12. Traffic & Transport

Introduction

12.1 This assessment considers the potential impacts on traffic and transport associated with the construction, operation and decommissioning phases of the proposed Carnbuck Wind Farm, hereinafter referred to as 'the Proposed Development'.

12.2 The site located within the townlands of Carnbuck, Magheraboy and Moneyneagh, near Corkey, County Antrim. The site is adjacent to the existing Gruig Wind Farm. The Planning Application Boundary, hereinafter referred to as the 'Site' is shown in Figure 1.2 Planning Application Boundary. The proposed site entrance is the existing entrance to the operational Gruig Wind Farm on the Altnahinch Road.

12.3 The following have been considered in this chapter:

- Legislation and policy;
- Access routes for abnormal indivisible loads (AIL), normal construction traffic and associated road improvements;
- The type and volume of traffic generated by the Proposed 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; and
- Cumulative impacts of surrounding operational, consented and proposed developments.

12.4 This assessment has been undertaken in-house by Renewable Energy Systems Ltd (RES) with at least one in-house Member of the Institution of Engineers Ireland and the Institution of Civil Engineers involved in its production.

12.5 This assessment is supported by the following:

- **Technical Appendix 12.1: Delivery Analysis**
- Figure 12.1: Turbine Delivery Route
- Figure 12.2: HGV Routes

Legislation, Policy and Guidance

DOE- Planning Policy Statement 3- Access, Movement and Parking (2005)

12.6 Policy AMP2 of PPS3 issued by the Department of Environment (DOE) in 2005 states that:

- *"planning permission will only be granted for a development proposal involving direct access, of the intensification of the use of an existing access, onto a public road where:*

a) *Such access will not prejudice road safety or significantly inconvenience the flow of traffic; and*
b) *The proposal does not conflict with Policy AMP3 Access to Protected Routes"*

12.7 Policy AMP3 of PPS3 (Clarification) published by the DOE in October 2006 states that: *"The Department will restrict the number of new access and control the level of use of existing accesses onto Protected routes as follows:*

- *Motorways and High Standard Dual Carriageways;*
- *Other Dual Carriageways, Ring Roads, Through- Passes and By-Passes- all Locations;*
- *Other Protected Routes – Outside Settlement Limits; and*
- *Other Protected Routes – Within Settlement Limits"*

Strategic Planning Policy Statement (SPPS)

12.8 The SPPS highlights that transportation issues to be addressed in the LDP should include Protected Routes. Whilst regional policy is to restrict the number of new access and control the level of use of existing accesses onto protected routes, there are exceptions where the principle of development accords with policy elsewhere in the SPPS.

DOE – Planning Policy Statement 18: Renewable Energy (2009)

12.9 Policy RE1 of PPS18 issued by DOE in 2009 requires applications for a wind energy development to demonstrate that no part of a development will have an unacceptable impact on roads, rails or aviation safety:

- *"Where any project is likely to result in unavoidable damage during its installation, operation or decommissioning, the application will need to indicate how this will be minimised and mitigated, including details of any proposed compensatory measures… This matter will need to be agreed before planning permission is granted."*

DOE – Best Practice to Planning Policy Statement 18 'Renewable Energy' (2009)

12.10 Section 1 of the Guidance relates to wind energy and names the "Adequacy of local access road network to facilitate construction of the project and transportation of large machinery and turbine parts to site" as one of the main concerns that needs to be considered by the developer when applying for a wind farm development.

IEMA – Guidelines for the Environmental Assessment of Road Traffic (1993)

12.11 The Institute of Environmental Management and Assessment (IEMA) guidelines (hereinafter referred to as IEMA Guidelines (1993)) are the most widely used guidance document for assessing traffic impacts as part of Environmental Statements and are referred to throughout this Chapter.

12.12 The IEMA Guidelines (1993) suggest two general rules for identifying the extent of the assessment area:

- **Rule 1** – include highway links where traffic flows will increase by more than 30% (or the number of heavy good vehicles (HGVs) will increase by more than 30%).
- **Rule 2** – include any other specifically sensitive areas where the traffic flows have increased by 10% or more.

12.13 Where the change is less than the above thresholds, the impact shall be considered 'negligible'.

Consultation

12.14 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 12.1***

Table 12.1: 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.

