicted noise levels likely to be experienced at the nearest residential properties are below relevant construction noise criteria at all residential properties.

An acoustic assessment of the proposed energy storage facility in accordance with BS 4142: 2014 shows that the impact would be low and the levels insignificant in comparison to the wind farm noise levels.

Traffic & Transport

An assessment of the potential impact of the Proposed Development on traffic and transport was undertaken, involving consultation with Department of Infrastructure (DfI) Roads.

The proposed access route for abnormal indivisible loads (AILs) from Belfast Port has been used previously for the construction of various wind farms and is shown on **Figure 5: Turbine Delivery Route**. From Belfast the route will travel north on the M2, onto the A26 at Dunsilly Roundabout, continuing for c. 34 km. The route exits onto the A44 Drones Road continuing north for c.49.9 km, turning south onto Hillside Road, following onto Lagge Road becoming Coolkeeran Road, and Glenbush/ Altnahinch Road continuing to the site entrance.

The proposed return route for the delivery vehicles is similar to the proposed delivery route noted above. Once the turbine components have been delivered, the vehicles will be shortened so they are no longer than a typical articulated HGV.

Widening works, either temporary road widening or vegetation removal, to facilitate oversail of the components will be required at three locations along the AIL delivery route. The widening works, where required, will include the installation of hardstand areas and vegetation trimming to facilitate the passage of AILs, which then will be reinstated once turbine delivery has been undertaken. If road widenings require the removal of boundary features such as fences, trees or hedgerows, these will be reinstated at suitable locations. Reinstatement will also be applied to any street furniture which may be removed on a temporary basis. In the unlikely event that a replacement blade is required during the operational phase of the wind farm, the widenings will need to be reopened temporarily, after which they will be reinstated. Any works will be undertaken following consultation with DfI Roads.

Normal HGV deliveries of concrete and stone respectively will also utilise the A44 but could do so from either direction dependant on the source of material and subject to confirmation with DfI Roads. Proposed HGV delivery routes are shown on **Figure 4: HGV Routes**. No passing bays will be required as the roads are two-way with adequate passing provided.

Where agreed by Dfl Roads, circular HGV haul routes may be implemented for the construction phase of the project.

The main traffic impacts are associated with the increase in HGV vehicle movements along the A44 and surrounding tertiary road network during the construction stage of the project. These roads have low levels of existing traffic and a small number of receptors will be affected. At worst, the frequency of vehicle movements is expected to be one vehicle every five minutes during the six days when the construction of each wind turbine foundation would occur.

Consideration has been given to the effect of increased HGV traffic flow on Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation, Accidents and Safety and Cumulative Impacts. Furthermore, consideration has been given to the environmental effects of any road improvement/widening works.

A Traffic Management Plan (TMP) will be developed and agreed with the local community and other relevant stakeholders, pre-construction, in order to control and mitigate impacts associated with increased vehicles movements.

Taking into account the existing vehicle movements on the affected roads, and the proposed type and frequency of vehicle numbers, it is considered that with the appropriate mitigation measures as set out above, there will be no significant impacts.

Shadow Flicker

A shadow flicker analysis of the Proposed Development was performed. Under certain combinations of geographical position, time of day, time of year and meteorological conditions, the sun may pass behind the turbine rotor and cast a shadow over neighbouring buildings' openings (i.e. windows and doors) where the contrast between light and shade is most noticeable. To a person within that room the shadow, depending on its intensity, may appear to flick on and off, giving rise to an effect referred to as shadow flicker.

The Best Practice Guidance to Planning Policy Statement 18 (PPS18) states that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

An analysis of shadow flicker throughout the year from Carnbuck Wind Farm was carried out, taking into account the behaviour of the sun, the local topography and the turbine layout and dimensions. The analysis was performed using a turbine layout consisting of 12 turbines, each with maximum tip heights of 180 m and maximum rotor diameter of 138 m.

The Best Practice Guidance to PPS18 recommends that, "shadow flicker at neighbouring offices and residential properties within 500 m should not exceed 30 hours per year or 30

minutes per day". There are no offices or residential properties within 500 m of the Proposed Development turbines, so the Proposed Development is in compliance with this recommendation.

The results shows that there are three properties where the total predicted hours exceed 30 per year. However, at over 1000 m from the nearest turbine all the properties are located far beyond the 500 m distance referenced in the guidance, so the effects are likely to be reduced. This is because at distance, when all other conditions allow, the wind turbine blades do not cover the sun but only partly mask it, substantially weakening any potential shadow.

