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Introduction

The Proposed Development

This Design and Access Statement has been prepared by RES Ltd in support of a full planning application for Carnbuck Wind Farm, hereinafter referred to as the Proposed Development, located in the townlands of Carnbuck, Magheraboy and Moneyneagh, near Corkey, County Antrim. The site is adjacent to the existing Gruig Wind Farm. Please see **Figure 1: Site Location**.

The Proposed Development comprises up to 12 three-bladed horizontal axis wind turbines, each up to 180 m maximum height above ground level; associated external electricity transformers; underground cabling; access tracks; turning heads; crane hardstandings; control building and substation compound, 22 battery 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; welfare facilities. The purpose of the Proposed Development is for the generation of electricity.

The Proposed Development is shown in **Figure 2: Infrastructure Layout**.

The Applicant

RES is the world's largest independent renewable energy company. At the forefront of the industry for nearly 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 and operates over 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 Requirement for a Design & Access Statement

This statement is provided in accordance with Section 40 (3a&b) of the Planning Act (Northern Ireland) 2011 and Article 6b of the Planning (General Development Procedure) Order (Northern Ireland) 2015, which require applications for Major Developments, or applications within a designated area and comprising a building or buildings where the floor space created exceeds 100 m², to be accompanied by a Design and Access Statement. The Proposed Development is a Major Development

application. In addition, a small portion of the application site falls within the Antrim Glens (AONB), and the Proposed Development includes a wind farm substation compound containing a control building which result in the creation of circa 137m² of floor space.

The requirement for Design and Access Statements is in response to the recognised need to secure positive place making, incorporating good design and access and contributing towards the government objective of promoting sustainable development. A Design and Access Statement should:

- Explain the design principles and concepts that have been applied to the development;
- Demonstrate the steps taken to appraise the context of the development and how the design of the development takes that context into account;
- Explain the policy or approach adopted to access and in particular, how the policies relating to access to, from and within the development have been taken into account;
- Demonstrate how policies relating to access in the local development plan have been taken into account and any specific issues which might affect access to the development for disabled people have been addressed;
- Describe how features which ensure access to the development for disabled people will be maintained;
- State what if any consultation has been undertaken on issues relating to access to the development and what account has been taken of the outcome of any such consultation;
- Explain how any specific issues which might affect access to the development have been addressed; and
- Explain the design principles and concepts that have been applied to take into account environmental responsibility.

This Design and Access Statement will therefore demonstrate that the Proposed Development is responsive to both its surrounding context and local development plan policies incorporating the requirements as laid out in Article 6 of the Planning (General Development Procedure) Order (Northern Ireland) 2015 and Development Management Practice Note 12 - Design and Access Statement (April 2015).

Development Context

Physical Context

The application site is located in the townlands of Carnbuck, Magheraboy and Moneyneagh, east of Corkey village, County Antrim. A small portion of the site (not including any wind turbines) lies within the Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB) with the majority of the site falling just beyond

the western boundary of the AONB. The site 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. The site is positioned adjacent to the existing Gruig Wind Farm and in close proximity to Corkey and Corkey Extension wind farms, where a re-powering development (Corkey Repower) has recently been consented. The Aghanageeragh River flows through the Site towards the southwest. The Site is currently used for rough grazing of sheep and cattle.

The Site can be accessed via the existing Gruig Wind Farm site entrance on the Altnahinch Road. The location of the Proposed Development is shown in **Figure 1: Site Location**.

Planning Policy Context

PPS 1 - General Principles (March 1998)

PPS 1 sets out the general principles that the Department observes in making development management decisions and also establishes the requirement to secure high quality design in new developments with a desire to ensure that the relationship with surrounding spaces is considered.

PPS 3 - Access, Movement and Parking (February 2003)

Policy AMP 2 states that “Planning permission will only be granted for a development proposal involving direct access, or the intensification of the use of an existing access, onto a public road where such access will not prejudice road safety or significantly inconvenience the flow of traffic”.

PPS 13: Transportation and Land use

Planning Policy Statement, PPS 13 “Transportation and Land Use” has been prepared to assist in the implementation of the RDS. It will guide the integration of transportation and land use, particularly through the preparation of development plans and transport plans, prepared respectively by Causeway Coast and Glens, Mid and East Antrim Borough Council and DfI Roads. It will also be a material consideration in dealing with individual planning applications and appeals. The main objective of PPS13 is to integrate planning and transport at the national, regional, strategic and local level and to promote “a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone’s quality of life.”

PPS 21 - Sustainable Development in the Countryside (June 2010)

Policy CTY1 states that non-residential development in the countryside will only be permitted if there are overriding reasons why the development is essential in that location. It goes on to state that renewable energy projects are acceptable in the countryside with the proposed buildings in this instance required for the

operation of the Proposed Development. The policy also requires that appropriate proposals for drainage and access are included.

Policy CTY14 states that a new building in the countryside will be unacceptable where it

- Is unduly prominent in the landscape; or
- Results in suburban style development; or
- It does not respect traditional patterns or settlement; or
- It creates or adds ribbon development; or
- The impact of ancillary works would damage the rural character.

Planning Strategy for Rural Northern Ireland

Policy DES 4 Areas of Outstanding Natural Beauty requires that development proposals within an AONB should be sensitive to the distinctive character of the area. In applying this, account should be given to the economic and social well-being of those living within the AONB and the needs of local communities. Respect should be given to the traditional architectural styles and settlement patterns in these areas.

Building on Tradition - A sustainable Design Guide for the Northern Ireland Countryside (May 2012)

This document is intended to support PPS 21 and offer guidance on its implementation. The relevant sections are 4, relating to visual integration and 6, on new buildings in the countryside.

Local Policy

11 of the 12 turbines fall within the Causeway Coast and Glens Borough Council area, and one turbine falls within the Mid & East Antrim Borough Council area. A small area of the Site at the site entrance lies within the Antrim Coast & Glens Area of Outstanding Natural Beauty (AONB). The relevant local development plans are the Northern Area Plan (2016) and the Ballymena Area Plan (1986-2001).

The purpose of the Ballymena Area Plan is to set out the broad land use framework for the physical development of the district. It aims to create urban and rural environments which will make a positive contribution to an improvement in the quality of life in the Borough. Whilst significantly dated (published in November 1989) it remains the extant plan for the area.

The purpose of the Northern Area Plan 2016 is to inform the general public, statutory authorities, developers and other interested parties of the policy framework and land use proposals that will be used to guide development decisions within the Plan area over the period of the Plan.

The application site falls outside of any defined settlements in the Plan and as such falls within the countryside. The Development falls within:

- An Area of Outstanding Natural Beauty (Antrim Coast and Glens) (in so far as set out above under the consideration against PPS2 Policy NH6.
- A Site of Local Nature Conservation Importance (Aghenagerragh River Bog)

A detailed assessment of the Aghenagerragh River Bog SLNCl is contained within the Countryside Assessment Technical Supplement of the NAP. This classifies the the Aghenagerragh River Bog as a blanket bog with dry heath dominated by Heather Crowberry with some Bell Heather and Cross-leaved Heath on the upper part of the site. Cottongrasses are abundant with Bog Asphodel and Carnation Sedge in wetter areas. The lower slopes are dominated by grasses with occasional acid flushes.

Policy for the control of development within SLNCl is contained in Policy ENV 2 of the NAP which states that planning permission will not be not be granted for development that would be liable to have a significant adverse effect on the intrinsic nature conservation interest of a designated SLNCl. Exceptionally, where development is permitted which might significantly adversely affect the intrinsic nature conservation interest, adverse effects should be kept to a minimum and appropriate mitigation measures implemented. Planning permission, where granted, will be subject to conditions to guide developers on the necessary compensation measures such as the provision of new or enhanced habitats or features or for improved management. Where appropriate, developers may be asked to enter into a Planning Agreement to secure these outcomes.

The impact of the Proposed Development on the Aghenagerragh River Bog SLNCl has been considered in Chapters 6 and 7 of the ES. 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 minor adverse or neutral effect and therefore 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 this is not significant impact.

The Northern Area Plan contains no specific renewable energy policies.

Design Statement

Site Selection

RES considers a range of potential factors when selecting a wind farm site. 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.

Design Strategy

Design Principles

The design of the Proposed Development was optimised in order to produce a layout that maximises the use of the land available for wind power generation balanced against the overall environmental impact of the development.

The following design principles were applied:

- The turbines must be separated by specific distances both perpendicular to, and in line with, the prevailing wind direction to minimise turbulent interaction between the wind turbines (i.e. wake effect). This needs to be considered to balance turbine performance with energy extraction, and to protect the life-span of the turbines. Spacing requirements vary between turbine manufacturers and are also subject to wind conditions
- The turbines must be located at a distance sufficiently far from occupied residential property to ensure adherence to relevant noise criteria and to ensure that shadow flicker impacts are minimised
- The turbines should be located in order to avoid and/or minimise potential effects on environmentally sensitive features (ecology, archaeology, hydrology etc.)
- Landscape and visual design considerations should be taken into account, including relationships with adjacent wind farm developments

- Utilisation of existing infrastructure should be implemented whenever possible to avoid unnecessary development
- Mitigation by design should be the principle method of reducing potential environmental impacts
- All site infrastructure should be designed as efficiently as possible to reduce the overall extent of development whilst maximising the renewable energy generation potential.