12.15 Please note, further consultation is required post consent with stakeholders relevant to traffic, roads and infrastructure on and near the delivery routes to finalise the preferred HGV access route strategy to the development.

Scope of the Assessment

12.16 The main transport effects will be associated with the movement of commercial Heavy Goods Vehicles (HGVs) and Abnormal Indivisible Loads (AILs) (i.e. turbine component delivery) to and from the site during the construction phase of the proposed development.

Once operational, it is envisaged that the volume of traffic associated with the proposed development would be minimal, comprising service and maintenance visits. Occasional visits may also be made to the site for more extensive maintenance/ repairs. The vehicle used for maintenance visits is likely to be a 4x4 vehicle (or similar) but there may be an occasional need for HGV deliveries, road-

going cranes or AILs to access the site for heavier maintenance and repairs. However, it is considered that the effects of such operational traffic will be negligible and therefore, detailed consideration of the operational phase of the proposed development is not included in this assessment.

The expected lifetime of the proposed development is 35 years. Decommissioning traffic will likely include the delivery of plant to site to undertake the works and the removal of turbine components, and is expected to be at lower volume than during the construction period. It is expected that should the proposed development be consented, a planning condition would be included to require the agreement of a decommissioning method statement with the relevant authorities prior to decommissioning.

12.17 For details of the assessment of construction noise associated with deliveries, see **Chapter 11: Noise**.

Abnormal Indivisible Loads (turbine component delivery)

12.18 Specialist vehicles are required to transport components to the site. One vehicle would transport turbine blades, while another type would transport the tower sections. The proposed access routes for AILs (turbine delivery) from the A44 to site is illustrated in **Figure 12.1 -Turbine Delivery Route.** 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. This is illustrated in **Technical Appendix 12.1: Delivery Analysis.**

The proposed access route for AILs 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.

12.19 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.

12.20 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.

12.21 AIL delivery will be timed to avoid peak local traffic times, such as commuting hours and school start and end times to minimise disruption.

Widening Works

12.22 Works within 3rd party land, either temporary road widening or vegetation removal to facilitate oversail of the components, will be required at three locations along

the AIL delivery route, as illustrated in **Technical Appendix 12.*1.*** Widening locations are:

- A44, Hillside Road junction (Detail 15)
- Coolkeeran Road/ Glenbush Road junction (Detail 18)
- Glenbush Road/ Altnahinch Road junction (Detail 19)

12.23 Widening works where required will include the installation of hardstand areas and vegetation trimming to facilitate the passage of AILs.

12.24 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.

Normal HGV Delivery

12.25 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 12.2 – HGV Routes**.

12.26 Sources of material will be confirmed prior to construction. No further passing bays will be required as the roads are two-way with adequate passing provided.

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

12.28 Post consent, a detailed review of all bridges/ structures along the preferred route will be undertaken and, if required structural surveys will be carried out. The requirement (if any) of any subsequent improvement will be undertaken following consultation with DfI Roads and detailed in the Traffic Management Plan (TMP).

Site Entrance

12.29 The site entrance is located on Altnahinch Road, utilising the existing site entrance to Gruig Wind Farm. It is designed accordingly to accommodate AIL deliveries however the gates and some fencing may be removed temporarily to facilitate oversail of the turbine components. These will be reinstated following turbine delivery.

12.30 The proposed site entrance is shown in ***Figure 1.10*** and has been constructed in accordance with the requirements of Development Control Advice Note (DCAN) 15, 2nd Edition.

12.31 As specified in DCAN 15, visibility splays measuring 215m x 4.5m are provided in both directions. Following construction, the site entrance will be reinstated to the gate and fencing originally installed.

Assessment Methodology

12.32 The assessment has been undertaken in accordance with the Institute of Environmental Assessment's 'Guidelines for the Environmental Assessment of Road Traffic' (1993).

12.33 The IEA Guidelines (1993) is the only document available that sets out a methodology for assessing potentially significant environmental impacts where a proposed development is likely to give rise to changes in traffic flows.

12.34 The IEA Guidelines (1993) suggest that, in order to determine the scale and extent of the assessment and the level of impact the development will have on the surrounding network, the following two 'rules' should be followed:

1. Include highways links (public roads) where traffic flows are predicted to increase by 10% or more.
2. Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

12.35 Where possible, the significance of each impact is considered against the criteria within the IEA Guidelines (1993). However, the IEA Guidelines (1993) State that:
"for many effects there are no simple rules or formulae which defines the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources."

