

# MWP

## **Chapter 18** **Schedule of Mitigation Measures**

**Brittas Wind Farm Project**  
**Co. Tipperary**

**Brittas Wind Farm Ltd**

**November 2024**

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## **18. Schedule of Mitigation Measures**

### **18.1 Introduction**

This Schedule of Environmental Mitigation summarises and sets out an implementation programme for all environmental mitigation measures recommended in the Environmental Impact Assessment Report (EIAR) and the Natural Impact Statement for the Proposed Project.

### **18.2 Format of the mitigation Schedule**

The schedule on the following pages is structured in accordance with the following project phases:

- Prior to Commencement of Construction
- During Construction Phase
- Post Construction/ Operational Phase
- Decommissioning

The schedule is presented in a Table format which outlines, for each of the project phases:

- I. the environmental aspect or resource for which mitigation is required,
- II. the required or proposed mitigation measure to undertake/implemented,
- III. the persons responsible for implementing the recommended mitigation
- IV. the relevant actions, procedures and plans relating to implementation of the mitigation

### 18.3 Pre-Construction Mitigation and Monitoring Measures

Table 18-1 Schedule of Pre-Construction Environmental Mitigation & Monitoring Measures

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Mitigation by Design</p> <p>Site design was carried out with cognisance to the full range of environmental features and sensitivities to minimise the impact of the Proposed project on the environment. Consultation between the design team (Project Manager, Project Engineers, and Project Ecologists and Environmental Consultants) and the Applicant was conducted on an ongoing basis during the design phase, in order to formulate a project design which would avoid, prevent and/or minimise any significant adverse environmental effects, in so much as was practicably possible. A considerable effort was spent by the project environmental consultants and engineers on avoiding or minimising environmental effects and this has been constraint led throughout the design process. These design measures relate to locating the turbines and associated infrastructure 50m away from water courses, outside the high flood zones and 720m from any neighbouring residential dwellings and outside the exclusion zones for monuments and other heritage resources, avoiding any in-stream works or works in sensitive ecological habitats, minimizing the removal of hedgerows and tree felling, avoiding dissecting and fragmenting agricultural fields as much as possible, minimizing the effects on landscape character and any material assets in the project area.</p> <p>The project has been designed to avoid and minimize all the potential significant negative environmental effects. The recommended mitigation measures have been incorporated into the Construction Environmental Management Plan (CEMP).</p> <p>Environmental design control measures identified in the CEMP and the design drawings will be installed, as appropriate, either in advance or in conjunction with the construction works in order to avoid and minimise all potential environmental effects associated with the works.</p>	<p>Applicant and Appointed Design and Environmental Consultants</p>	<p>Chapters 3, and 5-15. The CEMP must be adhered to during the construction phase.</p>
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Construction Environmental and Management Plan (CEMP)</p> <p>A Construction Environmental Management Plan (CEMP) has been prepared for the project and will be implemented during construction in order to ensure that the project is constructed in accordance with best practice, with the minimum effect on the surrounding environment. The implementation of proposed mitigation measures, environmental commitments of the project and the monitoring and supervision of these measures will be managed through the CEMP. It includes, but is not limited to, measures to control/manage various elements of the development including the following:</p> <ul style="list-style-type: none"> <li>• Management of Excavations</li> <li>• Surface Water Management and Run off Control (Sediment and Erosion Control)</li> <li>• Fuels and Oils Management</li> <li>• Management of Concrete</li> <li>• Construction Noise Management</li> </ul>	<p>Applicant</p> <p>Principal Contractor and Responsible personnel identified in the CEMP</p>	<p>Chapter 2 Project Description Chapter 3 Civil Engineering</p> <p>Appendix 2A CEMP</p> <p>To be communicated to Principal Contractor and incorporated into final CEMP.</p>

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>• Construction Waste and By Product Management Plan</li> <li>• Wheel Wash Management Procedure</li> <li>• Construction Traffic Management</li> <li>• Construction Dust Management</li> <li>• Construction Noise Management</li> <li>• Archaeological and Heritage Protection</li> <li>• Ecological Management Plan for the Protection of Habitats and Fauna</li> <li>• Management of invasive Species</li> <li>• Management of Material Assets</li> <li>• Landscape and Visual Management</li> <li>• Land and Soil Management</li> <li>• Emergency Response Plan</li> <li>• Site Environmental Training Awareness</li> <li>• Monitoring and Auditing</li> <li>• Environmental Accidents, Incidents and Corrective Actions</li> </ul>		Chapters 5 to 15 NIS
<b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b>	Construction Environmental and Management Plan (CEMP) The EIAR Construction and Environmental Management Plan will be updated to align with the conditions of the planning permit and any other licenses needed, and finalized by the appointed Contractor in advance of works commencing and will be submitted to the local authority(s) for approval. Construction method statements will be prepared prior to commencement of construction and incorporated into the CEMP.	Principal Contractor and Responsible personnel identified in the CEMP	Develop Final CEMP and submit to planning authority for comment.
<b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b>	Traffic Management Plan (TMP) A final TMP will be prepared by the Principal Contractor. It will take account of the measures specified in the TMP submitted with the planning application, and any measures agreed with the relevant authorities.	Principal Contractor	Develop final CTMP and submit to planning authority for comment.
<b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b>	Best Practice <u>Environmental Manager / Ecological Clerk of Works (ECoW)</u> A suitable qualified and experienced Project Ecologist/ECoW will be employed during the construction phase of the project. Duties will include the review of all method statements, delivery of toolbox talks, undertaking of all required pre-construction surveys for protected species, clearance works, and monitoring of works throughout the construction phase to ensure all environmental controls and EIAR mitigation is implemented in full. As part of toolbox talks, contractor staff and other site personnel, as relevant, will be made aware of the procedure to follow if a protected species or their resting or breeding site, is encountered. The Project Ecologist/ECoW will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects other than those predicted and mitigated for in	Applicant Principal Contractor	Chapters 5 to 16 Appendix 2B CEMP Appoint Project Team NIS

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>the EIAR. The project ecologist/ECoW will be responsible for pointing out boundaries of exclusion zones as per below.</p> <p>The appointed Project Ecologist/ECoW will have demonstrated professional experience in managing large-scale construction works affecting ecological receptors identified within the EIAR.</p>		
<b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b>	<p>Best Practice</p> <p>An <u>Ecological Clerk of Works (ECoW)</u> will be appointed to oversee all aspects of work. The ECoW will be a suitably experienced ecologist with knowledge and practical experience of wind farm development projects. The ECoW will deliver Toolbox Talks to contractors and will undertake audits of the site offering guidance and due diligence and ensure that ecological mitigation measures set out in all documents are implemented, working and reviewed.</p>	<p>Applicant</p> <p>Principal Contractor</p>	<p>Chapters 5 to 16</p> <p>Appendix 2B CEMP</p> <p>Appoint Project Team</p> <p>NIS</p>
	<p>Biodiversity Assessment of Root Protection Area</p> <p>A pre-construction assessment of hedgerows, treelines and woodland adjacent to works corridor, targeting sections that will be retained post-construction, will be undertaken by an appropriately qualified arboriculturist.</p> <p>To compensate for the partial permanent loss of these hedgerows, it is proposed to replant a hedgerow of better species diversity on site within the same area. The hedgerow would contain multiple species and be longer than the section of hedgerow that is to be removed from this area. Appropriate replanting of removed hedgerows and trees along the GCR and TDR will be undertaken to ensure no net loss.</p> <p>A root protection area (RPA) was calculated for the veteran/ancient trees on site. This root protection equates to 30m for the areas where the proposed borrow pit will be excavator. This RPA has been respected for the western and eastern sides of the hedgerow. The hedgerow will only be partially removed. The method of calculating RPA noted is noted in the BS:5387:2012.</p> <p>On the eastern side of the eastern block of woodland where the proposed T.10 is located there is an RPA of 15m which is been respected with the proposed turbine footprint and access track.</p> <p>When the borrow pits are backfilled, the hedgerow will be replanted/reinstated with <i>Prunus spinosa</i> as was previously planted. Any sections of drystone walling that will be impacted will be retained on site and re-constructed when the hedgerow is replanted to return the wall to as close as its original state as possible.</p>	<p>Project Ecologist</p>	<p>Chapter 6 Biodiversity</p>

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>Biodiversity Habitat Monitoring of Annex 1 Molinia meadows habitats (pre-construction, construction and post-construction)</p> <p>Pre-construction eight permanent quadrats (10x10 m squares) will be set up within the area of Annex I habitat in the proposed substation field for long-term vegetation monitoring. To ensure quadrats can be relocated on subsequent visits, accurate grid references of the square will be taken and these will be marked using permanent metal pins. Quadrats will be distributed through the habitat to sample central areas and areas around the edge of the Molina meadows habitat.</p> <p>Baseline conditions will be established pre-construction and for each quadrat:</p> <ul style="list-style-type: none"> <li>- Photographs will be taken to visually document any changes in site conditions over time;</li> <li>- Vegetation type will be recorded;</li> <li>- All species present will be listed, together with an indication species abundance, both in terms of % cover and rating on the DOMIN scale;</li> <li>- The presence of both positive and negative indicator species for the habitat type will be noted;</li> <li>- Other factors including vegetation height, ground conditions and management will be recorded;</li> </ul> <p>During construction surveys will be repeated to ensure that the habitat is not impact by constructions works, especially by any drainage in the vicinity of tracks leading to T4 from the substation field.</p> <p>Post-construction surveys will be undertaken in Years 1, 2, 3, 5 and 10.</p> <p>Surveys must be undertaken by a suitable qualified botanist and at the optimal time of year for surveying Molinia meadow habitat.</p>	Project Ecologist	Chapter 6 Biodiversity
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Biodiversity Non-volant mammals (Badger and Otter) - Pre-Construction survey</p> <p>In order to avoid accidental disturbance to the resting places of protected mammals, during the construction phase of the proposed project, including badgers, hares and pine martens; prior to works commencing these will be preceded by a due diligence ecological walkover survey of the proposed works corridor, including the grid connection route, TDR areas that include tree felling and hedgerow removal, and bat feature buffers.</p> <p>In order to limit accidental disturbance to bat roosts during the construction phase of the proposed project; prior to works commencing trees within the works corridor previously assessed as supporting moderate to high PRFs will be re-assessed. Initially this will involve a ground level visual assessment, which will be followed up by inspections under licence and re-entry/emergence surveys, as required.</p>	Project Ecologist	Chapter 6 Biodiversity
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Biodiversity Bats – Pre-construction Surveys</p> <p>A number of trees were identified as Potential Bat Roosts (PBRs) within the proposed project site and along the grid route and TDR.</p> <p>Pre-construction roost surveys of structures and trees will be carried out at the project site, including along the route of the proposed grid connection in advance of construction commencing. Emergence/re-entry surveys may be required at structures/trees, pending the results of the surveys.</p> <p>Prior to the felling of any trees identified as PBRs, detailed physical inspections of the trees Potential Roost Features (PRFs), using endoscope and high-powered torch, and/or dusk/dawn surveys will be undertaken at each affected tree to determine if roosting bats are present.</p>	Project Ecologist	Chapter 6 Biodiversity



PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>In the event that a bat roost is identified, mitigation will be recommended by the Project Ecologist/ECOW, as required, and will follow best practice guidance as per:</p> <p>Bat Mitigation Guidelines for Ireland Ver 2. Irish Wildlife Manuals, No 134 (Marnell et al., 2022);                      Bats and onshore wind turbines – survey, assessment and mitigation. (SNH, 2021);                      Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, undated);                      Guidelines for the treatment of bats during the construction of National Road Schemes (NRA, undated).</p> <p>All bats, and their roosts, are afforded legal protection by the Wildlife Act 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) . In the event that any active roosts are identified which it is proposed to remove, it will be necessary to submit an application for a Derogation Licence (issued under Regulation 54 of the Habitat Regulations). Strict criteria must be met before such a licence can be approved by the Minister who can only issue such derogation licences in very limited circumstances.</p>		
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Biodiversity                      Amphibians – Pre Construction Survey</p> <p>Amphibian surveys will be carried out by an ecologist in advance of construction works. These surveys will focus on breeding areas potentially used by amphibians. Methodology for frog surveys will follow Reis et al. (2013). In the event that there is a requirement to disturb breeding frogs, frog spawn and/or spawning habitat, appropriate actions will be followed by the project ecologist to ensure their preservation.</p>	<p>Project Ecologist</p>	<p>Chapter 6 Biodiversity</p>
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Water</p> <p>A program for water monitoring will be prepared in consultation with Inland Fisheries Ireland prior to the commencement of the construction of the wind farm. The plan will include monitoring of water during the pre-construction, throughout construction and in the immediate post construction phases.</p> <p>Further baseline water quality monitoring of all streams near the development site will be undertaken prior to construction to confirm existing conditions at the time of construction. This baseline data will include the main components of a full hydrograph for the streams including both high spate flow and base flow where possible.</p>	<p>Project Ecologist/ECOW</p>	<p>Chapter 6 Biodiversity                       Chapter 8 Water                       SWMP</p>