It should be emphasised that the analysis provide an extremely conservative estimate of the extent that houses will be affected by shadow flicker, because:

- The analysis assumes that there is always sufficient lack of cloud cover, for there to be sufficient sunlight for shadows to be cast by the turbine;
- The analysis assumes that there is always enough wind for the turbine blades to be turning;
- The analysis assumes that the wind is always coming from the right direction for the turbine rotor to be facing towards the house, to thus cast a shadow;
- The analysis assumes that the property has windows and/or glazed doors facing towards the turbine;
- The analysis assumes there is no shielding, e.g. in the form of trees or outbuildings, between the turbine and the property.

Therefore, the actual amount of shadow flicker seen in these areas is likely to be much less.

In the event of shadow flicker causing a nuisance a range of mitigation measures can be incorporated into the operation of the wind farm to reduce the instance of shadow flicker. Mitigation measures include planting tree belts between the affected dwelling and the responsible turbine(s) or installing blinds at the effected property. In the unlikely event that there is extreme nuisance mitigation could include shutting down individual turbines during periods when shadow flicker could theoretically occur.

Mitigation has not been accounted for within the predictions presented in this chapter and, if required, should further significantly reduce the impact of potential shadow flicker predicted. Taking all this into account the effects of shadow flicker are not considered to be significant.

There are no houses in the shadow flicker study area for Carnbuck that also fall within the 10 rotor diameter distance of Gruig Wind Farm and/or Corkey Repower. As such the operational Gruig turbines and consented Corkey Repower turbines will not contribute to a cumulative shadow flicker impact at any of the residential properties considered within this assessment.

Socioeconomics

This chapter presents estimates relating to the direct, indirect and induced benefits that could be generated by the construction and operation of the Proposed Development. It also provides a brief discussion on the unquantifiable benefits associated with a development of this type and scale, and the current macroeconomic and socioeconomic environments.

The chapter concludes that the Proposed Development will provide a much-needed boost of activity to both Causeway Coast and Glens and Mid and East Antrim Borough Council areas, and the regional economy. Job creation and economic activity will result throughout its construction, with a strong likelihood of local labour involvement. Both the construction and operational phase will generate increased tax and business rates revenue payable to central, regional and local Government.

Indeed, the Borough Council areas of Causeway Coast & Glens and Mid & East Antrim have both faced a challenging backdrop in recent years; with muted or declining employment opportunities between 2010 and 2019. Labour market conditions, therefore, have not been ideal in the lead up to the coronavirus pandemic. The implementation of subsequent restrictions and lockdowns to slow the spread of the virus, has had a significant impact on local businesses for at least the short term; and has placed upward pressure on local unemployment. As such, investment of this type and scale can provide positive (direct, indirect and induced) benefits across Northern Ireland; helping to provide and support economywide employment opportunities that would not otherwise have existed. It can also bring about catalytic benefits which can in turn attract further investment into Northern Ireland. For example, the knowledge, expertise and skills accumulated can act as a contributing factor to future investments in the area. Other local areas within Northern Ireland may also benefit as a result, helping to reduce the inequality across the region. Funding for such developments is usually project specific and involve a considerable amount of sunk cost. Therefore, if the Proposed Development does not take place the benefits, including the catalytic impact, are unlikely to be realised elsewhere in the Northern Ireland economy.

The Proposed Development is estimated to involve a capital spend of £64.9 million. Of this total, £29.8 million (nominal prices) will be realised within the Northern Ireland economy. The projected 18-month construction phase is estimated to create or sustain 175-284 total (direct, indirect and induced) job years of employment, £4.54-£7.40 million (2019 prices) of wages and £9.63-£15.43 million (2019 prices) of gross value added (GVA[2]) to the Northern Ireland economy.

The estimated total (direct, indirect and induced) benefits realised in Northern Ireland by the operational phase of the Proposed Development includes wages of £3.2 million (2019 prices) and £13.8 million (2019 prices) in GVA over the 35-year operating period.

[2] Gross Value Added (GVA) measures the value of goods and services produced in an area, industry or sector of an economy and is equal to output minus intermediate consumption.

We also expect a fiscal injection from the Proposed Development. During the construction, the UK Exchequer is estimated to benefit from increased tax revenue of £1.63-£2.66 million. Over the 35-year operational phase, an estimated £1.15 million revenue will be generated and a further £0.54-£1.11 million in benefit savings during the construction phase.