12.36 In the absence of established significance criteria for traffic and transport impacts, professional judgement has been used to assess whether the impacts on traffic and transport are considered to be significant, using the IEA Guidelines (1993) to identify the scale and extent of the assessment to be undertaken. The significance falls into two categories; 'not significant' and 'significant', the latter corresponding to significant impacts in accordance with IEA Guidelines (1993).

12.37 The IEA Guidelines (1993) state projected changes in traffic of less than 10% creates no discernible environmental impact, given that daily variations in background traffic flow may fluctuate by this amount, and that a 30% change in traffic flow represents a reasonable threshold for including a highway link (public road) within the assessment. The threshold for a detailed assessment therefore has been set at a 30% change in HGV traffic flow.

12.38 The following receptors have been used for this assessment:

- ACT 1, Altnahinch Road

- ACT 2, Old Cushendum Road
- ACT 3, Reservoir Road
- ACT 4, Corkey Road
- ACT 5, Glenleslie Road

12.39 The Traffic Count (ATC) surveys were undertaken during a period of seven consecutive days starting on 25th April 2022 as listed in ***Table 11.2.***

Table 12.2 ATC Summaries

Road Reference	24hr Average Daily Flow
ACT 1, Altnahinch Road	115
ACT 2, Old Cushendum Road	140
ACT 3, Reservoir Road	146
ACT 4, Corkey Road	580
ACT 5, Glenleslie Road	364

Potential Significant Effects

12.40 The construction of the proposed development is anticipated to take approximately 18 months. Construction site working hours will be from 0700 to 1900, Monday to Friday and 0700 to 1300 on Saturdays but deliveries may occur outside these times to minimise disruption to local residents and/ or to comply with Health and Safety, quality or any specific environmental requirements. During both turbine erection and decommissioning periods site workings could be seven days a week.

12.41 The associated traffic flows will vary over that time as different elements of the proposed development are constructed and will depend on the chosen contractor's preferred method of working. A Traffic Management Plan (TMP) will be prepared by the Applicant or the chosen contractor once the construction schedule, plant requirements and the turbine model have been defined, pre-construction. This will ensure impacts to the users of the delivery route are minimised where possible. The TMP will be submitted to DfI Roads for approval prior to the start of construction.

12.42 Estimated traffic generation during the construction stage assumes the following activities will take place:

- Delivery of components for site set-up;
- Delivery of materials for road and hard standings;
- Delivery of materials and components associated with the foundation construction;
- Delivery of components associated with turbines;
- Delivery of components and materials associated with cable installation;
- Delivery of substation components and materials;

- Other miscellaneous deliveries/ removal; and
- Construction workers commuting.

12.43 ***Table 12.3*** provides the estimated traffic generation across an assumed 18 month construction period. The assessment has been based on the assumption that all material has to be imported to site, including ready mixed concrete for the turbine foundations and all aggregate for the access tracks and areas of hardstanding, thus providing a worst case assessment.

Table 12.3 Estimated Traffic generation across an assumed 18 month construction period

Phase	Purpose	Delivery Vehicle	Approx. No. of deliveries for project duration	Approx. highest No. of daily deliveries	Approx. delivery period
Site Set-Up	Portacabin delivery	Low Loader	10	10	1
	Skip delivery	Low Loader	5	5	1
	Generator delivery	Low Loader	2	2	1
	Water & fuel tank delivery	Low Loader	1	1	1
	Excavator delivery	Low Loader	3	2	1-2
	Tool container delivery	Low Loader	2	2	1-2
	Roller-compactor	Low Loader	3	1	1-2
	Articulated dumper	Tipper Lorry	3	1	1-2
Site tracks & hard standings	Stone for site tracks	Tipper Lorry	2250	40	2-11
	Stone for control building & substation compound	Tipper Lorry	40	10	2-11
	Stone for construction compound	Tipper Lorry	20	20	2-11
	Stone for pathways	Tipper Lorry	30	30	2-11
	Stone for crane hardstandings	Tipper Lorry	1000	40	2-11
Foundation construction	Excavator delivery	Low loader	2	2	7-12
	Misc works	Backhoe loader	2	2	7-12
	Concrete for turbine foundations, piles & transformer plinths	Mixer truck	720	60	7-12
	Steel delivery	Flat bed	24	24	7-12
	Foundation bolts or steel insert delivery	Flat bed	12	12	7-12