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<p><b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b></p>	<p>Ornithology Pre-Construction Bird Survey</p>	<p>SNH (2009)<sup>1</sup> provides guidance on post-construction monitoring requirements for onshore wind farms. SNH (2009). Guidance note Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms January 2009. Scottish Natural Heritage, now NatureScot</p> <p>All surveys monitoring birds will be undertaken by an appropriately experience ornithologist.</p> <p>SNH (2009) states in relation to ornithological monitoring during construction of onshore wind farms: Monitoring should also take place during construction, where these effects are likely to be more than temporary, for example where disturbance and habitat loss (before mitigation) may have longer term impacts. Temporary effects are different in nature to those during the operation of the wind farm, and as they are not strictly part of the monitoring protocol, they are best dealt with through compliance monitoring of planning conditions.</p> <p>Construction phase monitoring will involve the following actions:                      Bird surveys, as part of a pre-construction due-diligence ecological survey will be undertaken within one month of the commencement of construction works and walkovers will target all suitable habitats out to 500 m from the turbine layout and works corridor.</p> <p>Should the clearance of vegetation suitable for nesting birds be required during the bird breeding season, the relevant area(s) of vegetation will be surveyed in advance by the ECoW (with ornithological survey experience).</p> <p>Any construction works proposed during the breeding bird season will be preceded by a survey and will ensure the implementation of appropriate buffer zones, if nests/territories are identified and measures required in order to avoid disturbance. Particular attention will be given to sensitive bird species, including breeding raptors and waders. Ongoing monthly site visits will be undertaken during the breeding season (mid-March to early-July, inclusive) and the frequency of monitoring may be increased to weekly as required, if for example, works are occurring within 500 m of the known peregrine nest over a sensitive period, e.g. egg laying and incubation. Monitoring will target all suitable habitats out to 500 m from the works corridor, and particular attention will be paid to the area ahead of any construction works.</p> <p>If works in the northern part of the Proposed Project Site are scheduled to commence in February, a pre-construction visit will be required to monitor potential lapwing breeding sites identified in <b>Appendix 7G: Figure 7G.1 of EIAR Vol. 3</b>, as this species can be present on territories early in the season (late-February/early March).</p> <p>The peregrine nest will be monitored during the breeding season while construction works are occurring in the southern part of the Proposed Project Site. Nest site monitoring will commence in April to determine what stage the birds are at and to manage when restrictions are no longer required. Fledging success and dispersal will be surveyed to investigate how fledged birds disperse into the wider area in relation to the turbines being constructed.</p>	<p>Developer Project Manager</p> <p>and/or</p> <p>Appointed Project Contractor</p>	<p>Chapter 7 Ornithology</p>

<sup>1</sup> SNH (2009). *Guidance note: Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms*. January 2009. Scottish Natural Heritage, now NatureScot

PRE CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<b>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</b>	Blasting – Pre-Construction Notification and Blast Management Plan	A Blast Management Plan will ensure compliance with the Explosive Act 1923 (amended by Part 6 of the Criminal Justice Act 2006) and related legislation, and BS 7385 will be complied with during any blasting. Tipperary County Council, An Garda Síochána, and adjoining landowners will be notified in advance of any blasting activities on the site. The Blast Management Plan will be prepared by the appointed contractor prior to the construction phase and in consultation with Tipperary County Council, An Garda Síochána and adjoining landowners. Additionally, the NPWS and any other required consultees will be consulted as part of the general consultation and blasting permitting process, in order to keep them informed of any blasting proposals for the site.	Appointed Project Contractor	Chapter 5 Population and Human Health Chapter 9 Land and Soil Chapter 10 Noise
<b>Principal Contractor and appointed Project Environmental Manager</b>	Material Assets – Pre-Construction surveys	<ul style="list-style-type: none"> <li>- Grid Route: Pre-Construction surveys will be carried out to ensure that all electrical, water and other services within the public road are identified prior to construction of the 110kV underground grid route cable and the construction works designed to avoid any existing infrastructure under the roads.</li> <li>- Turbine Delivery Route: Pre-Construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network. Repairs will be carried out on the public roads, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the use of the site, as required.</li> </ul>	Appointed Project Contractor	Chapter 15 Material Assets

## 18.4 Construction Phase Mitigation and Monitoring Measures

Table 18-2: Schedule of Construction Phase Environmental Mitigation & Monitoring Measures

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<b>DURING CONSTRUCTION</b>	General	The names and contact details of the individuals with responsibility for implementation and supervision of mitigation measures during all phases of the works will be clearly identified and displayed on notice boards at the site compounds as well as set out in documents such as the CEMP and site- specific method statements.	Developer Principal Contractor	CEMP
<b>DURING CONSTRUCTION</b>	General	Good work practices such as those set out in <i>Guidelines on Protection of Fisheries During Construction Works In and Adjacent to Waters</i> (IFI, 2016), <i>Environmental Good Practice on Site Guide</i> (CIRIA, 2015) will be employed at all times on site during the construction of the proposed project. The CEMP submitted as part of the documentation supporting the planning application will be finalised by the appointed contractor and will be treated as a live document to be updated as required throughout the lifetime of the proposed project.	Developer  Principal Contractor and Responsible personnel identified in the CEMP	Chapter 2 Project Description Appendix 2A CEMP To be communicated to Principal Contractor and incorporated into final CEMP. Chapters 5 to 15 NIS
<b>DURING CONSTRUCTION</b>	General	All personnel involved with the proposed project will receive an on-site induction relating to operations and the environmentally sensitive nature of the Lower River Suir SAC and to re-emphasize the precautions that are required as well as the measures to be implemented.  All staff and subcontractors have the responsibility to: <ul style="list-style-type: none"> <li>- Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts;</li> <li>- Understand the importance of avoiding emissions on-site, including pollutants, sediments and noise, and how to respond in the event of an incident to avoid or limit environmental impact;</li> <li>- Respond in the event of an incident to avoid or limit environmental impact;</li> <li>- Report all incidents immediately to their site environmental manager;</li> <li>- Monitor the workplace for potential environmental risks and alert the immediate line manager if any are observed; and</li> <li>- Co-operate as required, with site inspections.</li> </ul>	Developer  Principal Contractor and Responsible personnel identified in the CEMP	Chapter 2 Project Description  Appendix 2A CEMP  To be communicated to Principal Contractor and incorporated into final CEMP.  Chapters 5 to 15 NIS
<b>DURING CONSTRUCTION</b>	Protection of Water Resources – Design Mitigations	The full set of best practice design mitigation measures to protect water resources detailed in Chapter 3 of the EIAR (Civil Engineering) must be included in the Construction Methodology section (No. 4) of the CEMP and where relevant, in the Planning Drawings. All the relevant construction work must be undertaken in accordance with these best practice design measures. The CEMP must also include a Surface Water Management Plan that must be adhered to.	Developer  Principal Contractor and Responsible personnel identified in the	Chapter 2 Project Description Chapter 3 Civil Engineering Chapters 5, 8, 9 & NIS Appendix 2A CEMP

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
			CEMP	To be communicated to Principal Contractor and incorporated into final CEMP.
<b>DURING CONSTRUCTION</b>	Population & Human Health – Land Use	<ul style="list-style-type: none"> <li>- Residents and affected parties will be informed in advance of any planned utility diversions or potential disruptions. Clear and timely notifications will be issued to ensure residents are well-informed and can make necessary preparations.</li> <li>- Ongoing and transparent communication with the local community will be maintained to address any concerns related to diversions.</li> </ul>	Principal Contractor and Responsible personnel identified in the CEMP	Chapter 5
<b>DURING CONSTRUCTION</b>	Population & Human Health – Tourism & Amenity	<ul style="list-style-type: none"> <li>- Screening and landscaping will be used to minimise visual intrusion and noise effects.</li> </ul>	Principal Contractor and Responsible personnel identified in the CEMP	Chapter 5
<b>DURING CONSTRUCTION</b>	Human Health	<ul style="list-style-type: none"> <li>- The health and safety mitigation measures provided in the noise, air quality, shadow flicker and traffic Chapters will be complied with.</li> <li>- The CEMP will be developed, and relevant health and safety standards and protocols will be developed prior to initiation of the project.</li> <li>- A comprehensive traffic management plan will be agreed with the local authority prior to construction to assure the safety of local residence, motorists and pedestrians.</li> <li>- All those employed on the project’s construction must be inducted in the relevant health and safety standards and protocols and management plans before starting work on this project. Compliance with the health and safety standards must be monitored and enforced by management</li> </ul>	Principal Contractor and Responsible personnel identified in the CEMP	Chapter 5
<b>DURING CONSTRUCTION</b>	Biodiversity – Protection of Aquatic Species	Depending on the timing of the proposed works, different life stages of migratory fish species may be impacted by factors such as noise and disturbance associated with the installation of hardstands, or by increased sediment ingress into the watercourse during works involving excavation. Spawning and egg incubation for salmon occurs from October to February and for lamprey species from March to May, so works within 50m of watercourses, including the watercourse crossings required, will be carried out over summer if possible, bearing in mind that juveniles of these species may be present at any time of year.	Appointed Project Contractor  Appointed Ecological Clerk of Works	Chapter 6
<b>DURING CONSTRUCTION</b>	Biodiversity and invasive alien species	While no plant species listed under the Third Schedule of the European Communities (Birds and Habitats) Regulations 2011 as ‘non-native species subject to restrictions under Regulations 49’ were recorded on the Site, there is potential for IAS to be introduced to the Site. The EM and ECoW will be responsible for monitoring potential introduction of IAS to the Site. If IAS are identified, the areas of IAS will be screened (fenced) off, including an appropriate buffer and no personnel or machinery will enter this area. Should the	Appointed Project Contractor  Appointed Ecological Clerk of Works	Chapter 6

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		<p>IAS be within or adjacent to the proposed construction areas or corridors, they will be managed and removed by a contractor with appropriate experience in dealing with IAS and disposed of appropriately. This will prevent machinery hitting and spreading the IAS. All personnel and machinery will follow biosecurity measures to prevent the spread of IAS.</p> <p>The ‘check, clean dry’ method from the Northern Ireland Environment Agency<sup>2</sup> and the ‘Inspect, Remove, Dispose, Clean and Disinfect’ method from the IFI3 (refer also to Appendix 6B in the NIS) will be employed as general biosecurity measures on site for any works required within the 50m watercourse buffer, including any watercourse crossings and HDD. Any machinery, tools or equipment required within this buffer will also use the above methods post-works to avoid any contamination to other locations. This will also provide appropriate protection with regards to the spread of crayfish plague which is known within the catchment.</p>		
<b>DURING CONSTRUCTION</b>	Biodiversity – light disturbance of species	<p>Artificial lighting will be kept to a minimum as required for security. Light spill will be minimised near any watercourses by employing lighting restrictions. Consideration should be given to restrictions during dark hours from 9pm to 5am such as reducing light levels, turning off lights, or using motion sensor lighting only near access roads beside watercourses. White LED lighting has been shown to have greater impacts on wildlife and so alternative warmer colour wavelengths should be considered, between 2700 and 3000 Kelvin (Institute of Lighting Professionals 2018). Lighting installed near watercourses should also be directional, i.e. pointing towards the access road, with no lighting directed along the surface of the watercourse.</p>	<p>Appointed Project Contractor</p> <p>Appointed Ecological Clerk of Works</p>	Chapter 6
<b>DURING CONSTRUCTION</b>	Biodiversity/ Protection of Habitats	<p>Within the proposed project, there are several areas supporting important habitats. Annex I habitat Molinia meadows, poor fen and flush habitat and marsh habitats were identified.</p> <p>These sensitive habitats were identified in site scope surveys and the original site layout was re-designed to avoid these areas. This involved altering the layout of the substation in the proposed substation fields. One proposed turbine was also re-located away from the southern mature woodland in which it was first placed. These areas of the southern woodlands will be retained and additional post-construction monitoring for bats will be undertaken at these locations to determine if the residual habitat feature draws bats towards the rotor swept area – see post-construction monitoring for bats (Section 5.5.6.7).</p> <p>The proposed project layout was designed to utilise existing tracks, and the infrastructural footprint largely targets lower value habitats, including improved grassland. Likewise, areas where felling is required to implement bat feature buffers and the lengths of treelines and hedgerows that will be removed has been</p>	<p>Appointed Project Contractor</p> <p>Appointed Ecological Clerk of Works</p>	Chapter 6

<sup>2</sup> <https://invasivespeciesni.co.uk/what-can-i-do/check-clean-dry/check-clean-dry-resources/> (last accessed 10/09/2024)

<sup>3</sup> <https://www.fisheriesireland.ie/what-we-do/education-and-outreach/safeguarding-and-governance/biosecurity#:~:text=Biosecurity%20is%20the%20prevention%20of,boats%2C%20protective%20gear%20and%20clothing.> (last accessed 10/09/2024)

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>keep to a minimum. Likewise, the number of locations where access tracks are required to punch through hedgerows/treelines has been limited and the areas removed will be kept to a minimum.</p> <p>To avoid widespread disturbance to habitats, access within the construction site will be restricted to the footprint of the proposed works corridor. Access routes will be agreed on site and no access between different parts of the infrastructure will be permitted, except via the proposed works corridor. An Ecological Clerk of Works (ECoW) will be employed from the commencement to completion of construction works and will be tasked with monitoring work practices, which will ensure that construction activities are tightly constraint within the works corridor.</p> <p>To avoid construction damage from excavation or compaction to the roots of plants in hedgerows, treelines and woodlands adjacent to the proposed infrastructure that will be retain post-construction, appropriate root protection area (RPAs) will be implemented, in accordance with BS 5837:2012 Trees in relation to design, demolition and construction -Recommendations, as outlined in National Roads Authority - NRA (2006) . To this effect an appropriately qualified arboriculturist will undertake a pre-construction assessment to ensure impacts to vegetation are avoided.</p> <p>In addition, it is noted that impacts to roots will be avoided at most locations, as construction of wind farm access tracks will largely target upgrading of existing farm and forestry tracks. Where new sections of track are being laid these are in improved grassland where soil adjacent to hedgerows/treelines has been subject to recurring disturbance and therefore roots will be less sensitive. Root protection buffers will also be in place.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Biodiversity – Protection of Terrestrial Mammals</p>	<p>Potential impacts on aquatic mammals, specifically for otter which are a QI of the Lower River Suir SAC, is covered in the NIS (APEM, 2024) and outlined above in mitigation for watercourses. Mitigation was also included in the NIS to avoid disturbance to otters on the site, as follows:</p> <p>Before works commence, the Site and up to 150 m of the works areas will be checked for evidence of otter by a suitably experienced ecologist. Should an otter holt be recorded, no works in proximity to this identified holt will proceed until a suitably experienced and qualified ecologist has advised on appropriate mitigation.</p> <p>The following measures will be implemented to minimise as far as possible the disturbance to aquatic species:</p> <p>Methods to reduce noise and vibration;</p> <p>Soft-start techniques will be employed during working hours; and</p> <p>Machinery will not be used early in the day or late in the day (i.e., they will not start until at least one hour after sunrise and will cease not later than one hour prior to sunset). Lamprey species typically migrate in darkness, so this restriction will benefit them particularly. In addition to the above, to further minimise the potential for disturbance to be caused.</p>	<p>Appointed Project Contractor</p> <p>Appointed Ecological Clerk of Works</p>	<p>Chapter 6</p>

