3. Design Evolution and Alternatives

Introduction

3.1 In this chapter a description is given of the site selection process, consideration of alternatives, and design strategies that were adopted in arriving at the Proposed Development described in Chapter 2: Proposed Development. Firstly, the general design principles adopted by RES are outlined and potential key issues which may affect the design are identified. Thereafter, a description is given of how the turbine layout and infrastructure design evolved in response to constraints identified through the EIA process.

3.2 Figures 3.1 – 3.3 are referenced in the text where relevant.

Current land use and site context

3.3 The location of the Proposed Development is shown in Figure 1.1: Site Location. The Planning Application Boundary (red line) and Land Under Applicant Control (blue line) are shown on Figure 1.2: Planning Application Boundary. The Land Under Applicant Control surrounding the main site shown on Figure 1.2 formed the initial preliminary site boundary, which was reduced down through the design process, and is hereinafter referred to as 'the Site'.

3.4 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 outside 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 has recently been consented. The Aghanageeragh River flows through the Site towards the south west.

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

Key Issues and Constraints

Site Selection

3.6 The design of a wind farm is 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 optimal layout of a wind farm depends on a range of technical, economic and environmental criteria. There following are site specific factors determining the viability of a wind farm:

- 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 Principles

3.7 There are additional factors which also influence the scale and viability of a wind farm including:

- 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;
- Wind turbines have to 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 implications of locating turbines near environmentally sensitive features and areas (ecology, archaeology, hydrology etc.) need to be carefully considered; and
- Landscape and visual design considerations, including potential cumulative effects, need to be taken into account.

3.8 The apportioning of weight to each element is a site-dependent consideration and results in bespoke design approaches and strategies for each site.

3.9 For the Proposed Development, the upland nature of the Site creates a number of sensitivities that need to be carefully addressed through appropriate design of the

wind farm. The following sections identify potential issues and outline how these have been addressed through appropriate design.

3.10 The basis of the design process is the evaluation of the various constraints that have been identified through the environmental surveying that was undertaken at the Site. The constraints identified through these surveys, along with other technical constraints and appropriate buffers are presented in **Figure 3.3**: Combined Constraints and Infrastructure and are discussed in the layout evolution sections of this chapter.

Potentially significant effects

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

- Landscape and visual, including relationships 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.

3.12 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 are considered further as part of this Environmental Impact Assessment (EIA).

Consultation

3.13 Prior to and during the production of this Environmental Statement (ES), RES and the Consultant project team have consulted with various stakeholders and where appropriate incorporated the outcome of this into the various chapters of this ES.

3.14 Throughout the EIA process, continual scoping has occurred to ensure that the ES fully, but concisely, addresses all potentially significant issues.

3.15 Details of consultation undertaken in the preparation of each of the technical chapters of this ES (chapters 4 to 13) are presented in the relevant chapter.

Public Consultation

3.16 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.

3.17 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.

3.18 In addition, a public exhibition was held on Thursday 26th January 2023 from 4pm-8pm in The Millennium Centre, Loughgiel, BT44 9JN. 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

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

Alternatives

3.20 RES considers a range of potential options when selecting and designing wind farm sites. The following sections outline the broad design alternatives that have been considered in terms of the EIA Regulations.

Do-Nothing Alternative

3.21 The “do-nothing” scenario is a hypothetical alternative considered as a basis for comparing the potential significant effects of a development proposal. In the case of the Proposed Development the “do-nothing” scenario would be to have the Site continue to be managed for sheep grazing by the landowners. It is likely that current land management activities, including artificial drainage and grazing, would continue and are likely to cause further degradation to the habitats on the Site in the future.

Alternative Sites

3.22 RES has a robust site selection methodology, using a Geographical Information System (GIS) to aid identification of potential wind farm sites.

3.23 The Proposed Development Site meets the criteria listed in section 3.6 of this chapter. The GIS model was used to identify potential constraints which could restrict development, or would need to be addressed in the design process.

Alternative Layout Designs

3.24 There have been several iterations of the turbine and infrastructure layouts. From the outset the following design principles have been employed when making design decisions:

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

3.25 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 3.3.

3.26 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
- Technical and engineering site walkovers.