Phase	Purpose	Delivery Vehicle	Approx. No. of deliveries for project duration	Approx. highest No. of daily deliveries	Approx. delivery period
	Place foundation bolt cage or steel insert	30t – 50t crane	1	1	7-12
Turbine Erection	Tower section delivery	Clamp lift trailer	48	8	12-15
	Blade delivery	Extendible trailer	36	6	12-15
	Nacelle	Low loader	12	2	12-15
	Hub and rotor	Low loader	12	2	12-15
	Drive train	Low loader	12	3	12-15
	Large crane delivery & removal	1000t – 12000t crane	2	1	12-15
	Crane associated equipment delivery & removal	Low loader	42	10	12-18
	Smaller crane delivery & removal	150t – 200t crane	2	1	12-18
Cable Installation	Cable delivery	Flat bed	20	8	9-13
	Sand delivery	Tipper lorry	240	20	9-13
	Excavator delivery	Low loader	2	1	9-13
	Cable laying	Tele handler	2	1	9-13
Substation and Control Building	Concrete delivery	Mixer truck	36	36	7-12
	Brick delivery	Flat bed	3	3	7-12
	Roofing & Cladding	Flat bed	3	3	7-12
	Switchgear	Flat bed	2	2	7-12
	Misc. electrical equipment	Flat bed	3	3	7-12
Energy Storage	Onsite battery containers, PCS and transformer units	Flat bed	50	5	12-18
	Battery Delivery	Flat bed	50	5	12-18
	Electrical equipment delivery	Flat bed	15	5	12-18
	Concrete delivery	Mixer truck	25	25	12-18
	Spares container delivery	Flat bed	1	1	12-18
Misc.	Waste removal	Skip lorry	90	1	1-18

Phase	Purpose	Delivery Vehicle	Approx. No. of deliveries for project duration	Approx. highest No. of daily deliveries	Approx. delivery period
	Water/ fuel deliveries	Small tanker	90	1	1-18
Site Demobilisation	Portacabin removal	Low loader	10	10	18
	Skip removal	Low loader	5	5	18
	Generator removal	Low loader	2	2	18
	Water & fuel tank removal	Low loader	1	1	18
	Excavator Removal	Low loader	3	2	18
	Tool container removal	Low loader	2	2	18
	Roller-compactor	Low loader	3	1	18
	Articulated Dumper	Tipper Lorry	3	1	18
	Misc. works	Low loader	2	2	18
TOTAL Heavy Goods Vehicles			**4957**		
Site Staff & Deliveries	Staff	Cars & minivans	12,000	65	1-18
	Miscellaneous	Vans	1,300	5	1-18
TOTAL Cars & Light Vehicles			**13,300**		
TOTAL VEHICLES			**18,257**		

12.44 ***Table 12.3*** has been derived from experience gained from previous wind farm construction phases and assumes approximately 40 stone deliveries per day.

12.45 It is estimated that the greatest concentration of construction traffic occurs on the days when concrete is delivered to the proposed development for the construction of turbine foundations.

12.46 Technical 'best practice' construction requirements may necessitate that the concrete for an individual turbine base foundation will have to be delivered and poured in one day to prevent 'cold' joints forming in the structure. As a result, there may be a period in which there will be an increased number of delivery vehicles, compared with the rest of the construction period, entering and leaving the site. The total number of concrete deliveries for each turbine base may be up to 60 journeys per day.

12.47 This equates to approximately one vehicle movement every five minutes over the working day (0700 – 1900). ***Table 12.4*** illustrates the worst case percentage change of traffic flow (i.e. based on the busiest 6 days) along the proposed access route during the turbine base construction stage of the proposed development.