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>To reduce noise and vibration impacts, as outlined in Network Rail (2019)27, the following measures will be employed:</p> <ul style="list-style-type: none"> <li>- Road vehicles should not wait or queue up with engines running on the site</li> <li>- Noise from reversing alarms should be controlled and limited through adoption of the following:</li> <li>- Site layout designed to limit and where reasonably practicable, avoid the need for reversing vehicles by installing one-way systems or turning circles.</li> <li>- The contractor shall ensure that drivers are familiar with the site layout</li> <li>- Reversing alarms should be set to the minimum output noise level required for health and safety compliance</li> <li>- Equipment, including vehicles, should be shut down when not in use</li> <li>- Engine compartments should be closed when equipment is not in use</li> <li>- Plant and equipment should be examined for defects daily prior to the start of works and under no circumstances is defective plant to be used</li> <li>- Generators, compressors and pumps etc. required for 24-hour operation should be super silenced and screened/enclosed as appropriate</li> <li>- Modern, silenced and well-maintained plant fitted with efficient attenuators, mufflers or acoustic covers, where appropriate, should be used</li> </ul> <p>The appointed EM will perform weekly checks on Site to ensure that noise and vibration is monitored on a regular basis and if noise or vibration is found to be above acceptable levels, this will be remedied immediately</p> <p>The proposed layout for site infrastructure has been designed to minimise impact on features which are important for mammals such as hedgerows and drains. As much old growth woodland and treelines as possible have been avoided. While some felling is necessary, care has been taken to ensure that overall connectivity between the existing woodland and linear features will be retained throughout the construction and operational phased of the project.</p> <p>It is acknowledged that the distribution of mammal resting places can change over time. Therefore, in order to avoid accidental disturbance during the construction phase of the project, prior to works commencing these will be preceded by a due diligence ecological walkover survey of the proposed works corridor, including the grid connection route. If any mammal resting places are identified then appropriate exclusion</p>		



CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>zone will be implemented and felling operations will be timed to avoid sensitive periods for the species affected, i.e. the breeding season.</p> <p>Likewise, inappropriately timed vegetation removal required to implement bat feature buffers has the potential to directly impact on the resting sites of borrowing and arboreal mammals. Although during baseline surveys, no mammal resting places were identified within the proposed felling areas, a due diligence ecological walkover survey will be undertaken prior to commencement of felling operations.</p> <p>Pre-construction/felling surveys will cover all suitable habitat for protected mammals including within 50 m of the works corridor for badgers and 100 m for pine martin. The aim of the surveys is to identify the resting sites of protect mammals and implement appropriate exclusion zone buffers, if required.</p> <p>Setts, trails and feeding signs of badgers were recorded during site scoping surveys. Setts identified included one inactive sett with five entrances and an active outlier sett and active main sett. The following mitigation measures will be applied to avoid disturbance to badgers:</p> <p>No works will be undertaken within 20 m of active badger sett(s), as measured from all the entrances to burrows.</p> <p>A 10 m buffer zone will be set out along the River Suir on both sides, and existing drainage channels within the proposed project where no works can occur to reduce disturbances for otters.</p> <p>All heavy machinery will be excluded from areas within 30 m of active badger sett(s), as measured from all the entrances to burrows.</p> <p>Exclusion zone buffers of 30 m around all sett entrances will be marked off prior to commencement of construction works to ensure protection of these locations. Buffer zones will be appropriately signposted and will be marked out using fencing posts and rope.</p> <p>To avoid the period of time when badgers are particularly sensitive to disturbance (birthing and raising young cubs); no heavy construction works, including tree felling will be undertaken during the badger breeding season (December to June inclusive) near setts. Therefore, all felling and heavy construction works for the substation will be undertaken in July to November inclusive.</p> <p>Disturbance to foraging mammals will be avoided by:</p> <p>Construction works being largely limited to daylight hours allowing nocturnal animals like badgers and otters to forage through the night.</p> <p>Minimising the risk of mammals becoming trapped if falling into excavated holes and trenches through the provision of egress points, e.g. placing escape planks or spoil runs. In addition, the length of time holes will be exposed will be limited.</p>		

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DURING CONSTRUCTION	Biodiversity – Protection of Water Quality and Natura 2000 sites	Proposed mitigation measures required to prevent adverse effects on the downstream Lower River Suir SAC during construction are outlined in the Natura Impact Statement (NIS) for the proposed project - see APEM (2024). The mitigation measures included in the NIS relate to protection of water quality flowing into the Lower River Suir SAC. These mitigation measures are considered sufficient to also avoid impacts on other aquatic ecology KERs including salmonids. No further measures are deemed to be required to avoid impacts on watercourses. The NIS mitigation measures are also included in the other general and biodiversity mitigation measures included in this schedule.	Appointed Project Contractor	Chapter 6
			Appointed Ecological Clerk of Works	
DURING CONSTRUCTION	Biodiversity – Protection of Bats	<p><i>Mitigation to avoid potential direct impacts on roosting bats</i></p> <p>Throughout the proposed project site vegetation removal will be required to facilitate construction of wind farm infrastructure, mainly for access tracks and hardstands. Trees within the southern semi-natural woodland have potential roost features ranging from low to high. Given that the species present here are capable of fission and fusion, this woodland could be seen as a roost resource of high potential. It would be fair to assume that the majority of these trees could be used throughout the different seasons, from hibernation roosts (the high classes trees) to just day roosts, transitional roosts or even night roosts if weather goes bad. However, roost surveys were not exhaustive and there is a risk the any trees identified as supporting PRF, which are earmarked for removal during construction, could become occupied prior to works commencing. Each tree proposed for felling should be inspected by a bat specialist under a roost disturbance licence using an endoscope before any felling occurs, to ensure no bat is occupying the tree roost at that time. To ensure the tree inspection can be fully carried out by the bat specialist, the use of tree climbing equipment, or the use of a MEWP would be required for any high potential features which are not accessible from the ground level. Any tree found to have a bat roosting should be left and re-checked again after a few days to see if they have left that roost. The fission and fusion behaviour mean usually bats will only spend a few days, sometimes only a single night in a tree roost (Kaňuch <i>et al.</i> 2022).</p> <p>The woodland planted at Brittas estate contains multiple mature broadleaved trees some are veteran or even ancient. This woodland should be avoided as much as possible. To protect these trees during the construction phase of the project, primarily the excavation of the borrow pits and access tracks. A root protection area (RPA) has been established to preserve and protect them. The method of calculating RPA noted is noted in the BS:5387:2012. This root protection area is 30 m.</p> <p>The proposed felling at the “T”-shaped treeline is made up of live and dead ash trees. There are mainly ivy clad trees, with mainly trees of low potential. There is the occasional moderate classed tree here and so, it is anticipated that much occupancy of any PRFs will be limited to transitional roosts, e.g. autumn mating roosts. It is also considered that the surrounding area holds a number of structures offering higher suitability for the formation of significant maternity and hibernation roosts, e.g. Britta’s castle.</p>	Appointed Project Contractor	Chapter 6
Appointed Ecological Clerk of Works				
Project Ecologist				

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>Noting that areas within the site, including within potential felling areas, hold PRFs that could potentially support bats in the future, pre-construction roost surveys will be an important component of the species protection plan. For any trees found to be occupied by roosting bats prior to construction, an exclusion zone will be implemented to prevent disturbance during times of occupancy. The table below provides restrictive periods for different types of roosts, and therefore by extension restrictive periods for construction works, during which the exclusion zone for construction work would be applicable. The extent of the exclusion zone can be up to 30 m for any notably disruptive works such as pile-driving; however, the mitigation measure should be proportional to the disturbance levels emanating from the construction activity.</p> <p>Under the Wildlife Act, it is an offence to intentionally disturb, injure or kill a bat or disturb its resting place. Under this legislation it is unlawful to destroy, alter or disturb known bat roosts without an appropriate derogation licence, as issued by the NPWS. Pre-construction surveys will inform the application of a derogation license from NPWS to undertake appropriate mitigation actions as required to ensure the conservation of bats, if found to be utilising roosts within the construction corridor. Reporting of pre-construction bat surveys will be required to demonstrate due diligence regarding avoidance of disturbance to potential bat roosts.</p> <p>While acknowledging the limited likelihood of the treelines where vegetation removal/cutting is proposed to facilitate wind farm infrastructure; the mature trees identified as supporting PRFs will require further pre-construction roost surveys and assessment in acknowledgement that they have the potential to be utilised by bats in the future. The following locations have been highlighted as requiring this:</p> <ul style="list-style-type: none"> <li>• Trees on the turbine T.10 location</li> <li>• “T”-shaped treeline at T.4</li> </ul> <p>Areas listed above which are earmarked for vegetation removal will be thoroughly re-assessed for PRFs. Surveys will be conducted by an appropriately experienced ecologist. Any trees, outside of the “high” classed woodland roost resource, supporting PRFs will be targeted with further surveys, including emergence/re-entry surveys and/or roost inspections (using endoscopes and thermal imaging cameras) to determine occupancy of any moderate to high PRFs identified.</p> <ol style="list-style-type: none"> <li>1. If any bat roosts are identified, further assessment will be required to determine the type of roost (e.g. maternity, hibernation, mating, transitional), species using the roost and the level of occupancy.</li> <li>2. For any roost sites occupied, these surveys will inform the application of a derogation license from NPWS to undertake appropriate mitigation actions as required to ensure the conservation of bats. These could include measures to exclude bats from potential roost holes prior to vegetation removal and provision of alternative roost sites.</li> </ol>		

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED										
		<p>3. Reporting of pre-construction bat surveys will be required to demonstrate due diligence regarding avoidance of disturbance to potential bat roosts.</p> <p><b>Table of Optimal season for works at different roost types</b> Source: Kelleher &amp; Marnell (2006)</p> <table border="1"> <thead> <tr> <th>Bat usage of site</th> <th>Optimum period for carrying out works (some variation between species)</th> </tr> </thead> <tbody> <tr> <td>Maternity</td> <td>01-Oct to 01-May</td> </tr> <tr> <td>Summer (not a proven maternity site)</td> <td>01-Sep to 01-May</td> </tr> <tr> <td>Hibernation</td> <td>01-May to 01-Oct</td> </tr> <tr> <td>Mating/swarming</td> <td>01-Nov to 01-Aug</td> </tr> </tbody> </table>		Bat usage of site	Optimum period for carrying out works (some variation between species)	Maternity	01-Oct to 01-May	Summer (not a proven maternity site)	01-Sep to 01-May	Hibernation	01-May to 01-Oct	Mating/swarming	01-Nov to 01-Aug		
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<b>DURING CONSTRUCTION</b>	Ecological Monitoring – Bat Roosts	Construction works in areas of maternity bat roost potential should be avoided to prevent disturbance during the maternity season and until mothers and pups have moved on in search of hibernation roosts.		Appointed Ecological Clerk of Works	Chapter 6										
<b>DURING CONSTRUCTION</b>	Ornithology – Water Quality	Mitigation measures proposed to protect water quality during construction are set out in the Construction Environmental Management Plan (CEMP) - see Appendix 2B. These measures implemented in full will avoid any adverse effects on birds that rely on good quality water in downstream aquatic habitats, including cormorant, grey heron, little egret and kingfisher, as well as grey wagtail. The mitigation measures detailed within the CEMP are in accordance with measure detailed in Chapter 6: Biodiversity (Section 6.5.1), Chapter 9: Water (Section 9.5.1) and the NIS (APEM, 2024) designed to protect water quality. These mitigation measures are included in the various water quality sections in this table which follow below.		Appointed Ecological Clerk of Works	Chapter 7										
<b>DURING CONSTRUCTION</b>	Ornithology – Avoidance of Disturbance	<p>To avoid widespread disturbance to birds, access within the Proposed Project Site will be restricted to the footprint of the proposed works for all construction activities and no access between different parts of the site will be permitted except via the areas identified for proposed works.</p> <p>To avoid direct and indirect disturbance to breeding birds, the following restrictions on timings of construction works will, where feasible, be applied:</p> <ul style="list-style-type: none"> <li>Construction will be timed to commence outside the bird breeding season (March to August inclusive). This does not preclude construction continuing during the breeding season but would allow sensitive bird species to choose nesting sites away from sources of potential disturbance.</li> <li>Where removal of suitable nesting habitat is required to facilitate the works, habitat clearance works will be undertaken prior to the 1 March in the construction year(s).</li> <li>Vegetation removal required for creation of bat feature buffers around turbines will be undertaken outside the bird breeding season.</li> </ul>		Appointed Ecological Clerk of Works	Chapter 7										

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>Once vegetation has been removed within the works area, these areas will be retained in a condition that limits suitability for nesting birds for the remainder of the construction phase. Any areas of potential cover, particularly cover for ground nesting species, will be rendered unsuitable by cutting vegetation or tracking over with an excavator.</li> <li>Should the clearance of vegetation suitable for nesting birds be required during the bird breeding season, the relevant area(s) of vegetation will be surveyed in advance by the ECoW (with ornithological survey experience).</li> <li>Any construction works proposed during the breeding bird season will be preceded by a survey and will ensure the implementation of buffer zones (if nests/territories are identified) and measures required in order to avoid disturbance. Particular attention will be given to sensitive bird species (including breeding raptors and waders). Ongoing monthly site visits will be undertaken during the breeding season (mid-March to early-July, inclusive) and the frequency of monitoring may be increased to weekly if required. Monitoring will target all suitable habitats out to 500 m from the works corridor, and particular attention will be paid to the area ahead of construction works. Surveys will be undertaken by a suitability experience ornithologist.</li> <li>If works are scheduled to commence in February, a pre-construction visit will be required to monitor potential lapwing breeding sites identified in Appendix 7G: Figure 7G.1 in EIAR Vol. 3., as this species can be present on territories early in the season (late-February/early March). Appropriate buffers will be implemented around any lapwing breeding sites identified and access for construction works restricted. Lapwing are considered relatively tolerant of disturbance (Cutts et al., 2009, Woodward et al., 2015, Goodship &amp; Furness, 2019) and birds nesting in farmland habitats are habituated to a level of agricultural activity on the site. Therefore, taking account of on-site conditions buffers of 100-200 m on lapwing breeding sites will be applicable and this can be revised upwards or downwards based on professional judgement of the site ECoW (ornithologist), with consideration given to the behaviour of any pairs present and the nature of the works being undertaken.</li> <li>The proposed borrow pit is within 500 m of the known peregrine nest site, and therefore lies within the minimum recommended breeding season buffer zone (Goodship &amp; Furness, 2022). To avoid disturbance during the breeding season, works in the borrow pit will commence prior to the onset of the bird breeding season, i.e. prior to the 01 March. This will allow the resident pair to habituate to the disturbance factors and relocate to an alternative site, if necessary. It is considered unlikely that this pair will be significantly affected by the works given the secure position of the nest in relation the works, the separation distance (&gt; 340 m) combined with a level of natural screening provided by woodland and slope, as well as a high tolerance of this species to certain construction related disturbance factors, e.g. works in quarries. As a precaution, if the site is occupied, no works will be permitted within 500 m of the peregrine nest during egg laying and early incubation, which are considered to be the most sensitive stage in the breeding season. Typically, this occurs over April to mid-May. Nest site monitoring will be undertaken in April to determine what stage the birds are at</li> </ul>		