3.27 The final site layout for the Proposed Development (Figure 1.3: Infrastructure Layout) reflects the need to optimise the energy yield whilst paying due regard to environmental and technical sensitivities. Wind farm design is an iterative process and is influenced by potential environmental effects identified throughout the EIA process: policy recommendations; environmental, technical, engineering and landscape design considerations; and as a result of feedback from consultees.

3.28 The Design Evolution section of this chapter describes the evolution of the turbine and infrastructure layouts.

Alternative Tip Heights

3.29 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 in included in Chapter 4.

3.30 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 Volume 3 Figure 4.5.

3.31 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 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[1] 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 Chapter 4: Landscape & Visual.

3.32 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.

Design Evolution

Turbine Layout

3.33 There were four principle iterations of the turbine layout, shown in Figure 3.1: Turbine Layout Evolution, which were developed at the following three 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 issues highlighted and refinements were made to the layout as a result.

Initial Feasibility Stage

3.34 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

[1] Figure 4.9 (page 1 of 3) considers the Gruig cluster to include existing wind farms at Altaveedan, Corkey Extension and Gruig and Corkey Re-Power consented wind farm which will replace the existing Corkey wind farm with substantially larger turbines. The latter is not included in the ZTV calculation.

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 18[2].

3.35 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

3.36 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.

3.37 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 (Chapters 4 to 13).

3.38 The final Combined Constraints are shown in Figure 3.3 (Combined Constraints and Infrastructure).

Water Environment and Fisheries

3.39 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

3.40 A 25 m buffer was applied to a badger setts identified through the baseline surveys. Note that these are not marked on Figure 3.3 as their location is confidential.

3.41 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

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

guidance. This is based on an assumed blade length of 69 m, hub height of 111 m and maximum feature height of 5 m.

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

Vegetation and Peat Stability Assessments

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

3.44 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

3.45 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.

3.46 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

3.47 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 Wind Farm Development, particularly during the operational period. As described in earlier sections they are also useful in considering alternative turbine heights and geometries.

3.48 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.

3.49 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.

Collaborative Site Walkover

3.50 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.

3.51 Layout 2 on Figure 3.1 Turbine Layout Evolution represents the result of this stage.

Further assessment and refinement stage

3.52 The turbine layout was reviewed and refined in response to further assessment actions identified by consultant review and from the collaborative site visit, 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

3.53 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.

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

Archaeology and Cultural Heritage

3.55 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 to appropriate mitigation.

3.56 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

3.57 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.

3.58 Layout 3 on Figure 3.1 shows the resulting layout.

Noise and Shadow Flicker Assessments

3.59 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 3.1.** 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. Following final review, Layout 4 was agreed as final.

Final Turbine Layout

3.60 The final turbine layout is shown in Layout 4 of Figure 3.1 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 3.3.

3.61 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 1.3: Infrastructure Layout.

Infrastructure Design Evolution

3.62 The infrastructure design has evolved through the EIA process as illustrated in **Figure 3.2: Infrastructure Design Evolution, Designs 1 to 4.** Design 4 is the final design, which forms Figure 1.3 Infrastructure Layout.

Engineering considerations

3.63 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.

3.64 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.

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

Vegetation and Peatland

3.66 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

3.67 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 3.2. which is also included in Figure 1.3: Infrastructure Layout.

3.68 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

3.69 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,

3.70 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

3.71 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 2.6km 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.

Temporary Construction Compound

3.72 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 and Energy Storage

3.73 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

3.74 The final infrastructure layout is shown in Design 4 of Figure 3.2. Once finalised, the Planning Application Boundary was drawn, ensuring sufficient space within the boundary for all features.

3.75 The final Infrastructure Layout and combined constraints is shown in Figure 3.3.

Other Design Considerations

TV interference

3.76 Wind turbines can potentially interfere with communication systems that use electromagnetic waves as the transmission medium (e.g. television, radio or microwave links). Wind turbines therefore may cause interference to television reception in the proximity of a wind farm, primarily for receptors in the '*shadow*' of the turbines with aerials pointing through the wind farm, causing loss of picture detail, loss of colour or loss of audio. Microwave links can also be affected by the reflection, scattering, diffracting and blocking of the electromagnetic signal caused by wind turbines.

3.77 If the Proposed Wind Farm Development is consented, RES would agree a scheme of assessment and mitigation with the planning authority to be implemented in the case of complaints associated with television reception. Should interference to reception occur as a result of the Proposed Wind Farm Development, a range of viable mitigation measures can be considered, with the most suitable method chosen on a case by case basis. Any necessary work would be undertaken in a timely manner following receipt of a valid complaint, and would be funded by the wind farm operator.