Table 12.4 Summary of Percentage Increase in Traffic on Local Roads

Road Reference	24hr Average Daily Flow	Average Recorded Daily HGV Flow as a percentage (No. of HGVs)	Percentage increase of HGVs (No. of HGVs)	Is the IEA (1993) threshold of 30% increase in HGV Traffic Flow exceeded?
ACT 1, Altnahinch Road	115	30% (35)	671% (235)	Yes
ACT 2, Old Cushendum Road	140	16% (23)	970% (223)	Yes
ACT 3, Reservoir Road	146	16% (24)	933% (224)	Yes
ACT 4, Corkey Road	580	15% (87)	330% (287)	Yes
ACT 5, Glenleslie Road	364	18% (65)	408% (265)	Yes

12.48 It is predicted that there will be an increase in HGV vehicle movements of between 330% and 970%. The percentage increase is high given the low volume of HGV traffic which the roads currently experience. These roads are two way, with a number of passing bays already in place along the Altnahinch Road, and therefore will not need to be widened to accommodate vehicles travelling to and from the site entrance.

12.49 It should be noted the percentage increase will likely be lower than the calculations provided in table 12.4 as this is representative of all estimated HGV traffic travelling on each respective road. In reality this will likely be reduced with the use of a circular driving route and/or by using a number of different roads for access and egress to site, rather than all traffic using a single route.

12.50 The IEA threshold of 30% us exceeded in all five monitored locations, therefore an assessment of potential significant impacts has been provided in ***Table 12.5***.

12.51 Table 12.6 provides a summary of predicted environmental effects of the route widening works.

Table 12.5: IEA Environmental Impact

Predicted Impact	Description	Applicability to Tertiary Road Network
Severance	Severance is a perception that a road is more difficult or possibly less safe to cross. Increased severance can result in the isolation of areas of a settlement or individual properties. However, it is important to note that the impact is largely a function of traffic volumes, rather than one of vehicle composition amongst traffic.	The IEA guidelines suggest changes in traffic flow of 30% are likely to affect severance. There is low existing traffic flow and little pedestrian activity. The TMP will be undertaken with consultation of the utilised quarry, local school and local residents. An agreement will be made to ensure that delivery times do not coincide with 'pick-up' and 'drop-off' times that may affect access to local services. With this measure the temporary impact of severance is considered to be **Not Significant**

Predicted Impact	Description	Applicability to Tertiary Road Network
Driver Delay	Driver delay is that experienced by non-development related road uses on the surrounding roads and particularly as a consequence of slow moving traffic associated with construction.	The IEA guidelines suggest that delays are only likely to be of significance when the traffic on the surrounding network is at, or close to, full capacity. Given that this is not the case, this is not considered to be an issue. It is acknowledged that there may be localised delays directly attributable to construction traffic due to the large increase in traffic flow on the A44 and surrounding minor roads. This is most likely restricted to junctions, and local road users are familiar with encountering HGVs. The delivery of AILs will involve large, slow moving vehicles however these will be escorted and timed to cause minimal disruption. The potential impact is considered **Not Significant** given that there is a low volume of vehicles on the tertiary road network and these roads are two way. There are a number of passing bays already in place on the Altnahinch Road. Multiple routes are under consideration for HGVs, with the traffic likely spread across the tertiary road network. The increase in traffic predicted for the tertiary road network will therefore likely be reduced with the use of a circular driving route or using multiple roads for access and egress to site. Deliveries will be timed to minimise disruption, escorted where necessary and information regarding deliveries will be made available via the TMP, prior to construction.
Pedestrian Delay	Pedestrian delay is affected by changes in traffic volume, HGV movements and traffic speed. Pedestrian delay also depends on the existing level of pedestrian activity, visibility and current infrastructure provision. There is no threshold on which pedestrian delay is assessed.	Pedestrian movement on the A44 and surrounding tertiary road network is minimal The area therefore has a low sensitivity rating in relation to pedestrian delay and impacts will be **Not significant**