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		and to manage when restrictions are no longer required. Fledging success and dispersal will be surveyed to investigate how fledged birds disperse into the wider area in relation to the turbines being constructed. Observations over the baseline study suggests that young birds do not disperse towards the turbines.		
<b>DURING CONSTRUCTION</b>	Ornithology – Monitoring	<p>SNH (2009) states in relation to ornithological monitoring during construction of onshore wind farms:</p> <p>“Monitoring should also take place during construction, where these effects are likely to be more than temporary, for example where disturbance and habitat loss (before mitigation) may have longer term impacts. Temporary effects are different in nature to those during the operation of the wind farm, and as they are not strictly part of the monitoring protocol, they are best dealt with through compliance monitoring of planning conditions”.</p> <p>Construction phase monitoring will involve the following actions:</p> <ul style="list-style-type: none"> <li>• Bird surveys, as part of a pre-construction due-diligence ecological survey will be undertaken within one month of the commencement of construction works and walkovers will target all suitable habitats out to 500 m from the turbine layout and works corridor.</li> <li>• Should the clearance of vegetation suitable for nesting birds be required during the bird breeding season, the relevant area(s) of vegetation will be surveyed in advance by the ECoW (with ornithological survey experience).</li> <li>• Any construction works proposed during the breeding bird season will be preceded by a survey and will ensure the implementation of appropriate buffer zones, if nests/territories are identified and measures required in order to avoid disturbance. Particular attention will be given to sensitive bird species, including breeding raptors and waders. Ongoing monthly site visits will be undertaken during the breeding season (mid-March to early-July, inclusive) and the frequency of monitoring may be increased to weekly as required, if for example, works are occurring within 500 m of the known peregrine nest over a sensitive period, e.g. egg laying and incubation. Monitoring will target all suitable habitats out to 500 m from the works corridor, and particular attention will be paid to the area ahead of any construction works.</li> <li>• If works in the northern part of the Proposed Project Site are scheduled to commence in February, a pre-construction visit will be required to monitor potential lapwing breeding sites identified in Appendix 7G: Figure 7G.1 in EIAR Vol. 3., as this species can be present on territories early in the season (late-February/early March).</li> <li>• The peregrine nest will be monitored during the breeding season while construction works are occurring in the southern part of the Proposed Project Site. Nest site monitoring will commence in</li> </ul>		

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		<p>April to determine what stage the birds are at and to manage when restrictions are no longer required. Fledging success and dispersal will be surveyed to investigate how fledged birds disperse into the wider area in relation to the turbines being constructed.</p>		
<b>DURING CONSTRUCTION</b>	Land and Soils - Soil Erosion	<p>A site surface water management system will be constructed on the site to attenuate run-off, guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all work areas including all internal site access roads, storage areas, crane hardstand areas and temporary site construction compound. Details of the proposed site drainage system are described in Chapter 03 Civil Engineering of this EIAR.</p> <p>The following gives an outline of drainage management arrangements along internal services roads:</p> <ul style="list-style-type: none"> <li>• The surface water run-off drainage system will be implemented along all internal access routes, to separate and collect 'dirty water' run-off from the roadway and to intercept clean over land surface water flows from crossing internal roadways;</li> <li>• To achieve separation, clean water drains will be positioned on the upslope and dirty water drains positioned on the downslope of roadsides, with road surfaces sloped towards dirty drains; and</li> <li>• Clean water will be piped under both the access roads and downslope collection drains to avoid contamination. Piping the clean water under the service road allows the clean water to follow the course it would have taken before construction thus mimicking the existing surface water over land flow pattern of the site and thus not altering the natural existing hydrological regime on site.</li> </ul> <p>Temporary stockpiles of excavated spoil, stored in the footprint of the excavation areas, will be directed for use in backfilling and restoration or placed in the deposition areas on site. Reusable excavated sub-soils and aggregate will be stored in temporary stockpiles at suitably sheltered areas to prevent erosion or weathering and shall be shaped to ensure rainfall does not degrade the stored material. Stockpiles will be stored away from any open surface water drains, managing height and slope of all stockpiles and minimising soil movement. Estimated volumes of material can be found in Chapter 03 Civil Engineering of this EIAR.</p> <p>Whenever possible, existing access tracks have been utilised to access turbine locations. This reduces the volume of excavated material and imported crushed rock for track construction. Excavations and material removal that will take place during the construction phase will be localised to the turbine locations and access tracks.</p> <p>Excavated material from the grid connection route will be used to reinstate the area around the cable trench following backfilling of the trench with approved materials. Any excess material from the grid connection route will be removed and disposed of to the onsite deposition areas or to an appropriate facility licensed to accept such waste.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 8

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		<p>In terms of the turbine delivery route, the following mitigation measure will be implemented:</p> <ul style="list-style-type: none"> <li>• Use of the existing road network to reduce soil/subsoil excavation volumes;</li> <li>• The soil/subsoil which will be excavated during the construction phase will be localised to the proposed 2 no. locations along the turbine delivery route;</li> <li>• A minimal volume of soil/subsoil will be excavated/landscaped and the areas of ground where works will occur is small;</li> <li>• Excess excavated material will be used for local landscaping; and</li> <li>• Temporary hardstand area will be reinstated to original condition on completion of the works.</li> </ul> <p>The implementation of erosion and sediment controls will be made prior to the commencement of site clearance works. Silt traps, such as geotextile membrane, will be placed in the existing drainage network prior to construction work. These will be inspected weekly by the Environmental Manager and cleaned regularly as required as directed by the Environmental Manager.</p>		
<b>DURING CONSTRUCTION</b>	Land & Soils – Soil Compaction	<p>The CEMP (Appendix 2B) includes minimum site management controls to reduce and mitigate for compaction.</p> <p>A Traffic Management Plan (TMP) (Appendix 16A) has been developed to manage and control vehicular movement onsite. Measures will include the scheduling of HGVs during the construction phase to reduce the number of vehicle movements in, through and off site. This in turn will reduce the impact of soil compaction and erosion. Unscheduled vehicles will not have access to the site. Machinery will not operate directly on excavated/stockpiled soils. Heavy vehicles will only follow designated and newly constructed access tracks and avoid loading areas which are not contained within the footprint of the main works to minimise disturbance of the original soil and subsoil formations and to retain soil structure.</p> <p>The compound, vehicles, stockpiled materials and heavy machinery will be in place for the duration of the construction phase and will be removed once commissioning is complete.</p> <p>Within and around excavations, pore water pressure will be kept low by avoiding loading the soil/subsoil and giving careful attention to the existing drainage, as compaction would alter the surface drainage regime (see Chapter 09 Water).</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 8
<b>DURING CONSTRUCTION</b>	Land and Soils – Slope Stability	<p>All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 8



CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>All site excavations and construction will be supervised by a suitably competent and experienced engineer. The Contractor’s method statements for each element of work will be reviewed and approved by the engineer prior to site operations. Prior to excavation, drains will be established to effectively intercept overland flow prior to earthworks. From examination of factual evidence to date, the majority of landslides occur after an intense period of rainfall. An emergency response system will be developed for the construction phase of the project, particularly during the early excavation phase. This, as a minimum, will involve 24 hour advance meteorological forecasting (Met Éireann download) linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded (e.g. 1 in 100 year storm event or very heavy rainfall at &gt;25mm/hr), planned responses will be undertaken. These responses will include cessation of construction until the storm event including storm runoff has passed over.</p> <p>From a desk-top review, the GSI’s Landslide Events database has no records of any landslide events recorded within or in proximity to the site.</p> <p>A competent project geotechnical engineer or engineering geologist will be employed during the construction phase of the works. As part of the detailed design and assessment, identification of potential planes of weakness will be made in the overburden such as discrepancies in the material type and foliation direction in the bedrock. Earthworks will be constructed to safe stable angles in accordance with the detailed design and best practice.</p> <p>HDD will be carried out by an experienced HDD specialist.</p> <p>Plant and materials will be stored in approved locations only (such as the proposed temporary site compound) and will not be positioned or trafficked in a manner that would surcharge existing or newly-formed slopes.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Land &amp; Soils – Accidental Spills and Contamination /Pollution</p>	<p>The CEMP (Appendix 2B) includes site management controls to mitigate for contamination/pollution.</p> <p>The permanent access track works will require a drainage network to be in place for the construction and operation phases of the wind farm. Fundamental to any construction phase is the need to keep clean water (i.e. runoff from adjacent ground upslope of the permitted development footprint) clean and manage all other runoff and water from construction in an appropriate manner. Wheel wash facilities will be available onsite for the duration of the construction phase. These, and other measures are outlined in the CEMP (Appendix 2B). The proposed surface water drainage is summarised in Chapter 03 Civil Engineering and Chapter 09 Water.</p> <p>A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc.</p> <p>Good site practice will be applied to ensure no fuels, oils or any other substance are stored in a manner on site in which they may spill and enter the ground, particularly when the initial top layer of made ground is</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 8</p>

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>excavated. Dedicated, bunded storage areas will be used for all fuels or hazardous substances. Spill kits will be maintained on site. The CEMP includes a management plan and can be seen in Appendix 2B.</p> <p>The potential for hydrocarbons getting into the existing drains, local watercourses, and the land and soils environment will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure. A fuel management plan will be implemented incorporating the following elements:</p> <ul style="list-style-type: none"> <li>- Refuelling of Construction Plant On-Site- Refuelling will be carried out using 110% capacity double bunded mobile bowser. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using. Plant nappies or absorbent mats will be placed under refuelling points during all refuelling to absorb drips. Mobile bowser, tanks and drums will be stored in secure, impermeable storage areas, over 50m away from drains and open water. To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor. Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits, all oil and any contaminated material will be removed and properly disposed of in a licensed facility. Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery. Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction. In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery; and</li> <li>- Materials Handling, Fuels and Oil Storage- Leakages of fuel/ oil from stores will be prevented by storing these materials in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles or valves will be fitted with a lock system. On-site washing of concrete truck barrels will not be allowed. A designated chute wash down area, which will retain the washout water, will be located within the construction compound and there will be no other chute wash down activity on any other part of the site.</li> </ul> <p>The drainage and treatment system will be managed and monitored and particularly after extreme rainfall events during the construction phase. Controls will be regularly inspected and maintained. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed and records kept of inspections and maintenance works. The purpose of this management control is to ensure that the</p>		

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		<p>measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.</p> <p>Stockpiles of stripped topsoil will be in locations with minimum trafficking to prevent damage and dusting.</p> <p>The access track surface can become contaminated with clay or other silty material during construction. Access track cleaning will, therefore, be undertaken regularly during wet weather to reduce the volume of sediment runoff to the treatment system. This is normally achieved by scraping the track surface with the front bucket of an excavator and disposing of the material at designated locations within the site.</p>		
<b>DURING CONSTRUCTION</b>	Land & Soils – Rock Blasting	<p>In order to further mitigate against possible slope instability close to the borrow pit, blasting will not occur after periods of heavy rainfall. In particular, no blasting will take place for at least 24 hours following a period of rainfall which exceeds 25mm within the previous 24 hours. Rock blasting will only take place within the borrow pit if extraction using rippers or hydraulic breakers is deemed impractical. Circumstances include where the rock strength is such that other means of extraction are not possible and production rates need to be increased to keep up with the construction programme. If rock blasting proves to be necessary, a detailed blasting design will be undertaken by a suitably qualified and experienced specialist for each location to ensure that a peak particle velocity (PPV) of 10 mm/s is not exceeded at a distance of greater than 20m from the blast holes as per BS 7385 Part 2: 1993. If this cannot be achieved, blasting will not be permitted at this location. To mitigate against the risk of slope failure occurring, blasting will not be permitted at turbine locations unless robust mitigation measures are put in place. Blasting for the access track cuttings and hardstands will be subject to the same rigorous controls as that proposed at borrow pit and turbine foundation locations. To mitigate against the risk of excessive dust within the vicinity of the borrow pit, the blast areas will be lightly sprayed with water prior to blasting. A Blast Management Plan will ensure compliance with the Explosive Act 1923 (amended by Part 6 of the Criminal Justice Act 2006) and related legislation, and BS 7385 will be complied with during any blasting. Tipperary County Council, An Garda Síochána, and adjoining landowners will be notified in advance of any blasting activities on the site. The Blast Management Plan will be prepared by the appointed contractor prior to the construction phase and in consultation with Tipperary County Council, An Garda Síochána and adjoining landowners. Additionally, the NPWS and any other required consultees will be consulted as part of the general consultation and blasting permitting process, in order to keep them informed of any blasting proposals for the site.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 8
<b>DURING CONSTRUCTION</b>	Land & Soils – Tree and Hedge Felling	<p>Topsoil removed from felled areas for the construction of the proposed project will be used in landscaping works or placed in the deposition areas. Where possible, the vegetative layer will be stored with the vegetation and soil facing the right way up to encourage regrowth. The felling areas will then be monitored and maintained following construction and into the operational phase of the development.</p> <p>Any runoff from the clear-felled areas will be treated using the same design philosophy as that for the access tracks and hardstands. This includes the separation of clean and dirty water by the installation of berms,</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 8