Electromagnetic Interference

3.78 RES has consulted with all organisations operating microwave links which could be affected by the Proposed Development and these are listed in **Table 3.1**.

3.79 The proposed Carnbuck turbines are adjacent to and potentially impact two UHF scanning telemetry links, operated by System Operator Northern Ireland (SONI), which carry telemetry data from the Gruig Wind Farm substation. Talks are ongoing between RES, JRC and SONI who are engaging with the link provider, Vodafone, regarding potential mitigation solutions, including the option of utilising satellite technology.

3.80 If the Proposed Development is consented, RES would agree a scheme of mitigation with the planning authority, the link operator and provider, to be implemented prior to erection of turbines, and funded by the wind farm operator. A draft planning condition has been proposed, which is contained in Chapter 15: Summary of Mitigation.

Aviation

3.81 Wind turbines can potentially interfere with aviation operators by either physically affecting the safeguarding of an aerodrome by the close proximity of the turbines or through interference with the Air Traffic Control (ATC) radars that direct aircraft in flight. RES has consulted with all relevant organisations which could be affected by the Proposed Wind Farm Development.

3.82 NATS En Route (NERL) supplies air traffic service to all En Route aircraft navigating UK airspace. RES has consulted the published NATS safe-assessment maps which have been produced to indicate if a wind farm development will impact NERL infrastructure. The Proposed Wind Farm Development lies outside the safeguarding areas which identify need for further consultation with NERL and therefore the Proposed Wind Farm Development will have no impact on NERL infrastructure.

3.83 The Defence Infrastructure Organisation (DIO) consultation response stated that the Ministry of Defence (MOD) had no concerns to the Proposed Development.

3.84 Table 3.1 notes the pre-submission consultation that was undertaken with airports located in close proximity to the Proposed Wind Farm Development. These airports

included Belfast International Airport and Belfast City Airport. No objection responses were received from Belfast International Airport and Belfast City Airport.

3.85 As no anticipated detrimental impact upon any aviation stakeholder has been identified it is considered that there will be no additional impact created when considered cumulatively with other existing, consented or proposed wind farms.

Table 3.1: EMI and Aviation Consultation Summary

Consultee	Date of Consultation	Nature and Purpose of Consultation
Arqiva	November 2021	Check for EMI impact – no concerns
Atkins Global	November 2021	Check for EMI impact – no concerns
BT	December 2021	Check for EMI impact – no concerns
EMR Solutions	January 2022	Check for EMI impact – no concerns
Joint Radio Company	November 2021	Concerns raised and coordination report commissioned
Joint Radio Company	January 2022	Report identified mitigation required
Joint Radio Company	March 2022	Referred to SONI to review mitigation options
SONI	May 2022	Ongoing discussions to identify most viable mitigation, possibly satellite based
Northern Ireland Water	November 2021	Check for EMI impact – no concerns
Police Service Northern Ireland	November 2021 and January 2022	Check for EMI impact – no response
United Utilities	November 2021 and January 2022	Check for EMI impact – no response
Virgin	November 2021	Check for EMI impact – no concerns
Defence Infrastructure Organisation	December 2021 and January 2022	Check for aviation impact – no concerns
Belfast International Airport	December 2021	Check for aviation impact – no concerns
Belfast City Airport	December 2021	Check for aviation impact – no concerns

Ice Throw

3.86 Under certain climatic conditions, ice can build up on turbine blades which may be thrown from the blades during blade rotation or fall when blades are stationary.

3.87 The International Energy Association (IEA) has recommended an empirical formula to calculate the maximum distance that ice may be thrown from an operating turbine based on turbine geometry. For the proposed turbine envelope this ice throw risk distance has been calculated and used in the wind farm design to locate turbines away from public roads and therefore the potential for ice throw to affect members of the public is considered to be low.

Summary

3.88 The final layout of the Proposed Development reflects the need to minimise potential effects on environmental sensitivities whilst optimising the energy yield. Wind farm design is an iterative process and the design has been influenced by potential environmental effects identified through the EIA process. The proposed layout has evolved in response to policy recommendations, environmental, technical, engineering and landscape design considerations and as a result of feedback from key consultees.

List of Figures