Predicted Impact	Description	Applicability to Tertiary Road Network
Pedestrian Amenity	Pedestrian amenity can be affected by traffic volumes and the distance between pedestrians on the footway and passing traffic. The IEA guidelines suggest that changes to pedestrian amenity may be considered significant where traffic is doubled or halved.	There is minimal volume of pedestrian movement on the A44 and surrounding tertiary road network and whilst the volume of HGV sees a significant increase, given the lack of pedestrian movement this does not pose a significant risk. It is considered the impact on pedestrian's / cyclist's amenity will be **Not Significant** given that the worst case of vehicle movements will be one per five minutes on the six days associated with the turbine foundations.
Fear & Intimidation: Pedestrians	The IEA guidelines state that the degree of fear and intimidation experienced by pedestrians is affected by the volume of passing traffic, the proportion of HGV traffic and its proximity to pedestrians.	Despite the predicted temporary increase in traffic flows, the minimal volume of pedestrian movement along the A44 and surrounding tertiary road network combined with the two-way nature of these roads means this impact will be **Not Significant.**
Accidents & Safety	The IEA guidelines state that road accidents are attributable to a variety of local factors and as such do not provide a threshold to determine significance. Instead the IEA guidelines relies more on the assessor to use their own judgement.	Construction and predicted changes will be temporary and given that consultation will be undertaken with local residents, and traffic will be targeted to off peak travel times, there is unlikely to be an impact upon road safety and accident levels. Furthermore, all abnormal loads will be escorted, and the movement of these vehicles will be programmed to avoid busy periods thus reducing the potential impacts further. It is considered the overall impact on accidents and safety is **Not Significant** given that the worst case of vehicle movements will be one per five minutes on the six days associated with the turbine foundations.

Table 12.6: Summary of Predicted Environmental Effects of Widening works

Environmental Impact Type	Location	Summary of Predicted Environmental Effects
Landscape & Visual Amenity	Detail 15 (A44 / Hillside Road / Lagge Road junction)	Hedgerows around this road junction are generally in very poor condition and gappy. No significant landscape or visual effects would arise from removal of vegetation.
	Detail 18 (Coolkeeran and Glenbush Road junction)	Removal of one mature tree and a small section of established hedgerow which is in relatively good condition will be required on one side of this road junction. This will have limited landscape and visual effects which are not deemed to be significant. There is a residential boundary hedge on the other side of the junction. It is anticipated

		that works will be carried out within the carriageway or verge to avoid damage to this vegetation and therefore no significant landscape or visual effects would arise. There is also a tall mature line of Ash trees located immediately to the south west of the proposed widening which should be protected from damage during construction works.
	Detail 19 (Glenbush and Altnahinch Road junction)	Partial removal of an existing hawthorn hedge which is in poor condition and has already been partially replaced by a post and wire fence would have no significant effect on landscape character but the small stand of mature hedgerow trees within fields immediately to the south west of this location should be protected from damage during construction works.
Archaeology & Cultural Heritage	Detail 15 (A44 / Hillside Road / Lagge Road junction)	There are no heritage assets recorded on the Northern Ireland Sites and Monuments Record (NISMR) and no features depicted on historic Ordnance Survey mapping within the areas of overrun and oversail in any of these areas. The areas of overrun and oversail are likely to have been disturbed during construction works for the existing roads. The archaeological potential of these areas is therefore considered to be negligible and no mitigation is recommended.
	Detail 18 (Coolkeeran and Glenbush Road junction)	
	Detail 19 (Glenbush and Altnahinch Road junction)	
Vegetation & Peatland	Detail 15 (A44 / Hillside Road / Lagge Road junction)	No predicted effects (area was cleared previously)
	Detail 18 (Coolkeeran and Glenbush Road junction)	Loss to semi-mature tree, with low bat roost potential (BRP). Should be replaced with mature standard (native species of local provenance). Short section of hedgerow may be lost, this should be replanted after works are completed.
	Detail 19 (Glenbush and Altnahinch Road junction)	Loss to semi-mature tree, with low BRP. Should be replaced with mature standard (native species of local provenance). Short section of hedgerow may be lost, this should be replanted after works are completed.
Terrestrial Fauna	Detail 15 (A44 / Hillside Road / Lagge Road junction)	No predicted effects (area was cleared previously)
	Detail 18 (Coolkeeran and Glenbush Road junction)	
	Detail 19 (Glenbush and Altnahinch Road junction)	Loss to semi-mature tree, with Low BRP. Should be replaced with mature standard.
Ornithology	Detail 15 (A44 / Hillside Road /	No predicted effects