Based on rateable values of £7,100 per MW per year, we calculate that the Proposed Development will increase rateable value by £0.4 million each year, or by £12.52 million over the project horizon. From these values business rates are calculated and collected for local Councils and the Northern Ireland Assembly. By applying Causeway Coast & Glens and Mid & East Antrim non-domestic poundage rates, we estimate additional business rates of £0.18 and £0.02 million each year, respectively. Combining both Borough Council areas, we estimate business rates of £6.86 million over the 35-year lifetime of the Proposed Development.

The amount of electricity that could be produced by the Proposed Development is estimated at 206.4 GWh per year[3], which is enough electricity to meet the needs of 54,800 homes each year[4].

The Proposed Development is also estimated to reduce CO_2 emissions by 90,800 tonnes each year, compared against the equivalent generation from non-renewable sources. This equivalent to 57,200 newly registered cars.

[3] This figure has been calculated by multiplying the Proposed Development's indicative capacity (50.4MW) by the number of hours in a year and a load factor. This load factor accounts for wake and electrical losses using typical wind speeds/directions etc., and so provides a realistic prediction of electricity output (rather than using a theoretical maximum level whereby it is assumed that wind blows for 24 hours a day 365 days a year on every wind farm site). For the Proposed Development, RES has provided Oxford Economics with a load factor of 0.47. RES calculates the site-specific load factor considering all known information on wind resource, topography (including terrain and forestry), choice of turbine, and losses expected for the Proposed Development.

[4] The number of homes is calculated by dividing the estimated amount of electricity produced by the Proposed Development, by the UK average domestic household electricity consumption (temperature adjusted). The latter is taken from figures published by the Department of Business, Energy and Industrial Strategy (BEIS).

Conclusion

The potential effects of the Proposed Development have been assessed in accordance with regulatory requirements and good practice. The ES incorporates technical assessments of the Proposed Development based on the requisite legislation and the relevant planning policy framework. The ES has demonstrated that significant environmental effects associated with the construction, operation and decommissioning of the Proposed Development have been avoided or minimised through the use of the iterative design process and with the application of mitigation measures.

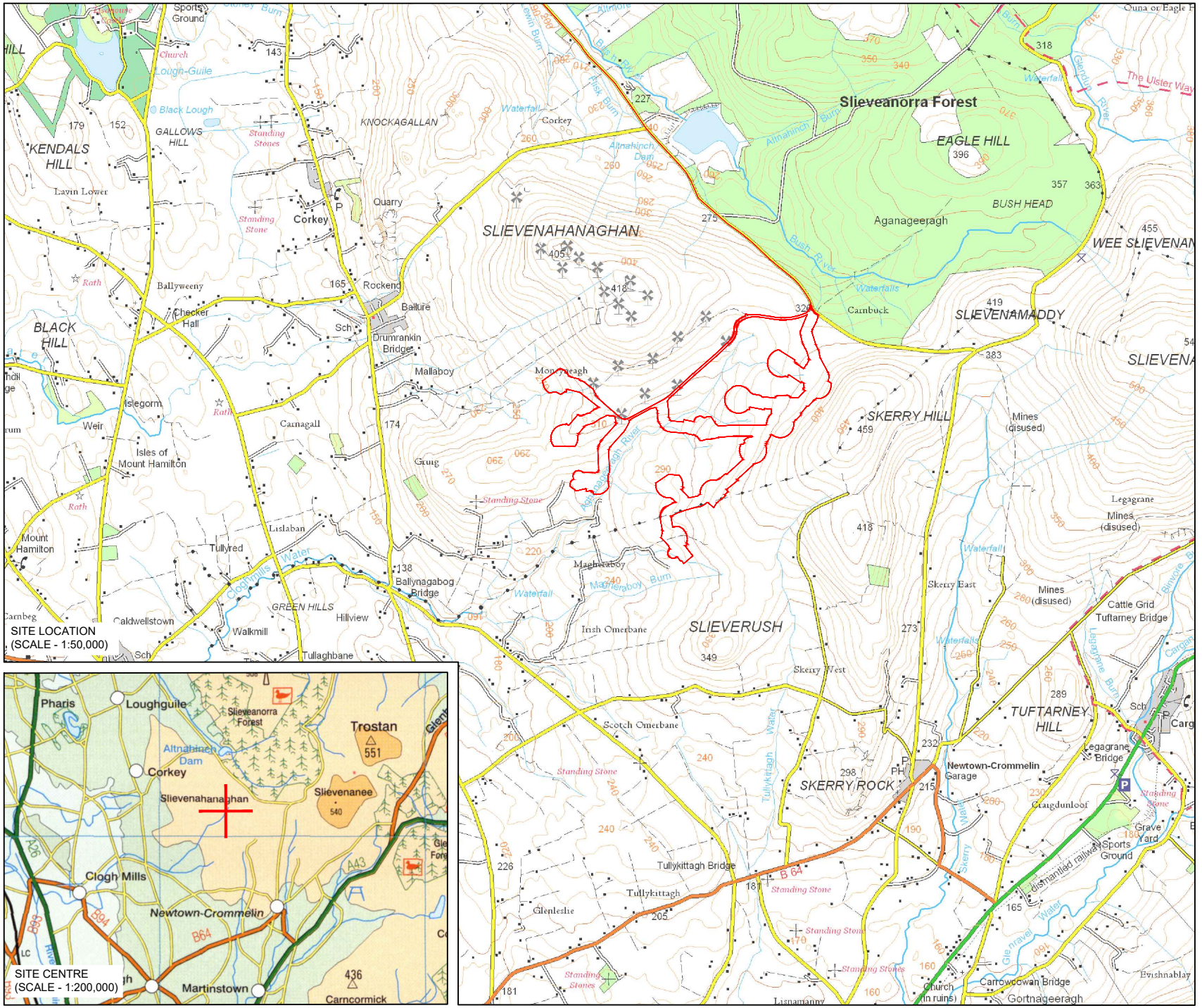
The amount of electricity that could be produced by the Proposed Development is estimated at 206.4 GWh per year which is equivalent to the electricity needs of 54,800 homes each year.