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>channelling dirty water to silt traps and settlement ponds and ensuring that the discharge rate of the drainage system is no higher than the existing condition by using engineered settlement ponds.</p> <p>Where practicable, brash mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along off-track routes where practicable, to protect the soil from compaction and rutting.</p> <p>All works will be completed to standard forestry guidelines (Department of Agriculture, Food and the Marine [Teagasc], 2019, Standards for Felling and Reforestation), and in accordance with licence conditions issued by the Forest Service.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Land &amp; Soils – Borrow Pit</p>	<p>The borrow pit proposed within the site will be used to obtain site won stone aggregate for use in the construction of the proposed wind farm. This borrow pit will be located within the southern area of the site where it will be used as a source of hardcore for the construction of access tracks, crane hardstands and construction compound. The proposed location of the borrow pit is shown on Planning Drawings 22156-MWP-00-00-DR-C-5412.</p> <p>Prior to commencement of excavation works, an interceptor drain will first be excavated upslope to intercept existing overland flows and divert them around the borrow pit prior to discharge via a buffer zone on the downslope side. Any subsoil material overlying the rock will be excavated and stockpiled. The stockpile will be sealed, and a perimeter drain installed to intercept any run-off so that it can be discharged through an appropriately designed silt trap.</p> <p>Standing water, any surface water runoff or water pumped from within the borrow pit is likely to contain an increased concentration of suspended solids. Runoff or pumped water from the borrow pit will be isolated from the clean catchment runoff by means of a series of open drains that will be constructed within the area. These drains will be of check dams that will attenuate the flow and provide storage for the increased runoff from exceptional rainfall events. The settlement ponds have been designed to a modular size where if larger areas of runoff must be catered for at a single discharge point the size of the settlement pond will be increased pro rata.</p> <p>Inspections of the borrow pit will be made by a geotechnical engineer through regular monitoring of the opening works. The appointed contractor will review work practices at the borrow pit where periods of heavy rainfall are expected where work will be stopped to prevent excessive runoff from being generated. Excavators will extract the stone using buckets and a ripper attachment or rock-breaker attachments may be utilised in the borrow pit location. It is expected that excavators will be utilised in tandem in the extraction of rock from the borrow pit.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 8</p>

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>Once all the obtainable rock has been removed from the borrow pit, it will be backfilled by spoil from the onsite excavation works, covered with topsoil, revegetated and reinstated as pasture land. This will reinstate the existing land use.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Protection of Water Quality – Site Clearance</p>	<p>Felling of 1.4 ha of forestry and removal of 4086m of hedgerow is required within and around the proposed wind farm infrastructure to accommodate the construction of foundations, hardstands and access tracks as well as to facilitate assembly of turbines and provide ecological buffers. It is proposed to fell to a distance of up to 105m around turbines. The proposed felled areas are detailed in section 4.1.1 of the CEMP and in Chapter 2 of the EIAR.</p> <p>All forestry felling will be undertaken in accordance with a forestry felling licence, using good working practices as outlined by the Department of Agriculture, Food, and the Marine (DAFM) Standards for Felling and Reforestation (2019). These standards deal with sensitive areas, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel, and machine oils. All conditions associated with the felling licence will be complied with.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 9</p>
<p><b>DURING CONSTRUCTION</b></p> <p>Protection of Water Quality –River Crossings</p>	<p>No work will take place within 50m buffer zones of EPA mapped watercourses except for construction works detailed in Section 4 of the CEMP.</p> <p>Any works taking place in the vicinity of unmapped watercourses or land drains will be undertaken in accordance with the mitigation measures set out in Section 4 of the CEMP. Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk that pollution could occur. All construction method statements will be developed in consultation with Inland Fisheries Ireland and in accordance with the details in the CEMP accompanying this application. The selection criteria and other details of the proposed crossings can be found in Chapter 03 Civil Engineering and have been incorporated into section 4 of the CEMP. These crossings will be subject to a Section 50 application to ensure flood risk upstream and downstream of the crossing is not increased.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 9</p>
<p><b>DURING CONSTRUCTION</b></p> <p>Protection of Water Quality –Concrete Control</p>	<p>During the pouring of concrete, the following measures will be implemented to avoid spilling concrete outside construction areas and to prevent concrete entering any part of the drainage system:</p> <ul style="list-style-type: none"> <li>• Concrete pours will be supervised by the construction manager, who will ensure the area of the pour is completely drained of water before a pour commences;</li> <li>• Pours will not take place during heavy rainfall; and</li> <li>• There will be a dedicated concrete chute washout area on site. Concrete trucks will be washed out off site at the source quarry. Wet concrete operations are not envisaged for the proposed project within</li> </ul>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 9</p>

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>or adjacent to watercourses or aquatic zones. No batching will take place on site. However, if wet concrete operations are required in such locations, a suitable risk assessment will be completed prior to works being carried out.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Protection of Water Quality -Plant and Refueling</p>	<p>The following will be undertaken in relation to plant and refuelling:</p> <ul style="list-style-type: none"> <li>• Only qualified persons shall operate machinery or equipment;</li> <li>• Machinery and equipment shall be checked on a regular basis to ensure they are working properly (no oil/fuel leaks etc.);</li> <li>• No refuelling shall take place within 50m of any watercourse;</li> <li>• Fuel will be stored in doubly-bunded bowsers or in bunded areas at the site compound;</li> <li>• Plant nappies and spill kits will be readily available on plant equipment or when working with fuel operated heavy tools;</li> <li>• To mitigate against sources of contamination, refuelling of plant and vehicles will only take place within designated areas of the site compound or in other areas specifically designated for this purpose;</li> <li>• Only emergency breakdown maintenance will be carried out on site;</li> <li>• Appropriate containment facilities will be provided to ensure that any spills from breakdown maintenance vehicles are contained and removed off site;</li> <li>• There will be no discharge of any priority or hazardous substances to groundwater and surface waters; and</li> <li>• A suitable permanent fuel and oil interceptor will be installed to deal with all substation surface water drainage. Temporary petrol and oil interceptors will be installed at the site compound for plant repairs/storage of fuel/temporary generator installation.</li> </ul>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 9</p>
<p><b>DURING CONSTRUCTION</b></p> <p>Protection of Water Quality -Inspection and Maintenance</p>	<p>The drainage and treatment system for the proposed wind farm will be continuously managed and monitored and particularly after heavy rainfall events during the construction phase. The drainage and treatment system will be regularly inspected and maintained to ensure that any failures are quickly identified and repaired so as to prevent water pollution. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage this programme as outline in the CEMP. A checklist of the inspection and maintenance control measures will be developed, and records kept of inspections and maintenance works. These drainage controls will be kept in place during the operational phase of the proposed wind farm until the vegetation is re-established.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 9</p>

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	Protection of Water Quality Weather Monitoring	Weather monitoring is a key input to the successful management of the drainage and treatment system during the construction of the proposed wind farm. This will involve 24 hour advance meteorological forecasting (Met Éireann download) and on site rain gauge linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded (e.g., 1 in 5 year storm event), planned responses will be undertaken. These responses will involve control measures including the cessation of construction until the storm event has passed over and flood flows have subsided. Dedicated construction personnel will be assigned to monitor weather. Refer to the CEMP for further details of the control measures and relevant personal.	Principal Contractor and appointed Project Environmental Manager	Chapters 8 & 9
	Wheel Wash Facility	Wheel washes will be provided for heavy vehicles exiting the site to ensure that tracks outside of the site boundary are clean. These can take the form of dry or wet wheel wash facilities. In the case of a wet wheel wash a designated bunded and impermeable wheel wash area will be provided, and the resultant wastewater will be diverted to a settlement pond for settling out of suspended solids.	Principal Contractor	Chapter 9
<b>DURING CONSTRUCTION</b>	Protection of Water Quality -Water Quality Monitoring	<p>In order to verify the efficacy of pollution prevention and mitigation works during construction, water quality monitoring is required. Monitoring will be undertaken by a suitable qualified independent Ecological Clerk of Works (ECoW). Monitoring will be conducted prior to, during and post completion of construction works. Survey locations will target watercourses within the catchment of the construction area and monitoring will comprise visual, hydrochemistry and grab sampling. A programme for water monitoring will be prepared in consultation with Inland Fisheries Ireland prior to the commencement of the construction of the proposed wind farm. The plan will include monitoring of water during the pre-construction, throughout and post construction phases.</p> <p>Further baseline water quality monitoring of all streams near the development site will be undertaken prior to construction to confirm existing conditions at the time of construction. This baseline data will include the main components of a full hydrograph for the streams including both high spate flow and base flow where possible.</p> <p>During the construction phase of the project, a surface water monitoring schedule, finalised prior to construction, will be followed. In summary, weekly field monitoring of surface water quality chemistry will be carried out at the identified and agreed surface water quality monitoring locations. The following parameters will be measured:</p> <ul style="list-style-type: none"> <li>● pH (field measured);</li> <li>● Electrical Conductivity (field measured);</li> <li>● Temperature (field measured);</li> <li>● Dissolved Oxygen (field measured);</li> <li>● Total Dissolved Solids (TDS) (field measured); and</li> <li>● Turbidity (field measured).</li> </ul>	Principal Contractor and appointed Project Environmental Manager	Chapter 9

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>Continuous, in-situ, monitoring equipment will be installed at selected locations upstream and downstream of the proposed project. The monitoring equipment will provide continuous readings for turbidity levels, flow rate and water depth in the watercourses.</p> <p>Each month, the EcoW (refer to the CEMP in Volume III of the EIAR for details of the person to be appointed) will take samples from each location and bring to a laboratory for analysis on a range of parameters with relevant regulatory limits and EQSs. This will be compared with the baseline data obtained prior to construction from the EPA and from sampling. If the measured value exceeds the baseline values, the cause will be determined, and remedial measures put in place as necessary.</p> <p>The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:</p> <ul style="list-style-type: none"> <li>• pH;</li> <li>• Total Petroleum Hydrocarbons (TPH);</li> <li>• Temperature;</li> <li>• Total Phosphorus;</li> <li>• Chloride;</li> <li>• Nitrate;</li> <li>• Nitrite;</li> <li>• Total Nitrogen;</li> <li>• Orthophosphate;</li> <li>• Ammonia N;</li> <li>• Biochemical Oxygen Demand; and</li> <li>• Total Suspended Solids.</li> </ul> <p>Periodic visual observations at each of the monitoring points will be recorded with specific reference to flow, stream substrate and water colour. Photos will be taken to support visual observation, and inspection sheets including visual observation results and photographic records will be kept on site.</p> <p>Visual observations will also be completed after major rainfall events along with photographs which will be collected and assessed by the EcoW.</p> <p>The elements which will be included in the visual checklist are as follows:</p> <ul style="list-style-type: none"> <li>- Appropriate period visual inspection of all watercourses which drain the proposed project by the EcoW or a suitably qualified and competent person delegated by the EcoW;</li> <li>- Groundwater seepage, water ponding and wetting of previously dry spots;</li> </ul>		



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	<ul style="list-style-type: none"> <li>- All elements of drainage system will be monitored including settlement ponds, check dams, interceptor drains etc. Corrective action will be carried out if there is a visual indication of discolouration, oily sheen, odour or litter.</li> <li>- Event based visual inspections by the ECoW as follows:                             <ul style="list-style-type: none"> <li>o Following a high intensity localised rainfall event (10mm/hr);</li> <li>o Heavy rainfall within a day (25mm in a 24 hour period); and</li> <li>o Higher than monthly rainfall within a week period.</li> </ul> </li> <li>- A record of all visual inspections will be included in the Construction Environmental Management Plan (CEMP) and maintained on site.</li> </ul> <p>The ECoW will be responsible for presenting the surface water monitoring results at or in advance of regular site meetings.</p> <p>The reports will include results from field monitoring as well as visual inspections and laboratory analysis completed for that period. The reports will describe how the results compare with baseline results. Any deterioration in water quality deemed to be caused by construction activity will be flagged and appropriate remediation or corrective actions recommended.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Material Assets – Electricity Network</p>	<p>All electrical services within the public road will be identified prior to construction of the 110kV underground grid route cable.</p> <p>The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.</p> <p>All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.</p> <p>There is a slight chance of potential electricity outage during rerouting of the 38kV overhead line. Any outage will be kept to a minimum and any customers affected by a potential outage will be contacted prior to works commencing.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 10</p>
<p><b>DURING CONSTRUCTION</b></p> <p>Material Assets – Aviation</p>	<p>Whilst the proposed project will not impede aircraft, IAA Electronic Air Navigation Obstacle Data sets has identified obstacles as objects whose height above ground level is 90m or higher, affecting air navigation.</p>	<p>Principal Contractor and appointed Project Environmental</p>	<p>Chapter 10</p>

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	<p>Irish Wind Energy Association (IWEA) Guidelines have set out the following measures to ensure that pilots of aircraft are fully aware of the presence of wind turbines.</p> <ul style="list-style-type: none"> <li>- All turbines and meteorological masts having a height of 90m90m, or more are promulgated in the Irish Air Navigation Obstacle database;</li> <li>- Wind turbines or any structure exceeding 90m in height may require appropriate aviation warning lighting as agreed with IAA;</li> <li>- The IAA should be informed 30 days in advance of the erection of any structure exceeding 45m in height.</li> </ul> <p>Having regard to the above:</p> <ul style="list-style-type: none"> <li>- The developer will agree an aeronautical obstacle warning light scheme for the wind farm development with the IAA;</li> <li>- The developer will provide the IAA with as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location;</li> <li>- The developer will notify the IAA of intention to commence crane operations with a minimum of 30 days prior notification of turbine erection.</li> </ul>	<p>Manager</p>	
<p><b>DURING CONSTRUCTION</b></p> <p>Material Assets – Tele-communications</p>	<p>Results from the impact analysis indicate that there are four radio links that cross over the proposed projectwind farm site. To mitigate the potential impact on the Enet radio link from Urlingford to St Joseph’s College the following mitigation will be carried out:</p> <p>Relay the Enet radio link via an existing Telecoms Mast</p> <p>To offset the potential impact on the ESB radio link from Kilduff to the Thurles 110 kV Substation the following mitigation will be carried out:</p> <p>Relocate the monopole at the Thurles 110 kV Substation or relocate the radio antenna at the Thurles end of the radio link.</p> <p>In the event of interference to television and telecommunication services arising from the wind farm development, the applicant will work with telecommunication providers to remedy any issues of interference to affected communication links. Appropriate mitigation measures can be implemented such that there will either be an imperceptible effect, or no effect, on surrounding reception as a result of the proposed project, with the solution to interference with TV reception or communication links dependent on where the residence receives signal from.</p> <p>As standard practice, a signed Protocol between the developer and RTE will be put in place, in which the developer will be responsible to resolve any issue of interference with television reception as a result of the proposed project.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 10</p>

CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<b>DURING CONSTRUCTION</b>	Material Assets – Watermains	<p>There are no existing watermains within the footprint of the proposed wind farm however there is distribution watermains which exists along a section of road where the grid connection route passes. Pre-construction surveys will be completed to avoid disturbance to existing watermains.</p> <p>All construction phase and operation phase wastewater will be taken off-site by an authorised waste contractor and brought to an authorised waste facility.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 10
<b>DURING CONSTRUCTION</b>	Material Assets – Waste Management	<p>Mitigation measures for waste management are based on best practice construction methods. Waste will be managed in accordance with the waste hierarchy in Council Directive 98/2008/EC on waste and section 21A of the Waste Management Act 1996, as amended, as follows:</p> <ul style="list-style-type: none"> <li>a) Prevention;</li> <li>b) Re-use;</li> <li>c) Recycling;</li> <li>d) Other recovery (including energy recovery); and</li> <li>e) Disposal</li> </ul> <p>All waste for offsite treatment/disposal is to be stored temporarily in appropriate dedicated storage areas. The areas in which wastes are stored on site are segregated to prevent material and contaminated surface water runoff entering local surface water drains.</p> <p>All chemical, hydrocarbon or other controlled wastes will be stored in designated areas in appropriate approved containers within bunds or on spill pallets, as required.</p> <p>All waste to be removed from site will be undertaken by authorised waste contractors and transported to an authorised facility in accordance with best practice and the site waste management plan as discussed in the CEMP as included in EIAR Volume 3 Appendix 2B. All personnel working on site will be trained in pollution incident control response, and an emergency response plan will be prepared as part of the CEMP.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 10
<b>DURING CONSTRUCTION</b>	Cultural Heritage	<ul style="list-style-type: none"> <li>- All groundworks associated with the construction works, turbines hardstands, temporary compound, Met Lidar, spoil deposition areas, borrow pit and internal grid connection/access tracks should be archaeologically monitored under licence from the NMS;</li> <li>- All ground works associated with the Grid Connection Route should be archaeologically monitored within the ZON of the ringfort TN041-026 and under the license from NMS;</li> <li>- Groundworks associated with cuttings through the townland / parish boundaries must be kept to a minimum. The cutting locations of these boundaries should be archaeologically monitored and include photographs, survey and written descriptions;</li> <li>- All ground disturbance works associated with Turbine Delivery Route should be archaeologically monitored under the license from NMS;</li> </ul>	Principal Contractor and appointed Project Environmental Manager	Chapter 11

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>Where possible, it is proposed to excavate external grid connection trench to the East side of the road to minimize potential physical impact to the recorded ringfort TN041-026.</p>		
<p><b>DURING CONSTRUCTION</b></p> <p>Noise &amp; Vibration</p>	<p>It is proposed that best practices be adopted during construction as required, including the following:</p> <ul style="list-style-type: none"> <li>- The construction programme will be managed to ensure that plant with the highest levels of noise and vibration emissions are not operated simultaneously and for the minimum amount of time as practicable;</li> <li>- Channels of communication between the contractor/developer, Local Authority and residents will be established;</li> <li>- A site representative responsible for matters relating to noise and vibration will be appointed; and</li> <li>- Keeping the surface of the site access roads even to mitigate the potential for vibration from lorries.</li> </ul> <p>Furthermore, a variety of practicable noise control measures will be employed. These include:</p> <ul style="list-style-type: none"> <li>- Selection of plant with low inherent potential for generation of noise and/or vibration;</li> <li>- Placing of noisy/vibratory plant as far away from sensitive properties as permitted by site constraints</li> </ul> <p>The contract documents shall specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures when deemed necessary to comply with the recommendations of BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction on open sites – Noise. The following list of measures will be implemented to ensure compliance with the relevant construction noise criteria:</p> <ul style="list-style-type: none"> <li>- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.</li> <li>- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working for the duration of the contract.</li> <li>- Compressors will be attenuated models, fitted with properly lines and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.</li> <li>- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.</li> <li>- Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen.</li> <li>- During the construction programme, supervision of the works will include ensuring compliance with the limits detailed in the table below following methods outlined in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.</li> <li>- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall be restricted to between 07:00hrs and 19:00hrs weekdays and between 07:00hrs and 14:00hrs on Saturdays. However, to ensure that optimal use is made of good weather</li> </ul>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 12</p>

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED																																												
	<p>period or at critical periods within the programme (i.e., concrete pours) or to accommodate delivery of large turbine component along public routes it could be necessary on occasion to work outside of these hours. Any such out of hours working will be agreed in advance with the local Planning Authority.</p> <table border="1" data-bbox="629 368 1547 1182"> <thead> <tr> <th data-bbox="629 368 1070 480">Assessment Category and Threshold Value Period.</th> <th colspan="3" data-bbox="1070 368 1547 443">Threshold values in Decibel Level (dB)</th> </tr> <tr> <td></td> <th data-bbox="1070 480 1189 528">Category A <sup>A)</sup></th> <th data-bbox="1189 480 1308 528">Category B <sup>B)</sup></th> <th data-bbox="1308 480 1547 528">Category C <sup>C)</sup></th> </tr> </thead> <tbody> <tr> <td data-bbox="629 528 1070 584">Night-time (23.00–07.00)</td> <td data-bbox="1070 528 1189 584">45</td> <td data-bbox="1189 528 1308 584">50</td> <td data-bbox="1308 528 1547 584">55</td> </tr> <tr> <td data-bbox="629 584 1070 632">Evenings and weekends</td> <td data-bbox="1070 584 1189 632">55</td> <td data-bbox="1189 584 1308 632">60</td> <td data-bbox="1308 584 1547 632">65</td> </tr> <tr> <td data-bbox="629 632 1070 687">Daytime (07.00–19.00) and Saturdays (07.00–13.00)</td> <td data-bbox="1070 632 1189 687">65</td> <td data-bbox="1189 632 1308 687">70</td> <td data-bbox="1308 632 1547 687">75</td> </tr> <tr> <td colspan="4" data-bbox="629 687 1547 751"> <p><i>NOTE 1 A significant effect has been deemed to occur if the total <math>L_{Aeq}</math> noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.</i></p> <p><i>NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e., the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total <math>L_{Aeq}</math> noise level for the period increases by more than 3 dB due to construction activity.</i></p> <p><i>NOTE 3 Applied to residential receptors only.</i></p> </td> </tr> <tr> <td data-bbox="629 751 1070 799">A)</td> <td colspan="3" data-bbox="1070 751 1547 799">Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</td> </tr> <tr> <td data-bbox="629 799 1070 847">B)</td> <td colspan="3" data-bbox="1070 799 1547 847">Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</td> </tr> <tr> <td data-bbox="629 847 1070 903">C)</td> <td colspan="3" data-bbox="1070 847 1547 903">Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</td> </tr> <tr> <td data-bbox="629 903 1070 951">D)</td> <td colspan="3" data-bbox="1070 903 1547 951">19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.</td> </tr> <tr> <td colspan="4" data-bbox="629 951 1547 999">Periods may be amended to suit local conditions</td> </tr> </tbody> </table> <p data-bbox="629 1241 1547 1326">Vibration: Distances between construction locations and the nearest NSLs are such that vibration levels as a result of construction activities including any necessary piling will be below the values set out in the table below. No mitigation measures are therefore proposed.</p>	Assessment Category and Threshold Value Period.	Threshold values in Decibel Level (dB)				Category A <sup>A)</sup>	Category B <sup>B)</sup>	Category C <sup>C)</sup>	Night-time (23.00–07.00)	45	50	55	Evenings and weekends	55	60	65	Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75	<p><i>NOTE 1 A significant effect has been deemed to occur if the total <math>L_{Aeq}</math> noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.</i></p> <p><i>NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e., the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total <math>L_{Aeq}</math> noise level for the period increases by more than 3 dB due to construction activity.</i></p> <p><i>NOTE 3 Applied to residential receptors only.</i></p>				A)	Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			B)	Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			C)	Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			D)	19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			Periods may be amended to suit local conditions					
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CONSTRUCTION PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED						
		<p><b>Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of</b></p> <table border="1"> <tr> <td>&lt;10Hz</td> <td>10-50Hz</td> <td>&gt;50-100Hz</td> </tr> <tr> <td>8mm/s</td> <td>12.5mm/s</td> <td>20mm/s</td> </tr> </table>	<10Hz	10-50Hz	>50-100Hz	8mm/s	12.5mm/s	20mm/s		
<10Hz	10-50Hz	>50-100Hz								
8mm/s	12.5mm/s	20mm/s								
		<p>Blasting: The following mitigation measures will be employed to control the impact during blasts:</p> <ul style="list-style-type: none"> <li>- Trial blasts will be undertaken to obtain scaled distance analysis.</li> <li>- Ensuring appropriate burden to avoid over or under confinement of the charge.</li> <li>- Accurate setting out and drilling.</li> <li>- Appropriate charging.</li> <li>- Appropriate stemming with appropriate material such as sized gravel or stone chipping.</li> <li>- Delay detonation to ensure small maximum instantaneous charges.</li> <li>- Decked charges and in-hole delays.</li> <li>- Blast monitoring to enable adjustment of subsequent charges.</li> <li>- Good blast design to maximise efficiency and reduce vibration.</li> <li>- Avoid using exposed detonating cord on the surface.</li> </ul> <p>Noise and vibration monitoring in accordance with the guidance contained in BS 5228-1:2009 during the construction phase shall be undertaken to ensure compliance with the criteria or if noise complaints are received.</p>								
<b>DURING CONSTRUCTION</b>	Shadow Flicker -Screening Measures	<p>In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including:</p> <ul style="list-style-type: none"> <li>- Installation of appropriate window blinds in the affected rooms of the residence;</li> <li>- Planting of screening vegetation;</li> <li>- Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation.</li> </ul> <p>If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator.</p>	Principal Contractor and appointed Project Environmental Manager	Chapter 13						
<b>DURING CONSTRUCTION</b>	Shadow Flicker	<p>If it is not possible to mitigate any identified shadow flicker limit exceedance locally using the measures detailed above, wind turbine control measures will be implemented.</p>	Principal Contractor and appointed Project	Chapter 13						

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
-Wind Turbine Control Measures	<p>Shadow Flicker Control Modules (SFCM) is a standard element of commercial wind turbine packages which requires the identified dates and times of day of potential occurrence of shadow flicker at dwellings within the shadow flicker study area to be inserted into the SFCM computer program. This software considers factors such as weather conditions, which will then automatically stop each wind turbine at times when shadow flicker could otherwise occur within any of the houses within the study area. Once the conditions for shadow flicker to occur no longer apply (e.g. when the sun has passed the relevant position in the sky or once it has been clouded over), the wind turbine is restarted.</p> <p>The shadow flicker computer model assessment provides very detailed information, down to the exact times of day when shadow flicker is predicted to occur and from which turbine for each receptor. This information will be used to program the shadow flicker modules to assist in eliminating shadow flicker making sure it does not occur at any property. Should the draft 2019 Wind Energy Development Guidelines be adopted in their current form this curtailment measure would be capable of satisfying the recommended requirements concerning Shadow Flicker, as detailed in section 13.3.1.2.</p>	Environmental Manager	
<p><b>DURING CONSTRUCTION</b></p> <p>Air/Climate Dust generation</p> <p>Construction Traffic Emissions</p>	<p>Construction phase generated dust will be minimised by the following measures that will be implemented in full and which are also incorporated into the site-specific CEMP (Volume III, Appendix 2D):</p> <ul style="list-style-type: none"> <li>- Water will be used as a dust suppressant where required e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise;</li> <li>- Public roads will be inspected regularly for cleanliness and cleaned as necessary;</li> <li>- All loads entering and leaving the site will be covered during dry periods, to protect from dust;</li> <li>- Vehicle speeds will be controlled when passing over access tracks and crane hardstanding areas within the site;</li> <li>- Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads;</li> <li>- Site stockpiling of materials will be designed and laid out to minimise exposure to wind;</li> <li>- Daily site inspections will take place to examine dust measures and their effectiveness.</li> </ul> <p>Construction traffic emissions will be reduced using the following measures that will be implemented in full:</p> <ul style="list-style-type: none"> <li>- Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently;</li> <li>- Implementation of the Traffic Management Plan (Volume III, Appendix 16A) to minimise congestion;</li> </ul>	Principal Contractor and appointed Project Environmental Manager	Chapter 14