For the Proposed Development, the upland nature of the application site created a number of sensitivities that needed to be carefully addressed through appropriate design of the wind farm. The basis of the design process is the evaluation of the various constraints that were identified through the environmental surveying that was undertaken, and consideration of landscape and visual effects. The following sections identify potential issues and outline how these have been addressed through appropriate design.

Key Considerations

Following consultation and baseline characterisation of the site, the following key environmental issues have been identified:

- Landscape and visual, including relationship with neighbouring wind farms
- Archaeology and cultural heritage
- Peatland and vegetation
- Fauna, including ornithology and fisheries
- Geology and the water environment
- Noise and shadow flicker
- Traffic and transport.

The issues listed above will be considered through design with the aim of designing out significant effects. Where it is not possible to mitigate by design, the issues were considered further as part of the Environmental Impact Assessment (EIA), described in the Environmental Statement (ES).

A key tool in the design process is the combined constraints drawing which integrates all potential constraints that need to be considered in the design process. The finalised combined constraints map is shown as Figure 5.

The combined constraints drawing is iteratively updated as new information from surveys, site visits and consultation is received. The following surveys informed the combined constraints drawing and design evolution process:

- Breeding and wintering bird survey
- Ornithological vantage point survey
- Phase 1 habitat survey and National Vegetation Classification (NVC) Phase 2 survey

- Terrestrial fauna surveys
- Fisheries survey
- Peat probing, peat management plan and peat slide risk assessment
- Hydrology assessment
- Archaeology and cultural heritage surveys
- Landscape field survey
- Transport and traffic reconnaissance trip

In addition, a number of multidisciplinary site walk-overs were 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. This ensured that interrelationships were thoroughly considered in the design of the layout.

Turbine Layout Evolution

There were four principle iterations of the turbine layout, shown in Figure 3: Turbine Layout Evolution, which were developed at the following stages in the project process:

- Initial feasibility/screening stage, when turbines were located based on preliminary constraints only, with baseline environmental surveys underway but not yet completed.
- EIA baseline data stage, when layouts were developed in response to baseline survey information and resulting constraint information.
- Further environmental assessment and refinement, when further, more detailed assessment was carried out on specific topics or issues highlighted and refinements were made to the layout as a result.

Initial 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

- Tip height + 10% to public roads, in accordance with the Best Practice Guidance to PPS 18¹.

This identified that the Site could potentially accommodate 12 turbines, to be further refined throughout the EIA process. **This is layout 1 in Figure 3.1.**

EIA Baseline Data 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 the ES. Any constraints to development, or avoidance areas, resulting from the baseline surveys were used to build up the combined constraints drawing.

Key constraints informing the layout are listed in the following sections. Further details on baseline surveys and mitigation by design are included in each technical chapter of the ES (Chapters 4 to 13).

The final Combined Constraints are shown in Figure 3 (Combined Constraints and Infrastructure).

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 250m 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.

¹ Best Practice Guidance to Planning Policy Statement 18: Renewable Energy, DOE Planning & Environmental Policy Group, August 2009.

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 recommended for removal 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 Wind Farm 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 Development, particularly during the operational period.

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 the removal of T11 from Layout 1, due to its elevated position on top of Skerry Hill, in addition to peat stability concerns at this location.

Layout 2 on Figure 3 Turbine Layout Evolution represents the result of this stage.

Further assessment and refinement stage

The turbine layout was reviewed and refined in response to further assessment actions identified by consultant review and from the collaborative site visits, including the following:

- Noise assessment, based on the background noise survey

- Shadow flicker assessment
- Archaeological assessment
- Further ecological assessment
- Further peat stability assessment
- Engineering considerations

Peat stability

Following the baseline stage, a second phase of peat probing was carried out the layout, and an outline peat slide risk assessment and peat management plan were prepared. As a result of recommendations in the outline peat slide risk assessment the locations of T6, T8, T9, T10 and T11 were adjusted to occupy shallower peat.

Refinements were also made to infrastructure, which are detailed later in this chapter.

Archaeology and Cultural Heritage

In consultation with the Archaeology and Cultural Heritage consultant the layout of Proposed Development has been designed to avoid significant effects on archaeological heritage assets in conjunction with appropriate mitigation.

Chapter 5: Archaeology & Cultural Heritage of the ES considers in detail the impact of the Proposed Development on the setting of a number of assets.

Collaborative Site Walkover

A second multidisciplinary site walk-over was arranged by RES, involving engineering, ecology, peatland, geology and water environment specialists to collaboratively review and refine the layout, discuss interrelationships and mitigation, resolve potential conflicts and agree actions for further assessment. It was agreed to move T5 south to a flatter area of land, thereby reducing the amount of earthworks necessary. Refinements were made to the infrastructure layout, which are detailed later in this chapter.

Layout 3 on Figure 3 shows the resulting layout.

Noise and Shadow Flicker Assessments

Layout 3 was further reviewed following assessments for noise and shadow flicker on nearby receptors. As a result T4 and T5 were repositioned to increase separation from houses and reduce noise and shadow flicker impacts. **This is Layout 4 for on Figure 3.** Full details of the noise and shadow flicker assessments are given in Chapters 11 and 13 respectively. Both chapters conclude that with appropriate mitigation there would be no significant effects on surrounding properties.

Final Turbine Layout

The final turbine layout is shown in Layout 4 of Figure 3 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 5.

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**.

Turbine Height

A landscape consultant was involved throughout the design process to provide advice regarding turbine height, as well as site suitability, scale of the development and cumulative effects. A full Landscape and Visual Impact Assessment (LVIA) of the Proposed Wind Farm Development is included in ES Chapter 4.

To assist the assessment of alternative tip heights, Zone of Theoretical Visibility (ZTV) diagrams were initially prepared to compare the difference in theoretical visibility for blade tip heights of 150 m versus 180 m. 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 the Study Area. Comparative wirelines were prepared from twenty provisional viewpoint (PVP) locations in key parts of the Study Area (PVPs 1 - 20 as detailed in Technical Appendix 4, Table 4.4.1) to compare and assess the appearance of the turbines at both heights, in relation to the layout generally and also the visual relationship between the Proposed Development and adjacent wind farms, including Corkey Re-Power wind farm which will replace the existing 10-turbine wind farm at Corkey. The comparative wirelines are not reproduced in the LVIA but a comparative ZTV illustrating the difference between the two blade tip height options is included at ES Figure 4.5.

The findings of this initial review of layouts and potential turbine dimensions were as follows:

- Some viewpoints located within approximately 5 km would experience clear views of all / most of the turbines in the Proposed Development. In these instances, the provisional wirelines showed a clear difference in the scale of 150 m versus 180 m high turbines. However, given that, in either scenario there would be clear views from these locations the overall extent of visibility would not be substantially altered. From locations at a similar distance where there would be less complete views of the Proposed Development, the difference in turbine heights was less discernible and, from locations to the south of Skerry Hill, close range views in the direction of the Proposed Development tends to be completely screened by topography;

- In viewpoints located beyond 5 km there was found to be no discernible difference in the perception of the scale of the Proposed Development regardless of blade tip height. However, refinements to the turbine layout were suggested to reduce instances of turbine stacking;
- The comparative ZTV diagram illustrating the difference in blade tip visibility between the 150 m and 180 m turbines (See ES Chapter 4, Figure 4.5) showed no significant increase in levels of visibility either within the Study Area as a whole or within the adjacent AONB resulting from turbines with 180 m tip heights. The additional visibility that would result from the use of 180 m high turbines would be 2.77% across the Study Area as a whole and approximately three quarters of this would be located at distances greater than 15 km from the Proposed Development.
- A cumulative ZTV illustrating the manner in which the Proposed Development would increase visibility over and above that of the existing Gruig cluster of wind farms indicates a 2.74% increase in overall visibility and suggests that the majority of this would be located within the central part of the adjacent AONB. However, further site analysis found that the close range visibility indicated to the south east of the Proposed Development would only be of a very small number of blade tips and would typically be screened by variations in topography that are not shown by the 50 m contour data used for the ZTV. In particular, the site assessment revealed very little clear visibility of the Proposed Development in proximity to Newtown Crommelin where the majority of additional visibility is indicated by the ZTV. Areas of additional theoretical visibility located around Glenariff Forest Park would, in practice be screened by forestry, and the uplands to the east of this are not publicly accessible. A more detailed analysis of the cumulative ZTVs is provided in ES Chapter 4: Landscape & Visual.