The Proposed Development is also estimated to reduce CO_2 emissions by 90,800 tonnes each year when compared against equivalent generation from non-renewable sources. This equivalent to 57,200 newly registered cars.

The Proposed Development will result in a reduction in greenhouse gas emissions from the electricity generating industry by harnessing wind as an alternative to the burning of fossil fuels, in line with the government's energy goals.

Figures

Figures



CARNBUCK WIND FARM

FIGURE 1

SITE LOCATION PLAN

KEY

- PLANNING APPLICATION BOUNDARY
- SITE CENTRE

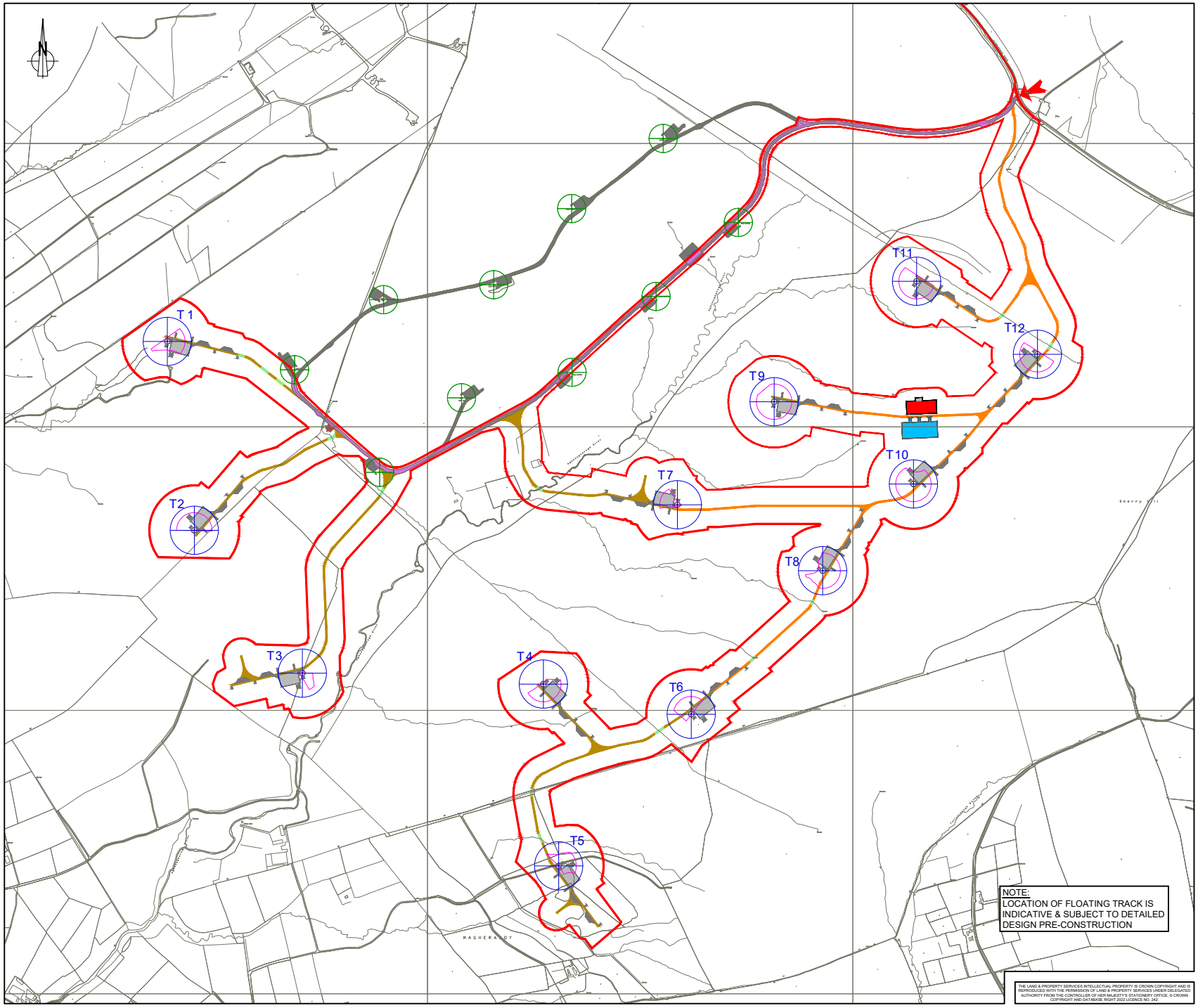
SITE LOCATION - NOT TO SCALE

LAYOUT DWG	T-LAYOUT NO.
N/A	N/A

DRAWING NUMBER	REV
03090-RES-LAY-DR-XX-001	2

SCALE - AS SHOWN @ A4

NON-TECHNICAL SUMMARY 2022



CARNBUCK WIND FARM

FIGURE 2

INFRASTRUCTURE LAYOUT

KEY - INFRASTRUCTURE LAYOUT

- PLANNING APPLICATION BOUNDARY
- WIND TURBINE LOCATION
- TURBINE MICROSITING
- NEW SITE TRACKS
- INDICATIVE FLOATED TRACKS
- EXISTING GRUIG WIND FARM SITE TRACKS - TO BE UPGRADED
- WATERCOURSE CROSSING
- CRANE HARDSTANDING AREA
  - PERMANENT
  - TEMPORARY
- TEMPORARY CONSTRUCTION COMPOUND AND BATTERY STORAGE
- CONTROL BUILDING & SUBSTATION COMPOUND WITH PERMANENT HARDSTANDING AREA
- SITE ENTRANCE LOCATION (SAME AS EXISTING GRUIG WIND FARM SITE ENTRANCE)

GRUIG WIND FARM - EXISTING SITE INFRASTRUCTURE

- TURBINE LAYOUT
- SITE TRACKS & HARDSTANDING
- EXISTING SITE TRACKS - TO BE UPGRADED
- EXISTING MAST
- EXISTING SUBSTATION

LAYOUT DWG	T-LAYOUT NO.
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DRAWING NUMBER	REV
03090-RES-LAY-DR-PE-001	5