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>- All site vehicles and machinery will be switched off when not in use, and no idling of engines will be permitted;</li> <li>- Some of the aggregate materials for the construction of the proposed project will be obtained from an on-site borrow pit. This will reduce the number of delivery vehicles to site, thereby reducing emissions associated with vehicle movements.</li> </ul>		
<p><b>DURING CONSTRUCTION</b></p> <p>Landscape and Visual</p>	<p>The construction works will occur over a phased period to minimise disruption.</p> <p>All construction works will be carried out in line with the Construction and Environmental Management Plan (CEMP) (see Appendix 2B) to minimize disturbance across the site and wider area. Amongst these measures will include installation of temporary fencing, where required, to protect landscape elements that are in close proximity to the construction.</p>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 15</p>
<p><b>DURING CONSTRUCTION</b></p> <p>Traffic and Roads</p>	<p>Reasonable efforts will be made to minimise the impact of the works on local residences and users of the public road network throughout the project lifespan, but particularly in the construction phase where elevated traffic numbers will occur. A Traffic Management Plan (TMP) outlining the required traffic management procedures to be implemented on the public roads during the construction of the proposed project and delivery of the wind turbine components is included as Appendix 16A. In the event ABP decides to grant approval for the proposed project, the final TMP will be updated to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by ABP. The TMP (Appendix 16A) will be updated prior to commencement of construction, subject to the approval of the local planning authority, to ensure controls are in place for the increase in the numbers of Heavy Good's Vehicles (HGV's) and Light Goods Vehicles (LGV's) using the local road infrastructure, associated with the construction phase. .</p> <p>The following measures will be incorporated to ensure a safe and regulated traffic management system is enforced during the construction phase:</p> <ul style="list-style-type: none"> <li>- A dedicated traffic management coordinator will be appointed for the duration of the project construction and this person will be the main point of contact for all matters relating to traffic management on the project.</li> <li>- Final TMP will clearly identify roads that will be used to access the project site and roads that are not to be used. Turbine components and quarry material deliveries shall use the N62 and the western 1.6km section of the L-8017 roads as the primary haul route.</li> <li>- With the construction of the grid route along the local narrow roads, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the grid connection under the public roads. Any such one-way systems will be identified in the construction stage TMP in agreement with the roads authority.</li> <li>- The appointed contractor shall make provision for safe access at all times to private residences and commercial/business premises in proximity to the construction works. Steel plates or stone will be made available to allow access to residential properties. This will be done in co-operation /</li> </ul>	<p>Principal Contractor and appointed Project Environmental Manager</p>	<p>Chapter 16</p>



CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>communication with local residents in the area. The appointed contractor will inform local residents of the programme of works in their area and local access will be catered for where possible.</p> <ul style="list-style-type: none"> <li>- Prior to the grid route construction works commencing, the area where excavations are planned will be surveyed and all existing services will be identified. All relevant bodies i.e., ESB Networks, EirGrid, Gas Networks Ireland, Eir, Tipperary County Council etc. will be contacted and drawings for all existing services sought. A road opening licence will be obtained where required from the council for the relevant road sections. All plant operators and general operatives will be inducted and informed as to the location of any services;</li> <li>- Prior to works commencing a dilapidation survey will be carried out photographing and noting any existing damage or defects to structures or road surfaces. A copy of this survey will be submitted to the council prior to works commencing;</li> <li>- Pre-construction and post-construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network. Repairs will be carried out on the public roads, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the safe use of the road, as required;</li> <li>- Haulage traffic will share the same route with local residents, and other road users, which would present risks. Advance warning will be given to the local residents for specific times when large volumes of HGV traffic may occur and appropriate signage will be placed at the approach to the site or where temporary works are planned;</li> <li>- All signage relating to the proposed construction traffic routes for construction traffic will be agreed with the planning authority;</li> <li>- A well planned and executed delivery programme avoiding peak traffic on typical days will be utilised;</li> <li>- Ensure a strict protocol for HGV drivers to follow the designated haulage route and timing restrictions are implemented and monitored by the contractor with the suppliers and deliveries;</li> <li>- Adequate parking will be provided on site for both employees and visitors at the temporary compounds during the construction and decommissioning phases and at the EirGrid substation and IPP substation compounds for the operational phase to ensure parking will not occur on the public road;</li> <li>- The construction phase of the wind farm will require the delivery of turbine components, concrete, steel and aggregate to the site via the public road network. The key timing periods when use of the public road network will be at its peak for residents is between 08:15 and 09:15. It is proposed to allow routine deliveries such as aggregate into the site outside of peak hours to minimise any impact on surrounding network peak traffic. The initial early morning delivery trucks will exit the wind farm site empty with the run of traffic, but they will be delayed from delivering again until the peak hour has fully subsided as instructed and coordinated by the contractor once appointed.</li> <li>- To mitigate the impact of the delivery of large turbine components, the deliveries will be undertaken under garda and traffic management escort during off-peak (i.e. night-time) hours. The arrangement of the appropriate abnormal load licenses will be obtained by the appointed contractor. The appointed</li> </ul>		

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>contractor will liaise with the relevant road’s authorities and an Garda Síochána on the delivery schedule for the oversized loads.</p> <ul style="list-style-type: none"> <li>- A road sweeping vehicle will be provided as required to remove any mud that may be deposited on the local road in the vicinity of the site access.</li> <li>- The nuisance of dirt on the local road network during wet weather and dust during dry weather is an area of identified concern where the primary mitigation measure for this impact will be in the form of a proprietary construction vehicle wheel wash facility to be installed on the exit of the wind farm site as detailed within the Traffic Management Plan (TMP) section 3.1.2 attached in Appendix 16.A.</li> <li>- All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre works condition or better and to the satisfaction of the roads authority.</li> <li>- All construction workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/ not used to access the site.</li> <li>- 24 hour emergency contact phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for the grid connection) and the site entrance for the wind farm site.</li> </ul> <p>General Measures</p> <p>The Traffic Management Plan (see Appendix 16A) details the proposed general traffic management and control procedures, including:</p> <ul style="list-style-type: none"> <li>- Excavation, backfilling and reinstatement of trenches in roads will be completed within the shortest possible time frame.</li> <li>- The planning of road closures and traffic diversions will ensure that reinstatement of the trenches, joint bays, launch and reception pits are completed and all temporary traffic measures (lane and road closures/diversions) are removed in progressive stages.</li> </ul> <p>Access for Residents and Commercial /Business properties (along the proposed Grid Route)</p> <ul style="list-style-type: none"> <li>- The appointed contractor shall make provision for safe access at all times to private residences in proximity to the construction works.</li> <li>- Where it is required that trenches in the public road are left open overnight in proximity to a residence, steel plates or stone will used to bridge the trench and allow access to residential properties. This will be done in co-operation / communication with local residents in the area.</li> <li>- The appointed contractor will inform local residents of the programme of works in their area and local access will be catered for where possible.</li> </ul> <p>Pedestrian Safety</p> <ul style="list-style-type: none"> <li>- The appointed contractor shall ensure that throughout the course of the works its operations do not put pedestrians at risk.</li> </ul>		

CONSTRUCTION PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>- Where the construction work necessitates the restriction, partial closure or closure of a pedestrian walkway where they may exist, the appointed contractor shall provide adequate safety barriers, signposts, lighting and temporary surfacing (if applicable) to ensure safe passage for pedestrians.</li> <li>- With respect to pedestrians, the appointed contractor shall refer to and observe the requirements of the updated version of the Traffic Signs Manual 2019 titled Temporary Traffic Measures and Signs for Roadworks, or any guidance that supersedes this.</li> </ul>		

## 18.5 Operational Phase Mitigation and Monitoring Measures

**Table 18-3: Schedule of Construction Phase Environmental Mitigation & Monitoring Measures**

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	Human Health	<ul style="list-style-type: none"> <li>- The health and safety mitigation measures provided in the noise, air and climate, shadow flicker and traffic reports for the construction and decommissioning phases must be complied with.</li> <li>- All those employed on the site must be inducted in the relevant health and safety standards and protocols before starting work. Compliance with the health and safety standards must be monitored and enforced.</li> </ul>	Wind Farn Operator/Owner	Chapter 5
POST CONSTRUCTION /OPERATIONAL PHASE	Biodiversity – protection of water courses and downstream designated sites	<ul style="list-style-type: none"> <li>- Any herbicide / weed killer used on site will be an ecologically safe product, including safe for the aquatic environment to ensure that any run-off from the site will not contain harmful herbicide / weed killer that could affect surface water.</li> <li>- Any maintenance required will avoid hydrological features as in the construction phase mitigation, by the implementation of buffer zones (i.e. 50 m to main watercourses, and 10 m to main drains, except for watercourse crossings). Any maintenance vehicles will also be checked for leaks and other potential sources of contaminants before arriving on Site and on a daily basis for the maintenance time required. No fuels, oils or construction fluids will be stored on the Site, unless within a designated area with bunds of 110% storage capacity and away from any drains and / or watercourses. Spill kits will be available in areas where these chemicals are stored. No plant maintenance will be completed on-site, with any broken-down plant removed from site to be fixed.</li> <li>- No crossing of rivers or streams by machinery will be permitted, all machinery must stay within the constructed access routes.</li> <li>- Any maintenance works required during the operational phase will follow mitigation measures outlined above for the construction phase. Site personnel should also be made aware to check for signs of IAS colonising the Site. Where this is identified, the IAS should be dealt with appropriately and immediately to prevent further spread.</li> </ul>	Wind Farn Operator/Owner	Chapter 6
POST CONSTRUCTION /OPERATIONAL PHASE	Biodiversity – Protection of Important Habitats	<p>There were habitats identified as Annex I or having the potential to become Annex I habitats. The proposed substation layout was altered slightly to avoid these important areas. The grid connection route will follow existing roads for the majority of the route. All existing roads and farm roads within the proposed project will also be utilized, reducing the need to create new tracks and disturb habitats. For the duration of the project, these tracks will be the only tracks designated for use, limiting works to a confined working corridor to minimise the extent of land take. This will help reduce habitat impact.</p> <p>No additional measures for avoidance to protect habitats during the operational phase are required.</p>	Wind Farn Operator/Owner	Chapter 6

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	Biodiversity – Protection of other taxa	No additional measures for avoidance to protect other taxa during the operational phase are required.	Wind Farn Operator/Owner	Chapter 6
POST CONSTRUCTION /OPERATIONAL PHASE	Biodiversity – Protection of Terrestrial Mammals	<p>No significant impacts on the overall connectivity between existing woodland and linear features are expected to arise during the construction or operational phases of the project. Hedgerows required to be felled during the construction phase will be replanted for the operational phase, resulting in no net loss of hedgerow length. The movement of turbines away from the woodland “roost resource” will also reduce potential impacts on the existing mammal populations using this woodland for roosts and foraging.</p> <p>Once proposed bat feature buffer are implemented, no further operational phase impacts were identified for mammals; therefore, no specific mitigation measures are required. Mitigation measures aimed at protecting water quality water are outlined.</p>	Wind Farn Operator/Owner	Chapter 6
POST CONSTRUCTION /OPERATIONAL PHASE	Biodiversity – Protection of Bats	<p>The bat survey report in Appendix 6F provides detailed discussion on mitigation measures for bats to avoid operational impacts, including collision and barotrauma; as well as secondary impacts on foraging and commuting bats due to vegetation removal.</p> <p>Mitigation to avoid potential direct operational impacts on bats</p> <p>The main mitigation measure employed to avoid collision and barotrauma in bats relates to the design of the wind farm infrastructure to avoid features utilised by foraging/commuting bats. The presence of high risk collision species such as Leisler’s bats, common pipistrelles and soprano pipistrelles showing high activity levels on site will have impacts on these species during the operation phases.</p> <p>As recommended by NatureScot et al. (2021), a basic calculation formula is used to estimate bat feature buffers for this project. These buffers are provided as the distance from turbine towers to the feature, with the separation distance being dependent on feature heights in relation to turbine dimensions.</p> <p>As recommended by NatureScot et al. (2021), a minimum 50 m separation distance from habitat features used by bats and the tips of operational turbine blades must be maintained as bat feature buffer. Larger buffers may be appropriate when turbines are near important bat features such as swarming, maternity or hibernation sites (NatureScot et al., 2021). EUROBATS (Rodrigues et al., 2015) recommend buffers up to 200 m, therefore making a compromise between NatureScot and EUROBATS buffers, a 100 m buffer was calculated for these specific cases (named here as NatureScot "extended"). Table 6. 26 provides the bat feature buffer for the three turbine models assessed for the proposed project.</p>	Wind Farn Operator/Owner	Chapter 6

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
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Table of Bat buffers calculations using three turbine models in relation to feature height and the buffers recommended by NatureScot et al. (2021) and EUROBATS (Rodrigues et al., 2015).

Turbine model	Feature height (m)	Turbine buffer distance (m)		
		NatureScot (50 m)	NatureScot "extended" (100 m)	EUROBATS (200 m)
<b>Vestas</b> blade length = 73.7 m Hub height = 105 m, Lowest rotor swept = 31.3 m	0	65.4	138.4	252.8
	2	68.5	139.9	253.6
	5	72.8	142.0	254.8
	15	84.9	148.6	258.5
	25	94.4	154.2	261.7
<b>Nordex</b> blade length = 73 m Hub height = 105 m, Lowest rotor swept = 32 m	0	64.1	137.5	252
	2	67.2	139.0	252.8
	5	71.6	141.2	254.0
	15	83.8	147.7	257.7
	25	93.4	153.4	261.0
<b>Siemens-Gamesa</b> blade length = 76 m Hub height = 102.5 m, Lowest rotor swept = 26.5 m	0	73.3	143.1	256.3
	2	76.0	144.5	257.1
	5	79.8	146.5	258.2
	15	90.6	152.7	261.8
	25	99.3	158.0	264.9

The area where trees/scrub are cleared to create the bat feature buffers must be rendered as unsuitable as

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	<p>possible and maintained as such throughout the lifetime of the wind farm. To achieve this, felled timber and branches must be removed, and stumps should be brushed to ground level. Any excess spoil from excavation works during construction can be broadcast to cover over any ground stumps, creating a more homogeneous surface. Additionally, to prevent the area from scrubbing up again, a mowing or grazing regime will be implemented and closely monitored as part of the Habitat Management Plan.</p> <p>The area where trees/scrub is cleared to create the bat feature buffers must be rendered as unsuitable as possible and maintained as such over the lifetime of the wind farm. Felled timber and branches must be removed, with stumps brushed to ground level. Any excess spoil from excavation works during construction can be broadcast to cover over any ground stumps to create a more homogeneous surface. To prevent the area scrubbing up, a mowing or grazing regime will be implemented and monitored as part of the Habitat Management Plan.</p> <p><i>Mitigation by curtailment</i></p> <p>Bat feature buffers are effective in reducing turbine collisions for high-risk collision bat species, such as common and soprano pipistrelles, which commute and forage along forest edges. However, they may be less effective for species like Leisler’s bat and Nathusius’ pipistrelle that regularly commute and forage at turbine height in open areas. For these species, a turbine curtailment plan is highly recommended as a mitigation measure by NatureScot et al. (2021), EUROBATS (Rodrigues et al., 2015) and CIEEM (Reason &amp; Wray, 2023). A curtailment plan involves reducing specific turbines to run at less than 2 rpm, when predetermined climatic conditions suggest increased Leisler’s bat activity during the active bat season.</p> <p>More effective than weather data-only curtailment schemes (blanket curtailment) are new automated smart curtailment technologies such as the Turbine Integrated Mortality Reduction (TIMR) system (Hayes et al., 2019). This system comprises three primary components aimed at facilitating smart curtailment:</p> <ul style="list-style-type: none"> <li>- Bat acoustic detectors installed on the turbine nacelle for detecting bats within the turbine rotor swept zone;</li> <li>- A TIMR server responsible for analysing bat acoustic data in real-time alongside wind speed data obtained from the facility; and</li> <li>- A SCADA (Supervisory Control And Data Acquisition) interface designed to initiate turbine shut down when bats are detected, and wind conditions are within the curtailment zone.</li> </ul> <p>Using this smart curtailment approach, turbines are feathered only when bats are detected and wind conditions are within the curtailment zones, thereby minimising power generation losses (Hayes et al., 2019, Rabie et al., 2022). Applying this smart curtailment approach not only reduces the likelihood of high fatality rates of open space bat species such as Leisler’s bat but also addresses species that may be attracted to turbines, for example, due to red aviation safety lighting, such as common, soprano, and Nathusius’ pipistrelles (Voigt et al., 2018a).</p>		