As a result of the design iteration process, 180 m blade tip was deemed to be an acceptable tip height. The combination of a larger rotor and taller hub height would create greater clearance/ visual separation between the blade tips and skyline and the blades would be less likely to interfere with appreciation of the landscape. Furthermore, it is accepted that a taller turbine with a larger rotor is able to capture more wind and is therefore more productive.

Infrastructure Design Evolution

The infrastructure design has evolved through the EIA process as illustrated in **Figure 4: Infrastructure Design Evolution, Designs 1 to 4**. Design 4 is the final design, which forms Figure 2 Infrastructure Layout.

Engineering considerations

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 3.3)
- 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
- 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.

As well as the turbine positions, the layout of infrastructure was also a key consideration in the collaborative site walkovers described earlier in this chapter.

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
- Realignment of crane pad at T7 to avoid peat habitat

In line with recommendations in Chapter 6: Vegetation and Peatland and Technical **Appendix 10.5: Peat Management Plan**, consideration was given to the use of floated track in areas of where peat depths exceeded 1 m, particularly within areas of Northern Ireland Priority Habitat. As well as reducing impacts on surrounding habitat the use of floated reduces quantities of excavated peat. As such the amount of floated track proposed has increased through the infrastructure design iterations, with the final proposal shown on **Design 4 of Figure 4**. which is also included in **Figure 2: Infrastructure Layout**.

Following the NVC phase vegetation survey, and in consultation with the vegetation and peatland consultant, a new section of floated track approaching T7 from the east was added to the design. Whilst this section of track does encroach on an area

initially identified by the consultant as peat habitat avoidance, the track section was included on balance to offer a potential alternative access to T7, rather than the access over the Aghanageeragh River. Please see Chapter 6: Vegetation and Peatland for further details.

Water Environment

The location and nature of watercourse crossings were reviewed with the hydrology and fisheries consultants. Following the mitigation detailed in ES Chapter 9: Fisheries and ES 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
- 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 or the site entrance but the track will be upgraded/maintained as required throughout construction. Temporary removal of fences and gates may be required at the site entrance to facilitate delivery of turbine components.

Temporary Construction Compound

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.

Control Building and Substation

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.

Final Infrastructure Layout

The final infrastructure layout is shown in **Design 4 of Figure 4**. Once finalised, the Planning Application Boundary was drawn, ensuring sufficient space within the boundary for all features.

The final Infrastructure Layout and combined constraints is shown in **Figure 3**.

Access Statement

A full assessment of the potential impact of the Proposed Development on traffic and transport is provided in **ES Volume 2, Chapter 12: Traffic and Transport**, the assessment has been prepared in line with Policy AMP 6 of PPS3.

The following key considerations were taken into account during the design and assessment of access arrangements for the Proposed Development, including relevant policy and guidance:

- Access routes for abnormal indivisible loads (AIL), normal construction traffic and associated road improvements
- The type and volume of traffic generated by the Development
- Identification of sensitive/critical locations along the delivery route
- Assessment of construction, operation and decommissioning traffic impacts
- Outline of suitable mitigation measures and the evaluation of residual impacts
- Cumulative impact of surrounding consented and proposed developments
- DOE - Planning Policy Statement 3 - Access, Movement and Parking (2005)
- DOE - Planning Policy Statement 18: Renewable Energy (2009)
- DOE - Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy' (2009)
- IEMA - Guidelines for the Environmental Assessment of Road Traffic (1993)
- Northern Area Plan 2016
- Ballymena Area Plan 1986-2001

Consultation with stakeholders relevant to traffic, roads and infrastructure on and near the delivery routes were undertaken. The feedback from this consultation process helped to clarify the local transport strategy, identify issues of specific local importance and gather basic information on local infrastructure and structures. A summary of the consultation responses and proposed mitigation measures are included in **Table 1**.

Table 1: Consultation Responses

Consultee	Issue	Solution/ Further Steps
DfI Roads, Northern Division	Advised of proposed AIL delivery route associated with the Proposed Development	DfI Roads were consulted with regards to the proposed primary AIL route, approaching northbound on the A44, exiting south onto Hillside Road, following onto Lagge Road becoming Coolkeeran Road, and Glenbush/ Altnahinch Road thereafter Mitigation measures proposed are that the turn from the A44 south onto Hillside Road should be engineered with hardstand as required to allow AIL passage. This would require reinstatement to grass verge upon construction completion.

A summary of consultation responses and proposed mitigation measures are included in **ES Volume 2, Chapter 12: Traffic & Transport**.

Site Entrance

The site entrance is located on Altnahinch Road, utilising the existing site entrance to Gruig Wind Farm. It is designed accordingly therefore no widening works will be required however the gates and some fencing may be removed temporarily to facilitate oversail of the turbine components. These will be reinstated following turbine delivery. The site entrance is located within the Causeway Coast and Glens area and therefore falls within the Northern Area Plan 2016. The site entrance is not identified as a protected route in the current Northern Area Plan 2016 and as such complies with policy TRA1 and TRA1 & Protected Routes Network of the Northern Area Plan 2016. The site entrance has been designed in accordance with Policy AMP2 of PPS 3.

The proposed site entrance has been constructed in accordance with the requirements of Development Control Advice Note (DCAN) 15, 2nd Edition.

As specified in DCAN 15, visibility splays measuring 160m x 4.5m are provided in both directions. Following construction, the site entrance will be reinstated to the gate and fencing originally installed.

Site tracks

In order to minimise impacts existing infrastructure from Gruig Wind Farm was used where possible. 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 in line with PPS 18.

Delivery Routes

Turbine delivery

Specialist vehicles are required to transport components to the site. One vehicle would transport turbine blades, while another type would transport the tower sections. Swept path analyses have been undertaken for blade delivery as this is the more onerous scenario, to determine the works required to allow passage through pinch-points on the route as illustrated in **ES Vol 4 Appendix 12.1**

The proposed access route for turbine deliveries from Belfast Port has been used previously for the construction of various wind farms. From Belfast the route will travel north on the M2, onto the A26 at Dunsilly Roundabout, continuing for c. 34km. The route exits onto the A44 Drones Road continuing north for c.49.9km, turning south onto Hillside Road, following onto Lagge Road becoming Coolkeeran Road, and Glenbush/ Altnahinch Road continuing to the site entrance. The route from the A44 is shown in **Figure 6: Turbine Delivery Route**.

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.

Where required, approval to temporarily remove street furniture (for the minimum period as is reasonably practical), will be obtained from the appropriate bodies prior to deliveries post planning consent.

Works with third party land, either temporary road widening or vegetation removal to facilitate oversail of the components, will be required at three locations along the turbine delivery route. Widening works will include the installation of hardstand areas and vegetation trimming to facilitate the passage of the vehicles and turbine components.

Widening areas will be laid with a suitable hardstand, and then 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.

No widening works will be completed within the listed protected routes in the current Northern Area Plan 2016 with exception of A44, Hillside Road junction, in which an area of overrun will be stoned during construction and will be

sympathetically reinstated at the end of wind farm construction period; and as such complies with policy TRA1 & Protected Routes Network Policy of the Northern Area Plan.

Normal HGV Delivery

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. Indicative HGV routes between the A44 and the Site are illustrated in **Figure 7: HGV Routes**.

Sources of material will be confirmed prior to construction. No passing bays will be required as the roads are two-way with adequate passing provided. Where agreed by DfI Roads, circular HGV haul routes may be implemented for the construction phase of the project

Car Parking

A temporary Construction compound will be present throughout the duration of the enabling and construction works providing adequate car parking for all onsite staff. Staff numbers during the operational phase will be limited due to minimal on-site staff requirements however car parking provision will be accommodated within the site in line with Policy AMP 7 of PPS 3.

Disability access

Disabled access to the buildings within the Proposed Development will be provided via ramps and suitable parking will be provided, consideration has been given to Policy AMP1 of PPS 3.

Sustainability

Sustainable design refers to the selection of an appropriate site for a particular development whilst ensuring that the architectural style is suitable for the site, so that the development will not detract from the sense of place. It incorporates the use of environmentally friendly materials and construction techniques as well as resource efficiency, all of which will help to minimise environmental impact whilst conserving local character and enhancing the viability of local communities.

The Design Statement section of this report details how the site was selected as appropriate, and describes how the layout of the Proposed Development has been carefully designed in order to minimise environmental effects.