SCALE - 1:15,000 @ A4

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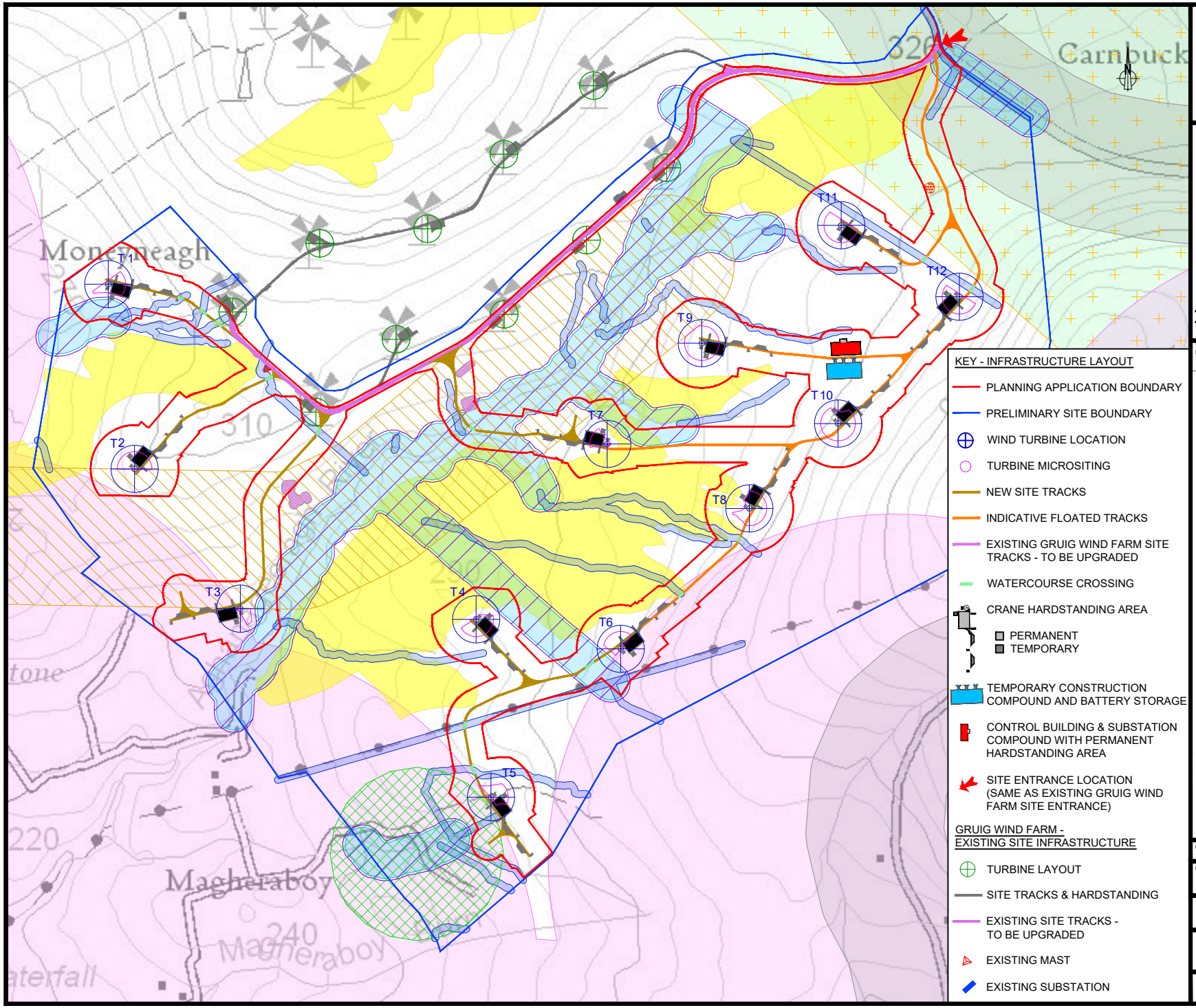


KEY - INFRASTRUCTURE LAYOUT

- PLANNING APPLICATION BOUNDARY
- PRELIMINARY SITE BOUNDARY
- WIND TURBINE LOCATION
- TURBINE MICROSITING
- NEW SITE TRACKS
- INDICATIVE FLOATED TRACKS
- EXISTING GRUIG WIND FARM SITE TRACKS - TO BE UPGRADED
- WATERCOURSE CROSSING
- CRANE HARDSTANDING AREA
  - PERMANENT
  - TEMPORARY
- TEMPORARY CONSTRUCTION COMPOUND AND BATTERY STORAGE
- CONTROL BUILDING & SUBSTATION COMPOUND WITH PERMANENT HARDSTANDING AREA
- SITE ENTRANCE LOCATION (SAME AS EXISTING GRUIG WIND FARM SITE ENTRANCE)

GRUIG WIND FARM - EXISTING SITE INFRASTRUCTURE

- TURBINE LAYOUT
- SITE TRACKS & HARDSTANDING
- EXISTING SITE TRACKS - TO BE UPGRADED
- EXISTING MAST
- EXISTING SUBSTATION