	Lagge Road junction)	
	Detail 18 (Coolkeeran and Glenbush Road junction)	No predicted effects
	Detail 19 (Glenbush and Altnahinch Road junction)	No predicted effects. In order to avoid any possible disturbance to nesting birds the proposed tree removal at this location should be completed outside the bird nesting season (March to July).
Geology & Water Environment	Detail 15 (A44 / Hillside Road / Lagge Road junction)	Geology: The proposed works are localised not requiring significant excavations; therefore, potential adverse effects on the geological environment are unlikely. Groundwater: Limited potential for short term slight deteriorations in water quality due to excavations that would release sediments; use of mechanical plant with associated fuels and lubricants. Mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Surface Water: There are no surface water features located within 150 m of the proposed works; therefore, potential adverse effects to surface water quality in the surrounding area is unlikely. However, mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Protected Areas: There are no protected areas in the vicinity of the proposed works. PWS / Abstractions: No private water supplies or abstractions are identified on DWI / NIEA mapping in the vicinity of the proposed works. Flood Risk: Discrete areas of surface water flooding are identified on Flood Maps NI in the vicinity of Detail 15. Appropriate techniques to manage surface water around working areas shall be implemented as outlined in

		Chapter 10 and Technical Appendix 10.1 – Surface Water Management Plan.
	Detail 18 (Coolkeeran and Glenbush Road junction)	Geology: The proposed works are localised not requiring significant excavations; therefore, potential adverse effects on the geological environment are unlikely. Groundwater: Limited potential for short term slight deteriorations in water quality due to excavations that would release sediments; use of mechanical plant with associated fuels and lubricants. Mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Surface Water: Field drainage channels are located c. 30 m and c. 25m east and west, respectively from the area of proposed works. Mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Protected Areas: There are no protected areas in the vicinity of the proposed works. PWS / Abstractions: No private water supplies or abstractions are identified on DWI / NIEA mapping in the vicinity of the proposed works. Flood Risk: Discrete areas of surface water flooding are identified on Flood Maps NI in the vicinity of Detail 18. Appropriate techniques to manage surface water around working areas shall be implemented as outlined in Chapter 10 and Technical Appendix 10.1 – Surface Water Management Plan.
	Detail 19 (Glenbush and Altnahinch Road junction)	Geology: The proposed works are localised not requiring significant excavations; therefore, potential adverse effects on the geological environment are unlikely. Groundwater: Limited potential for short term slight deteriorations in water quality due to excavations that would release sediments; use of mechanical plant with associated fuels and lubricants. Mitigation to address

		potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Surface Water: There are no surface water features located within 130 m of the proposed works; therefore, potential adverse effects to surface water quality in the surrounding area is unlikely. However, mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated, shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 10: Geology and Water Environment and accompanying Technical Appendix 10.1: Surface Water Management Plan. Protected Areas: There are no protected areas in the vicinity of the proposed works. PWS / Abstractions: No private water supplies or abstractions are identified on DWI / NIEA mapping in the vicinity of the proposed works. Flood Risk: No flooding is predicted by Flood Maps NI in the vicinity of Detail 19.
Noise	Detail 15 (A44 / Hillside Road / Lagge Road junction)	The works are far enough away from residential properties that the 65 dB(A) daytime target level specified by BS 5228-1:2009 would be met.
	Detail 18 (Coolkeeran and Glenbush Road junction)	The 65 dB(A) daytime target level specified by BS 5228-1:2009 is predicted to be exceeded at nearby properties due to these works although their temporary nature is such that the impact is not expected to be significant.
	Detail 19 (Glenbush and Altnahinch Road junction)	The 65 dB(A) daytime target level specified by BS 5228-1:2009 is predicted to be exceeded at nearby properties due to these works although their temporary nature is such that the impact is not expected to be significant.

Cumulative Impacts

12.52 There is one consented project within 10 km of the proposed development. This is Corkey Wind Farm Repowering 1.5 km northwest of the Carnbuck site entrance. Corkey Repower and Carnbuck intend to partially utilise the same turbine delivery

route for AILs, with Carnbuck traffic continuing to the Gruig site entrance c. 2.3km further along Altnahinch Road. HGV traffic for Corkey Windfarm repowering is indicated to take access from the west off the A44.

12.53 Whilst there could theoretically be cumulative traffic impacts, it is considered very unlikely that the construction periods for these two projects would overlap, as Corkey Repower is already consented. Pre-construction, as part of the TMP consideration of any construction traffic from other wind farms will be reviewed in detail and mitigated accordingly. Given the low traffic volume associated with operational phase wind farm traffic, this has not been considered in this assessment.