In addition, the Proposed Development incorporates a host of mitigation measures as recommended in the technical chapters of the Environmental Statement Volume 2 (Main Report), further reducing environmental effects and incorporating best practice. Key measures include the following:

- An Outline Habitat Management Plan has been prepared to restore and enhance blanket bog and heathland habitats on site (ES Volume 4 Technical Appendix 6.2)
- The Site will adopt a surface water management plan/site drainage design using the principles of Sustainable Drainage, promoting the principles of on-site retention of flows and use of buffers and other silt removal techniques. All drainage-related mitigation measures proposed will be encompassed by a robust and proven Sustainable Drainage System (SuDS) design which will be used to control drainage and silt management on the Site. An outline SUDS Plan has been prepared (Contained within ES Volume 4 Technical Appendix 10.1).
- An Outline Construction Environmental Management Plan (oCEMP) (Contained within ES Volume 4 Technical Appendix 1.5) is included within the Environmental Statement and a Construction and Decommissioning Method Statement (CDMS) will be prepared if planning consent is granted. The CEMP and CDMS would be agreed with the planning authority and would 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 total megawatt (MW) capacity of the Proposed Development will be confirmed pre-construction however for the purposes of the assessment of socioeconomic effects 4.2MW capacity turbines have been assumed, based on a turbine model typical of the turbine size being applied for. This would give a total installed capacity of 50.4MW

A socioeconomic assessment of 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, £4.54-7.4 million (2019 prices) of wages and £9.63-£15.43 million (2019 prices) of GVA to the Northern Ireland economy.

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

For further details see ES Volume 2 (Main Report) Chapter 14: Socioeconomics.

Potential effects on local residents in terms of noise, shadow flicker, traffic and transport, have been considered in the design of the Proposed Development and assessed in the ES. Predicted effects were found to be acceptable with incorporation of the proposed mitigation.

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 engaged early with the local community to facilitate a constructive consultation process. The consultation process assisted RES in gaining a greater understanding of any concerns the community may have and allowed us to consider these aspects as part of the environmental assessment process.

Through the consultation process, we have taken the opportunity to engage with interested parties to facilitate public understanding of the potential impacts and benefits of the Proposed Development. A Pre-Application Community Consultation (PACC) Report has been submitted with the planning application.

Conclusion

This Design and Access Statement has presented the final design of the Proposed Development. It explains the design principles and concepts that have been applied to the development, demonstrating the steps taken to appraise the context of the development and how the design of the development takes that context into account whilst ensuring adherence with all relevant policies.

It has explained the approach adopted for access and in particular, how the policies relating to access to, from and within the Proposed Development have been taken into account. Arrangements relating to access to the development for disabled people have been addressed. It has also outlined the consultation process and its effects on the design.

It has explained the design principles and concepts that have been applied to take into account environmental responsibility. In all instances sustainability has been considered to ensure the selection of an appropriate site for the development whilst ensuring the wind farm layout and architectural style of the buildings are suitable for the site, so that the development will not detract from the sense of place. The design has also considered the use of environmentally friendly materials and construction techniques, as well as resource efficiency, all of which will help to minimise environmental impact whilst conserving local character and enhancing the viability of local communities.

The resulting Proposed Development layout includes the following features:

- 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;

- Reduction of impacts on environmental, technical and engineering constraints and sensitivities identified through site survey and consultation;
- Reduction in overall land take and ground disturbance through careful design of site infrastructure including tracks and crane hardstandings and maximising use of existing infrastructure at the adjacent Gruig Wind Farm;
- A building that is integrated and sympathetic to its setting in the surrounding landscape;
- An existing access, avoiding unnecessary development to reduce land take, visual impact and impact on road users;
- A development which is sustainable and environmentally responsible.

Figures

1. **Site Location**
2. **Infrastructure Layout**
3. **Turbine Layout Evolution**
4. **Infrastructure Layout Evolution**
5. **Combined Constraints and Infrastructure**
6. **Turbine Delivery Route**
7. **HGV Route**



CARBUCK WIND FARM

FIGURE 1

SITE LOCATION PLAN

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KEY

- PLANNING APPLICATION BOUNDARY
- + SITE CENTRE



SITE LOCATION - NOT TO SCALE



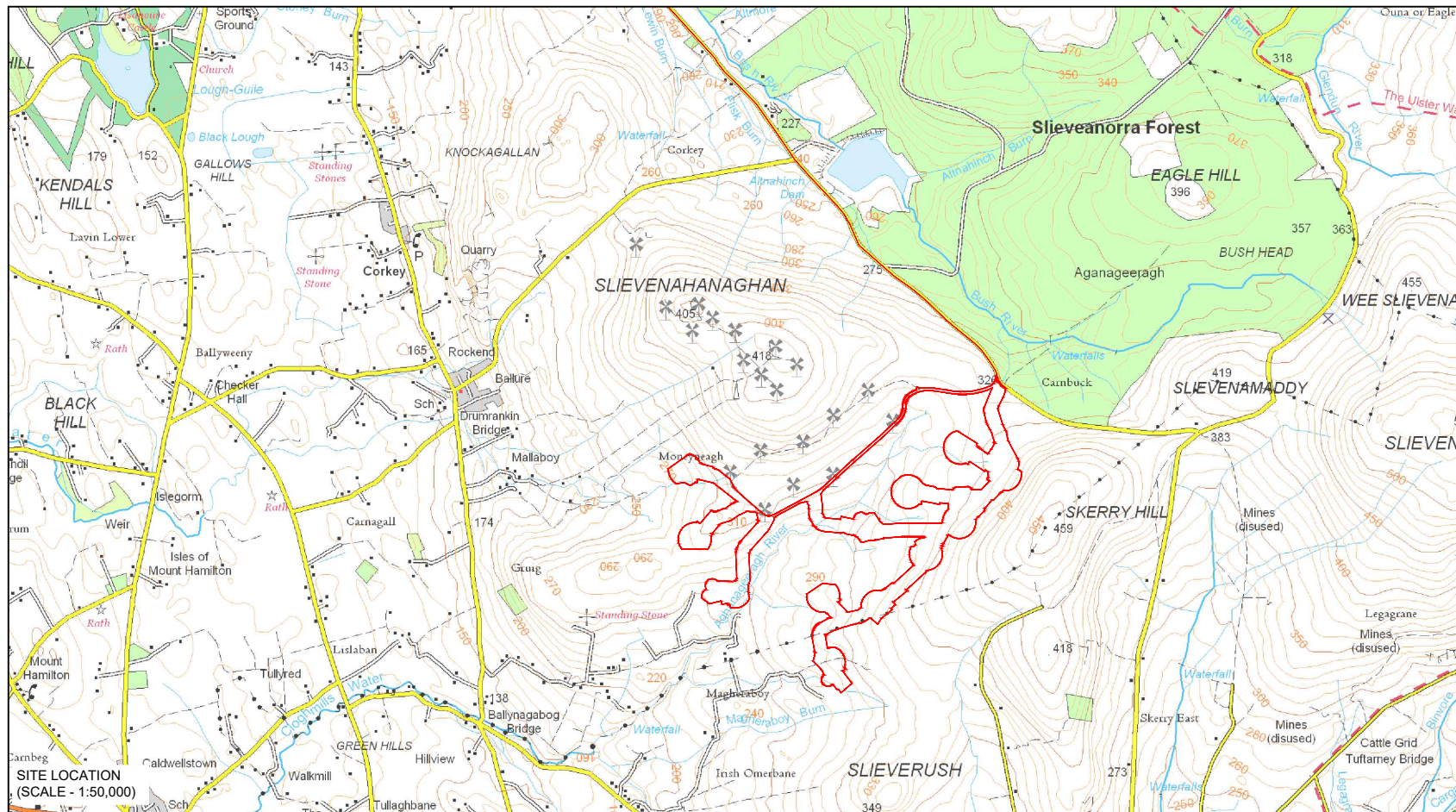
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DRAWING NUMBER **03090-RES-LAY-DR-XX-001** REV **2**

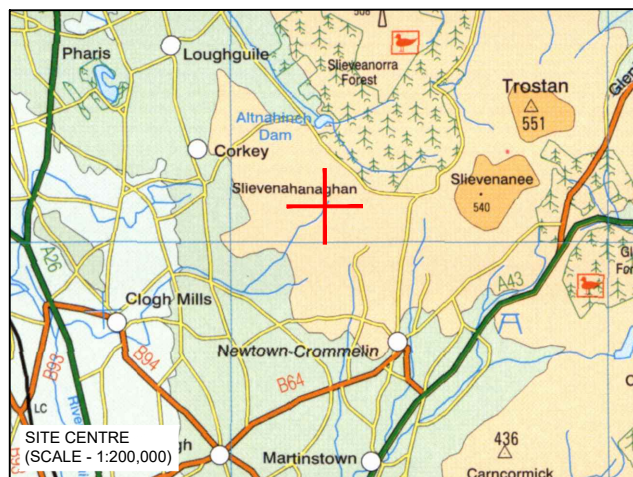
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SITE LOCATION
(SCALE - 1:50,000)