CARNBUCK WIND FARM

FIGURE 5

COMBINED CONSTRAINTS & INFRASTRUCTURE LAYOUT

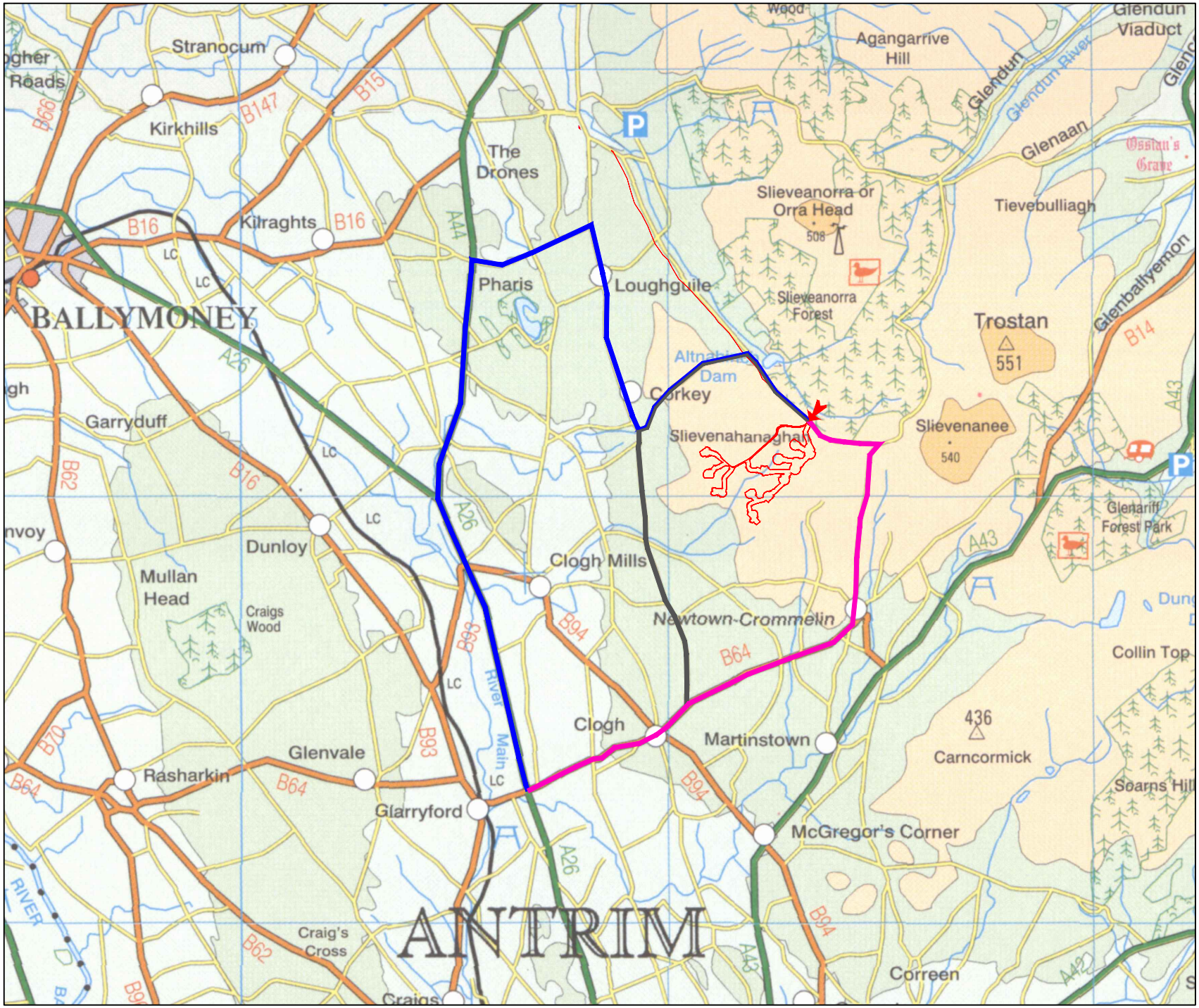
KEY - COMBINED CONSTRAINTS

- ROAD BUFFER (198m)
- HOUSING BUFFER (1000m)
- HYDROLOGY BUFFER (10m)
- HYDROLOGY BUFFER (50m)
- PRIVATE WATER SUPPLY BUFFER (250m)
- GRUIG OHL BUFFER (198m)
- BURROWS BUFFER (25m) (CONFIDENTIAL): NOT MARKED ON DRAWING
- DEVILS BIT SCABIOUS BUFFER (15m)
- BAT BUFFER (TO ACHIEVE 50m SEPARATION BETWEEN BLADE TIP AND FEATURE
- PEAT HABITAT AVOIDANCE
- SPECIES RICH GRASSLAND
- AONB
- ARCHAEOLOGICAL FEATURES BUFFER (10m)

LAYOUT DWG	N/A	T-LAYOUT NO.	N/A
DRAWING NUMBER	03090-RES-IMP-DR-EN-001	REV	3

SCALE - 1:15,000 @ A4

NON-TECHNICAL SUMMARY 2022



CARNBUCK WIND FARM

FIGURE 4

HGV DELIVERY ROUTES OVERVIEW

KEY

HGV DELIVERY ROUTES

- ROUTE 1
- ROUTE 2
- ROUTE 3
- PLANNING APPLICATION BOUNDARY
- PROPOSED SITE ENTRANCE (EXISTING GRUIG WIND FARM SITE ENTRANCE)