Table 12.6: Pre-construction Wind Farms in the Vicinity of the Proposed Development

Name	Status	Number of Turbines	Distance from Proposed Site Boundary
Corkey Windfarm Repowering	Consented	5	1.5km north west of site entrance

Mitigation

12.54 A Traffic Management Plan (TMP) will be prepared by the Applicant in accordance with the requirements of DfI, the local PSNI, and if required, any other relevant stakeholders. Features of the TMP will include:

- Details of the access route, conformation of any points along the access route that require street furniture removal, details of traffic numbers, delivery timings, and signage and escort requirements
- A delivery schedule for normal and abnormal loads to minimise disruption as far as reasonably practicable
- Details of how any movements will comply with legislation regarding the movement of abnormal loads e.g. notice procedures and notice periods
- Details on the use of escorts where required. Where long vehicles and abnormal loads would have to use the wrong side of the carriageway or need to swing into the path of oncoming vehicles a lead warning vehicle would be used. One escort vehicle would drive ahead and pull oncoming traffic into identified passing places. An escort vehicle would travel directly in front of the convoy and pull over any oncoming traffic that comes onto the road after the first escort vehicle has passed. A further convoy escort vehicle would follow the convoy
- Information about marking of vehicles as long/abnormal loads

12.55 Information will be given on how warning signs will be used. These will be used to advise other road users of 'Caution Slow Plant Turning Ahead' and will be placed at intervals from both directions along the main road approaching the site entrance during the construction phase. The TMP will also detail additional measures to ensure impacts from traffic movements are minimised where possible, for example provision of road sweepers and/or wheel wash facilities.

12.56 If required, the wheel wash facilities will include a waterless drive over wheel wash for lorries. This will be provided at the site entrance to prevent mud and dust being

brought out from the Site onto the public highway and anything being brought onto Site from public highway. Although experience has shown the majority of mud is shaken off wheels on site before the vehicle reaches the public road, the site entrance and adjacent public highway will also be monitored and cleaned if necessary.

12.57 The TMP will include details about Video Surveying and Road Repairs. A video survey of the pre-construction condition of all public roads will be recorded around the site entrances and access routes (but including the site entrance and access roads), to provide a baseline record of the state of the roads prior to construction work commencing. This will enable any repairs and maintenance work required to the relevant road due to any damage caused by the passing of heavy vehicles associated with the wind farm construction to be identified following the construction phase. The roads will be returned, at minimum, to the baseline condition at the end of the construction phase. Any damage caused by wind farm traffic during the construction period, which would be hazardous to public traffic, will be repaired immediately. These works will be carried out under permits with DfI Roads, as appropriate.

12.58 The TMP will include plans for notifying relevant stakeholders in advance of delivery periods, including the emergency services, DfI Roads, local residents, local business, local services and schools. The local community will be informed prior to the commencement of construction and prior to the commencement of turbine deliveries by letter and through local press. The contact details of the Construction Site Manager will be made available as a contact point for enquiries. Local schools on the delivery routes will be contacted to identify school and nursery drop-off and pick up locations and times. Construction deliveries will be scheduled to avoid these busy periods as far as reasonably possible.

12.59 If cutting or removal of hedges and trees is required, then this should be done outside the bird breeding season (1st March to 31st August) unless otherwise agreed. If work is to be done during the breeding season, then there should be a survey to establish whether nesting birds are present.

Summary

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

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

12.62 A TMP will be developed and agreed with relevant stakeholders post consent and pre-construction in order to control and mitigate impacts associated with increased vehicles movements.

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

List of References, Figures and Appendices

References

Department of Environment (2009); Best Practice Guidance to Planning Policy Statement 18 – Renewable Energy, Planning and Environmental Policy Group.

Department of Environment (2005); Access, Movement and Parking Planning Policy Statement 3, PPS 3, The Planning Service.

Department of Environment (2015); Northern Area Plan 2016. Institute of Environmental Assessment (1993);

The Institute of Environmental Assessment's Guidelines for the Environmental Assessment of Road Traffic.

Figures

Figure 12.1: Turbine Delivery Route

Figure 12.2: HGV Routes

Technical Appendices

12.1: Delivery Analysis