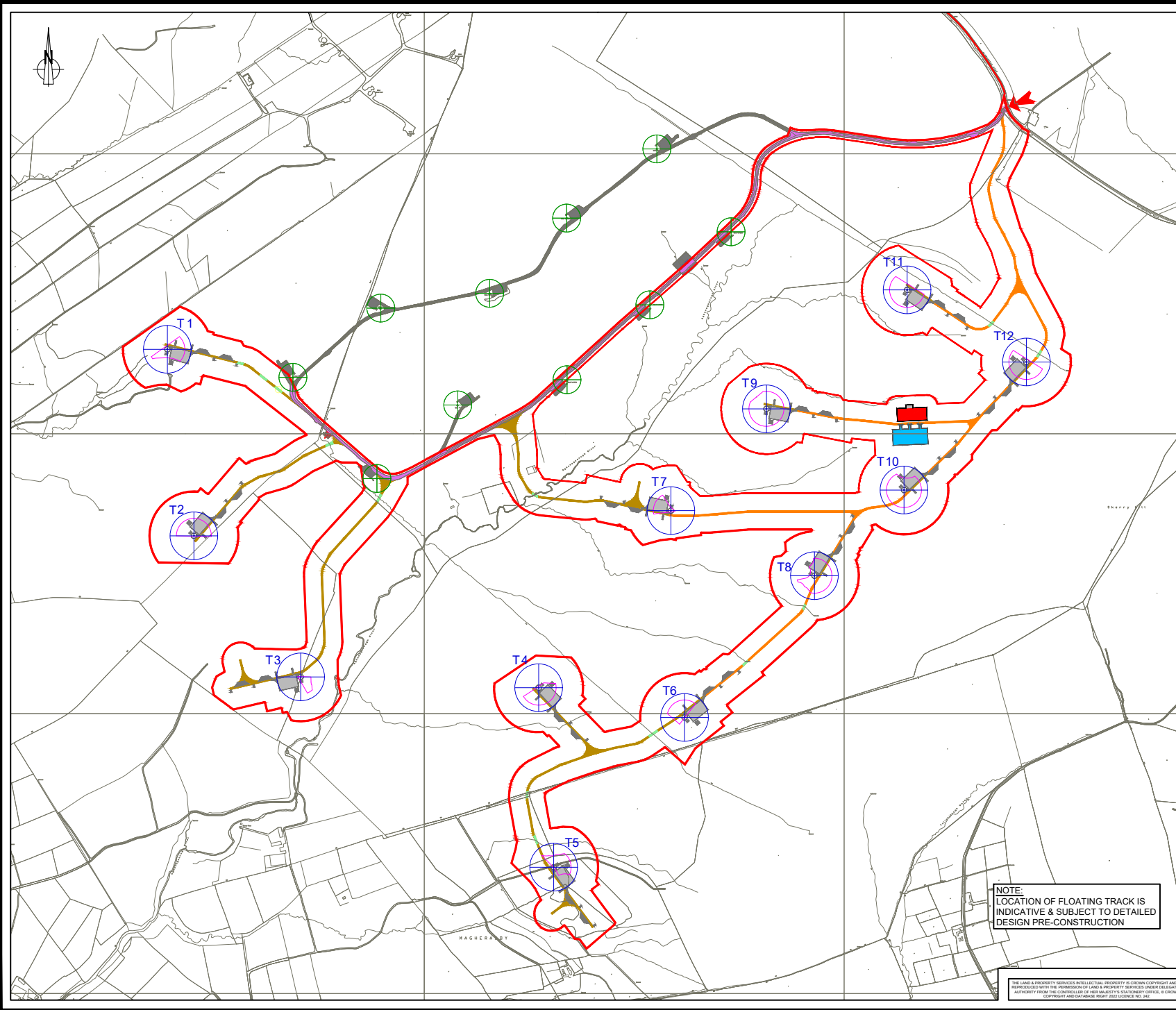


SITE CENTRE
(SCALE - 1:200,000)