NOTE

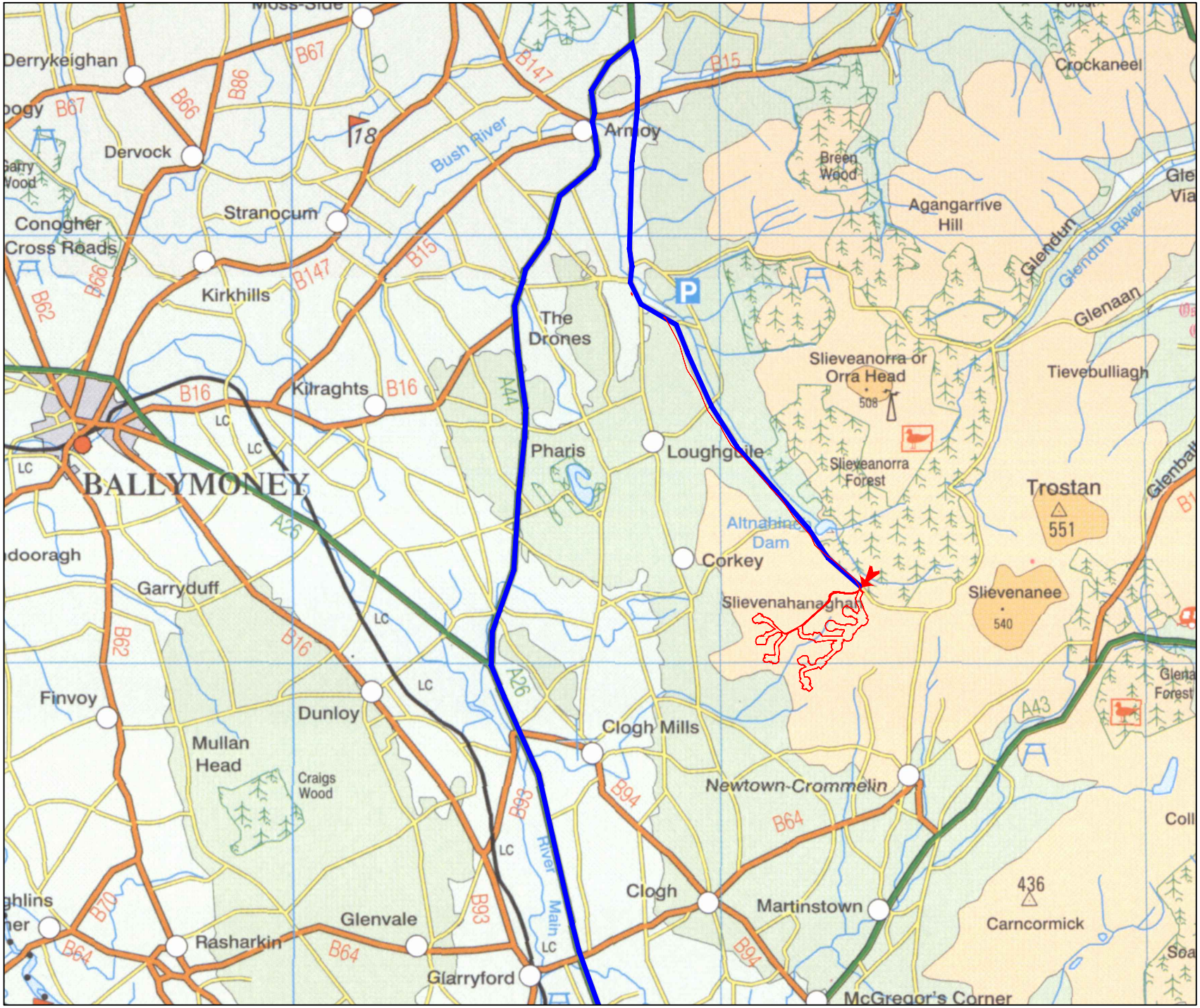
1. ROUTES ARE INDICATIVE AND WILL BE CONFIRMED PRIOR TO CONSTRUCTION.

LAYOUT DWG	T-LAYOUT NO.
N/A	N/A

DRAWING NUMBER	REV
03090-RES-ACC-DR-PT-002	2

SCALE - 1:125,000 @ A4

NON-TECHNICAL SUMMARY



res

CARNBUCK WIND FARM

FIGURE 5

TURBINE DELIVERY ROUTE OVERVIEW

KEY

- TURBINE DELIVERY ROUTE
- PLANNING APPLICATION BOUNDARY
- PROPOSED SITE ENTRANCE (EXISTING GRUIG WIND FARM SITE ENTRANCE)

LAYOUT DWG	T-LAYOUT NO.
N/A	N/A

DRAWING NUMBER	REV
03090-RES-ACC-DR-PT-001	3

SCALE - 1:125,000 @ A4

NON-TECHNICAL SUMMARY