CARBUCK 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

NOTE:
LOCATION OF FLOATING TRACK IS
INDICATIVE & SUBJECT TO DETAILED
DESIGN PRE-CONSTRUCTION

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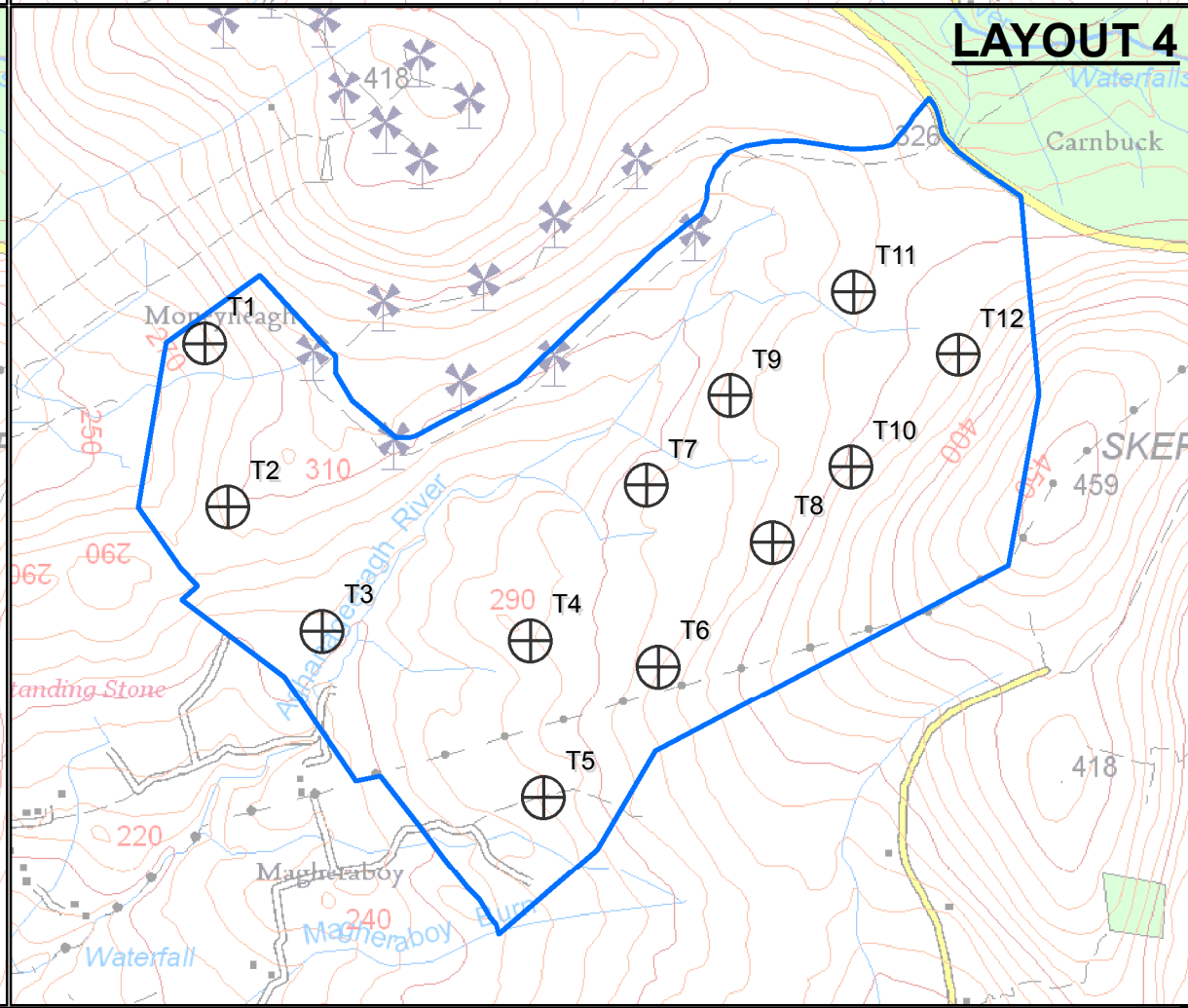
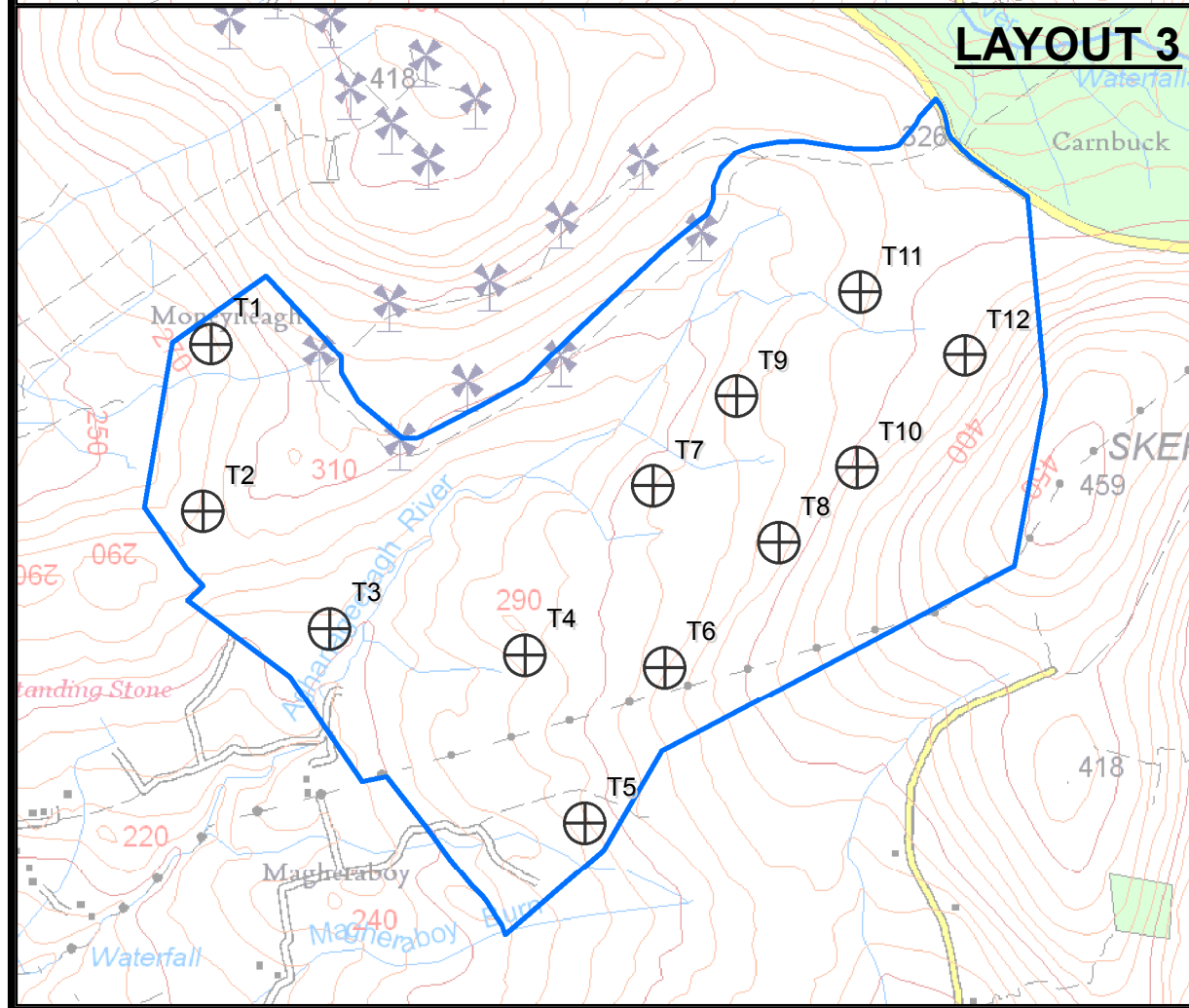
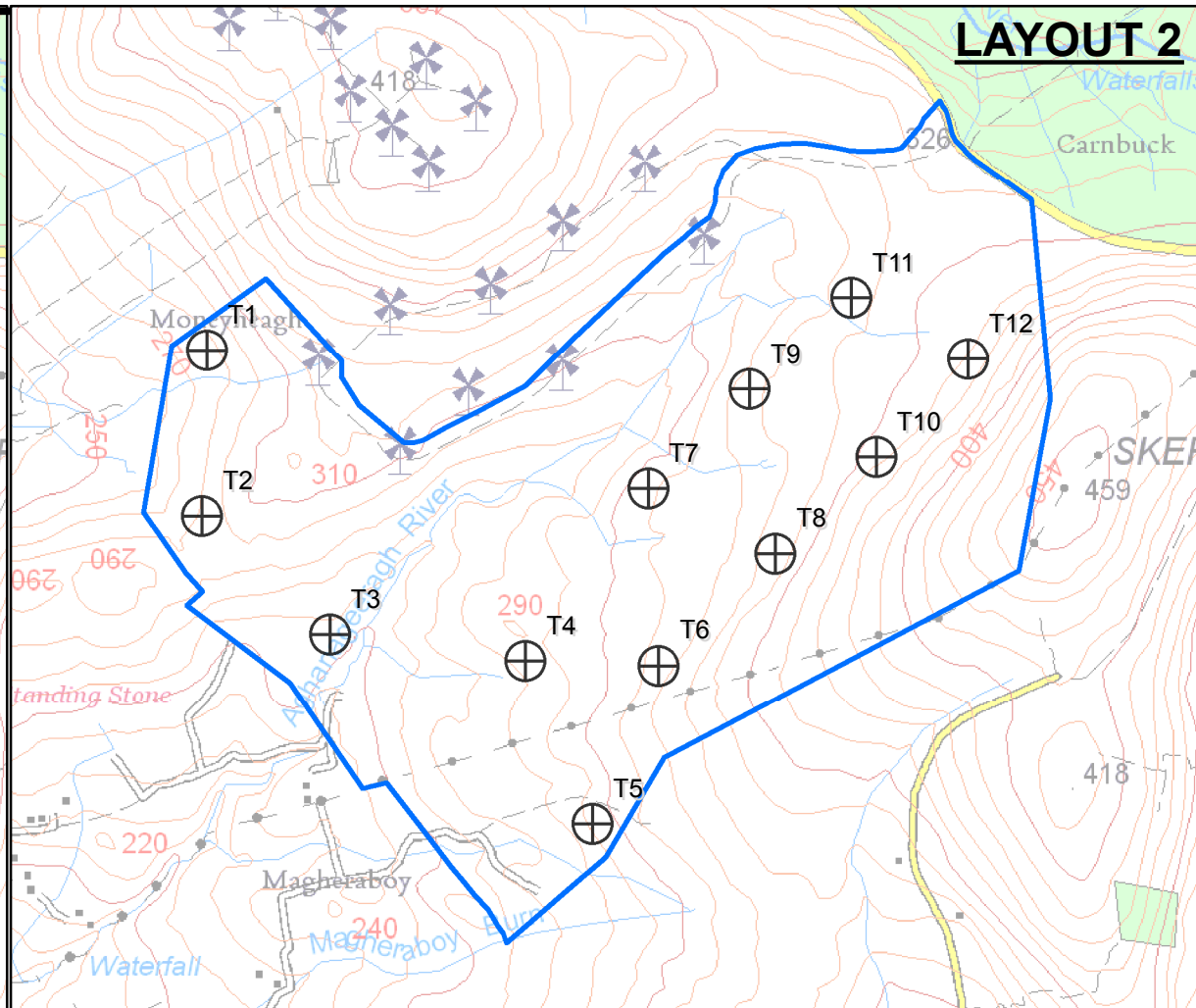
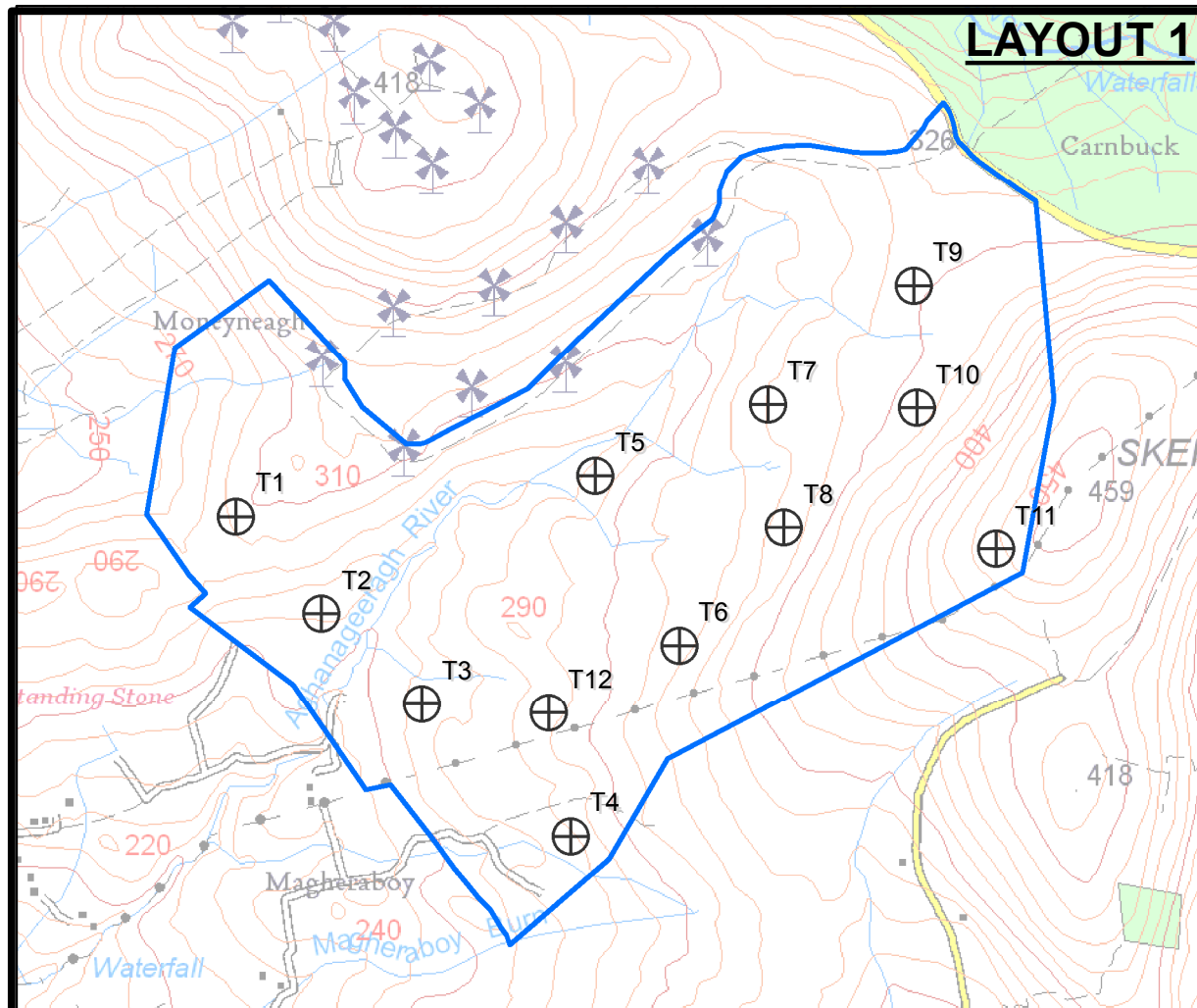
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
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CARNBUCK

**FIGURE 3
TURBINE LAYOUT
EVOLUTION**

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-  Turbines
-  Preliminary Site Boundary



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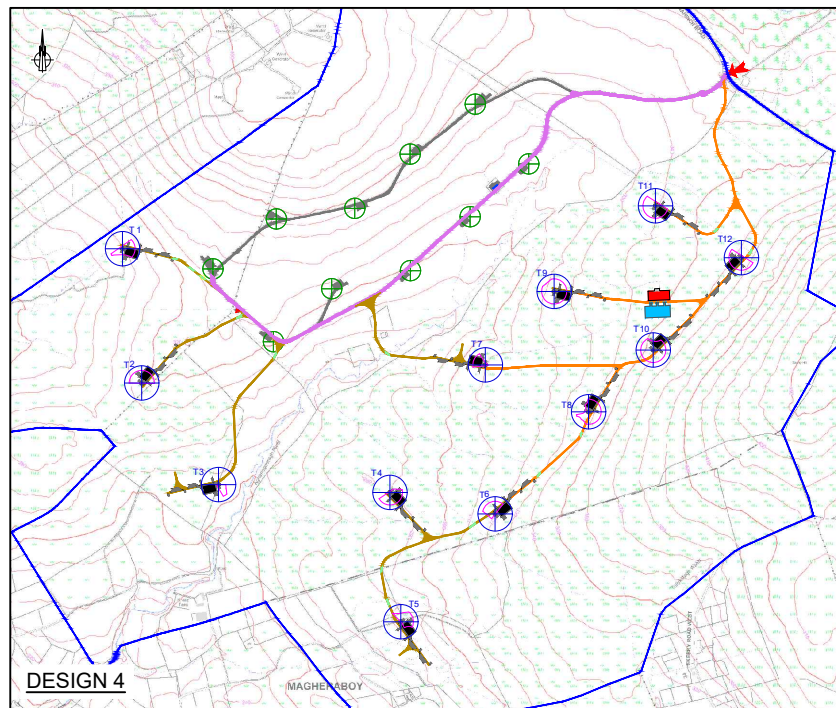
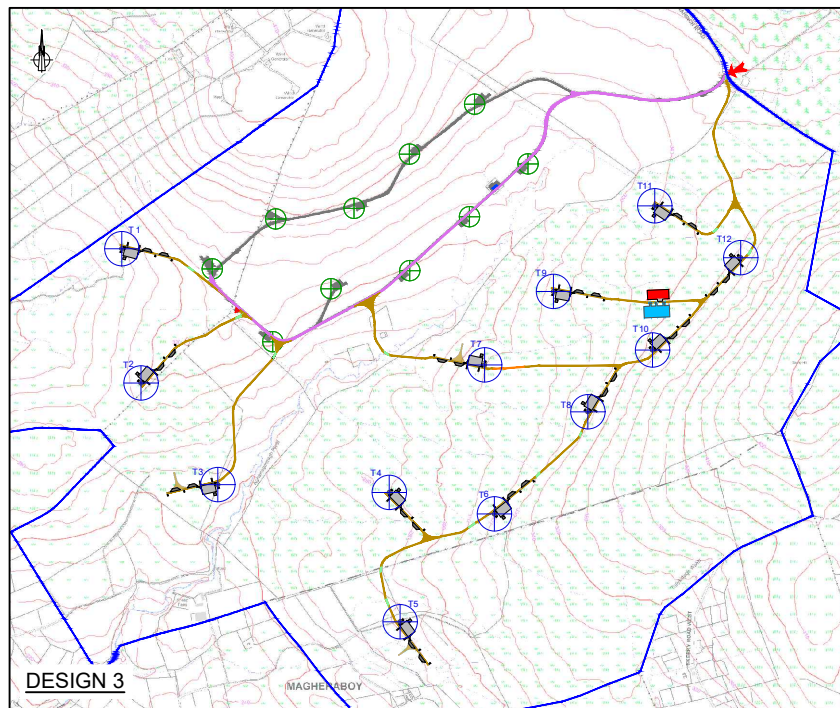
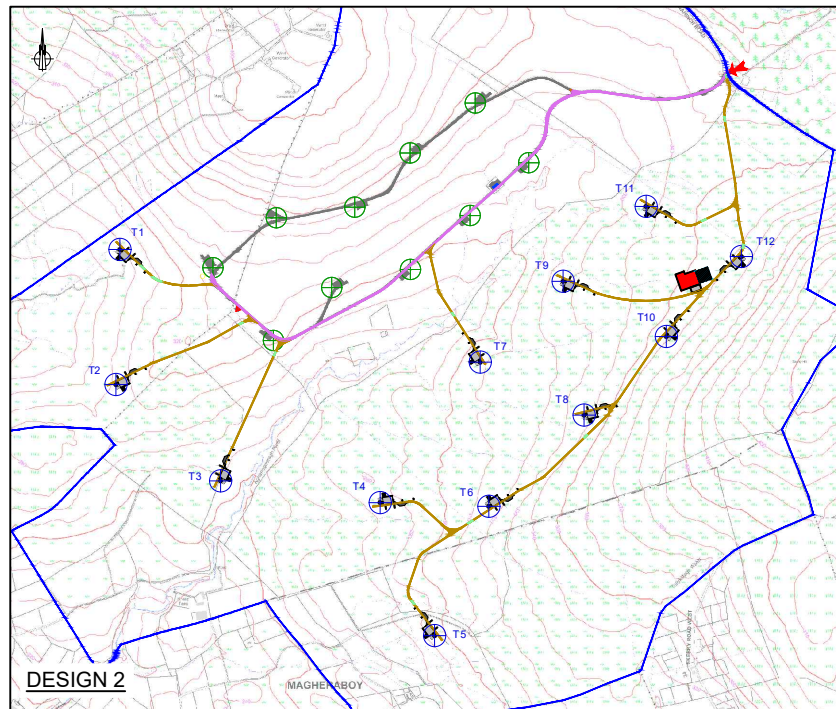
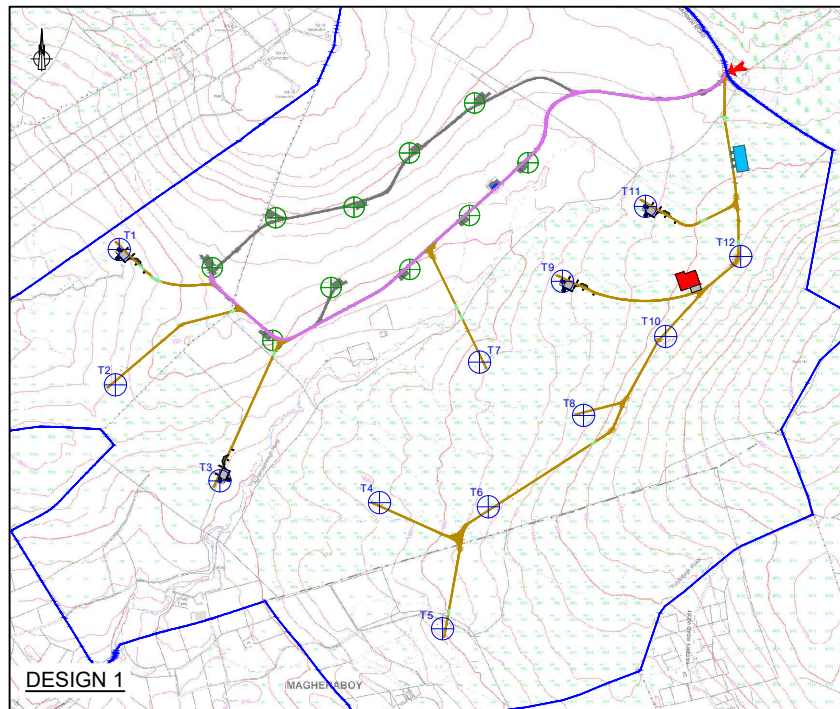
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CARBUCK WIND FARM

FIGURE 4.0

INFRASTRUCTURE DESIGN EVOLUTION



KEY - INFRASTRUCTURE LAYOUT

- LAND UNDER APPLICANT CONTROL
- ⊕ 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: N/A | T-LAYOUT NO.: N/A

DRAWING NUMBER: **03090-RES-LAY-DR-PT-001** | REV: **2**

SCALE - 1:30,000 @ A4

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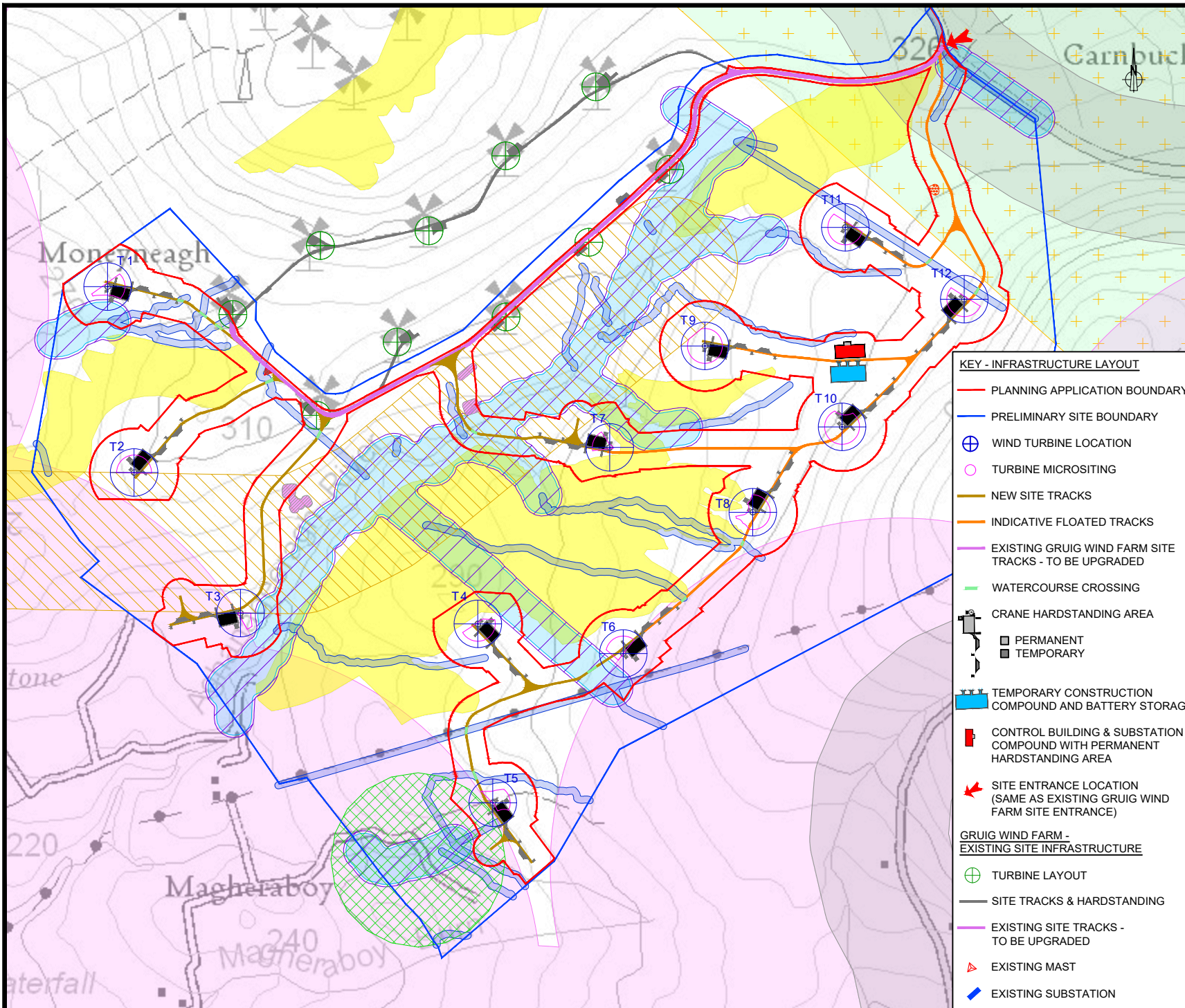
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CARBUCK WIND FARM

FIGURE 5

COMBINED CONSTRAINTS & INFRASTRUCTURE LAYOUT

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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

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)

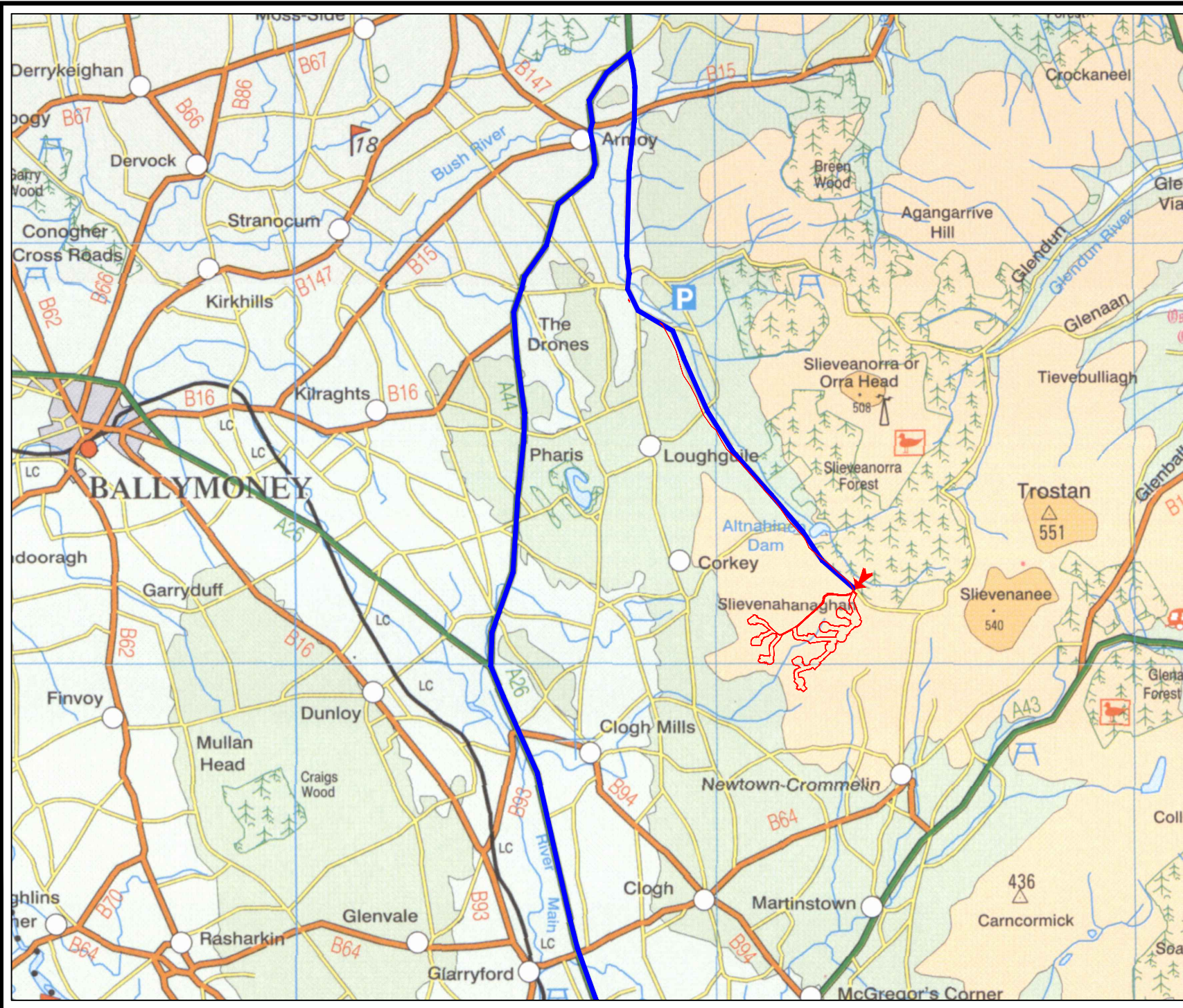
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CARNBUCK WIND FARM

FIGURE 6

TURBINE DELIVERY ROUTE OVERVIEW

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



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

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CARBUCK WIND FARM






FIGURE 7

HGV DELIVERY ROUTES OVERVIEW

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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 N/A T-LAYOUT NO. N/A

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

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