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	<p>At the proposed project site, Leisler’s bats were notably more active during spring and summer, particularly near the proposed T.10 (closest detector was D.07) and T.8 (closest detector was D.04) turbine locations. There is also a suspected swarming site at T.7 (monitored by D.09). Based on observed Leisler’s bat activity levels, turbines requiring curtailment include:</p> <ul style="list-style-type: none"> <li>- T.8 during the spring;</li> <li>- T.10 during summer;</li> <li>- T.7 during the autumn;</li> <li>- T.9 and T.10 may require curtailment during spring as common and soprano pipistrelles showed high activity levels at D.05, D.06, D.07 and D.08, which are within or just outside the 300 m search area buffers of turbines T.9 and T.10; and</li> <li>- T.10 may require curtailment during summer and autumn if 2024 surveys indicate similar Leisler’s bat, common pipistrelle and soprano pipistrelle activity levels, all of which showed high activity at D.07, as assumed during the impact assessment.</li> </ul> <p>This mitigation measure technique has been documented to reduce bat fatalities rates substantially and effectively at wind farms (Voigt et al. 2022) with minimal impact on power generation. For instance, a recent study in Canada estimated that feathering wind turbines when windspeed was lower than 5.5 m/s between 6 pm of one day and 6 am the following day would result in only a 0.43% loss of total energy production (Thurber et al., 2023).</p> <p><i>Mitigation to avoid potential secondary impacts on bat foraging/commuting habitat</i></p> <p>Several locations have been identified where, vegetation removal has the potential to impact on foraging and commuting bats, with the follow areas highlighted as locations where the impact will be negative., including:</p> <ul style="list-style-type: none"> <li>- The loss of some of the woodland at T.4, T.9 and T.10; and</li> <li>- The loss of hedgerows at T.1, T.2, T.3, T.5, T.7, T.8 and T.9.</li> </ul> <p>Project design has attempted to avoid the removal of treelines, hedgerows and woodland habitats utilised by bats. To compensate for any unavoidable loss of bat commuting/ foraging habitat there will be an equivalent area identified as compensatory habitat.</p> <p>Compensation should aim to maximise future woodland, hedgerow and treeline ecological function by specifying an appropriate species mix and replacement locations to maximise connectivity. In the latter case, full consideration must be taken of bat usage of the site. It is proposed that compensatory planting of hedgerow/treeline habitat is undertaken in order to maintain connectivity between the woodland surrounding T.10. From the roost survey at F.24, it shows that the “T”-shaped treeline at T.4 is important for foraging for multiple species on site, and so replanting of hedgerow/treeline habitat just outside the 300 m</p>		



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	<p>buffer should be considered. Replanting should also be considered at T.7, as this area had high Leisler activity, and is suspected of being a swarming site. Swarming sites are an important site for mating, and this area should be conserved.</p> <p>This replanting, given adequate buffer distance from the turbine, would complement the mitigation for collision and barotrauma by acting as linear features along which bats commute, reducing their likelihood of commuting through the buffer zone. The removal of vegetation to implement turbine buffers is not anticipated to significantly reduce the edge effects that create habitat features utilised by bats and may actually increase this, in combination with compensatory planting leading to an enhancement of the foraging features within the developable site.</p> <p>The loss of habitat could pose an indirect impact to brown long-eared bats and myotis species. Due to the Natterer’s bat and brown long-eared bat roosts at the pNHA Ormond’s mill, it is recommended that any removal of native broad-leafed trees should be avoided. Any replanted trees should not be conifers, as these are not a preferred species of tree for the Natterer’s bat, who depends on woodland and river corridors for foraging. Degradation of foraging habitats such as woodlands could impact brown long-eared bat populations (Aughney &amp; Roche, 2008).</p>			
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Biodiversity                      Post-Construction Monitoring - Bats</p>	<ul style="list-style-type: none"> <li>- The aim for bat feature buffers around turbines is to ensure that habitats are as featureless as possible to discourage foraging bats, as well as potential prey species for kestrels. Initially, this will require regular monitoring in Year 1, 2 &amp; 3 to ensure vegetation clearance measures and ongoing management result in the desired habitat conditions. Once the optimal conditions have been created (after year 3) a habitat maintenance plan will be implemented. Compliance checks in spring (April) and late summer (August) will be required annually over the lifetime of the proposed project to ensure buffers are maintained in a suitable condition.</li> <li>- The aim for bat feature buffers around turbines is to ensure that habitats are as featureless as possible to avoid bats flying next to operating turbines. However, due to the extensive habitat changes often necessary at wind farm sites, particularly regarding vegetation removal and resulting edge effects and habitat connectivity disruptions, it is recognized that post-construction patterns of bat activity can be unpredictable (Rodrigues <i>et al.</i>, 2015, NatureScot <i>et al.</i>, 2021). Therefore, NatureScot <i>et al.</i> (2021) recommends a three-year post-construction monitoring program for bats, involving monitoring in each of the first three years to assess the effectiveness of the bat feature buffers and the curtailment plan.</li> </ul> <p>Initially, regular monitoring will be conducted in Year 1, 2 &amp; 3 to ensure that vegetation clearance measures and ongoing management efforts result in the desired habitat conditions. Following the establishment of optimal conditions (after year 3), a habitat maintenance plan will be implemented. Annual compliance checks in spring (April) and late summer (August) will be required throughout the proposed project's lifespan to ensure that buffers are maintained in suitable conditions. The</p>	<p>Wind Farm Operator/Owner</p>	<p>Chapter 6</p>

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>recommended three-year post-construction monitoring also includes bat activity monitoring and carcass searching (NatureScot <i>et al.</i>, 2021).</p> <p>Bat activity monitoring in years 1, 2 &amp; 3 will involve three seasonal deployments of 10 static bat detectors operating for a minimum of 10 nights under compliant weather conditions. Ten detectors will be positioned at each turbine location to monitor bat activity post-construction. Deployment will cover the following periods:</p> <ul style="list-style-type: none"> <li>- early May and mid-June;</li> <li>- mid-June and mid-August;</li> <li>- early September;</li> <li>- If feasible, a continuously recording bat detector will be deployed on the meteorological mast to simultaneously monitor bat activity at ground level (c. 2 m) and at height (c. 50 m). Similar to pre-construction surveys, a fully automated weather station with 3G connectivity will be deployed to generate real-time rainfall, wind speed, and temperature data. This can be supplemented with wind speed data collected from wind turbines.</li> </ul> <p>NIEA guidance recommends carcass searching which involves the detection of bat (and bird) casualties around the turbine blades (NIEA, 2024). These searches can be conducted by appropriately trained operational staff and should ideally occur early in the morning during high-risk periods at the site (i.e., during summer and autumn). Trained dogs with handlers are considerably more efficient and quicker than humans in locating carcasses and should be employed, if possible, to achieve more reliable results, although this is not mandatory. Observer efficiency should not fall below 50%, necessitating observer efficiency tests to minimize the risk of high false negative results. Alongside these observer efficiency tests, the carcass removal rate by predators should also be quantified to mitigate bias resulting from scavenging.</p>		
<p>Biodiversity –                      Habitat monitoring –                      Annex 1                      Molinia meadows</p>	<p>The eight permanent quadrats (10x10 m squares) marked using permanent metal pins were to be set up during the pre-construction phase within the area of Annex I habitat in the proposed substation field for long-term vegetation monitoring. Quadrats will be distributed through the habitat to sample central areas and areas around the edge of the Molinia meadows habitat.</p> <ul style="list-style-type: none"> <li>- Photographs will be taken to visually document any changes in site conditions over time;</li> <li>- Vegetation type will be recorded;</li> <li>- All species present will be listed, together with an indication species abundance, both in terms of % cover and rating on the DOMIN scale;</li> <li>- The presence of both positive and negative indicator species for the habitat type will be noted;</li> </ul>	<p>Wind Farm                      Operator/Owner</p>	

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	<ul style="list-style-type: none"> <li>- Other factors including vegetation height, ground conditions and management will be recorded;</li> <li>- Post-construction surveys will be undertaken in Years 1, 2, 3, 5 and 10.</li> <li>- Surveys must be undertaken by a suitable qualified botanist and at the optimal time of year for surveying Molinia meadow habitat.</li> </ul>			
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Ornithology – Protection of Water Quality</p>	<p>As detailed in Chapter 6: Biodiversity and Chapter 9: Water, the risk of deterioration in water quality during the operational phase of the project is lower than during construction due to the reduced levels of traffic on site. With the following measures in place any adverse effects on birds that rely on good quality water in downstream aquatic habitats will be avoided, including cormorant, grey heron, little egret and kingfisher, as well as grey wagtail.</p> <p>The sediment ponds employed during construction will be partly filled in the interest of health and safety; these along with other drainage infrastructure will continue to function ensuring that runoff will be attenuated and dispersed across existing vegetation before reaching the downstream receiving waters. This infrastructure will be inspected regularly by the operational maintenance personnel, along with culverts and stream crossings.</p> <p>All vehicular movement during operation and maintenance will be restricted to the internal access tracks and hardstands, i.e. no crossing of rivers or streams by machinery will be permitted. Any maintenance required will avoid hydrological features as in the construction phase mitigation, by the implementation of buffer zones (i.e. 50 m to main watercourses, and 10 m to main drains, except for watercourse crossings). Any herbicide/weed killer will be an ecologically safe product, including safe for the aquatic environment to ensure that any run-off from the site will not contain harmful herbicide/weed killer that could affect surface water.</p> <p>No fuels, oils or construction fluids will be stored on the Site, unless within a designated area with bunds of 110% storage capacity and away from any drains and / or watercourses. Any maintenance vehicles will also be checked for leaks and other potential sources of contaminants before arriving on Site and on a daily basis for the maintenance time required. Spill kits will be available in areas where these chemicals are stored. No plant maintenance will be completed on-site, with any broken-down plant removed from site to be fixed.</p> <p>Potential effects on water quality due to the operation and maintenance of the wind farm is principally related to the minor risk of oil spillages. This risk is mitigated by design through the provision of adequate bunding and implemented in the construction stage.</p> <p>Any maintenance works required during the operational phase will follow mitigation measures outlined in the Chapter 6, Chapter 9 and in the NIS.</p>	<p>Wind Farm Operator/Owner</p>	<p>Chapter 7</p>

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<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Ornithology – Collision Risk &amp; Displacement</p>	<p>The potential impacts on bird during the operational phase of wind farm developments relates to the consequential effects on sensitive populations from mortality arising from collisions with turbines and displacement effects due to operational turbines. The relative magnitude of effects due to displacement and collision as a result of operational wind turbines can be closely related. For instance displacement effects on a population may limit collision risk. However this relationship is seldom likely to be absolute and the relationship between displacement and collision risk is more likely to be dynamic, evolving over time. For example, birds initially displaced by turbines can over time become increasingly habituated to them, which correspondingly can result in increased levels of collision risk, if the species is susceptible to collisions.</p> <p>Mitigation measures can be designed to exploit displacement effects as means of reducing collision risk by making areas around turbines less suitable for sensitive species. While this approach may be appropriate to limit the attractiveness of the foraging habitats for certain species, in some cases displacement of sensitive species from breeding sites in particular, may be less desirable. The following sections provide mitigation measures to limit the effects of displacement and predicted collision risk for species where potential significant effects during the operational phase of the Proposed Project have been identified – see Section 7.4.5.</p> <p><u>Mitigation measures for breeding lapwing</u></p> <p>There were a maximum of 6 pairs of lapwing utilising the Proposed Project Site, which were assessed as a nationally important population (NRA, 2009). The baseline study identified two breeding areas, one located on the western bank of the River Suir, north of the Rossestown Bridge; and the other to the east, associated with a second order tributary of the River Suir – see Figure 7G.1 in Appendix 7G. The infrastructural footprint of the Proposed Project was designed to avoid lapwing breeding areas, and all turbines are set back at least 100 m.</p> <p>For breeding lapwing, in the absence of mitigation, operational turbines at the Proposed Project Site where predicted to exert a low magnitude of effect (c. 1%) due to collision risk and a low magnitude effect (1-5%) due to displacement. This is a precautionary assessment as evidence suggests that this species is notably tolerant of operational turbines (Mc Guinness et al, 2015)</p> <p>On-site habitat conditions during the baseline study were assessed as sub-optimal for breeding lapwing and this population was struggling to breed successfully, apparently mainly due to predation effects. Management measures are proposed to improve the quality of the breeding habitat for lapwing ensuring increased productivity and survival of young birds. Implementing these measures are anticipated to offset the low magnitude effects due to predicted collision risk and displacement. If these measures can deliver the successful breeding attempted and survival of 1 to 2 lapwing annually, this would completely offset any potential adverse effects due predicted collision risk and displacement. Measures would also aim to increase the size of the breeding population, as there is evidence that larger colonies are more successful.</p>	<p>Wind Farn Operator/Owner</p>	<p>Chapter 7</p>

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	<p>The areas selected by breeding lapwing within the Proposed Project Site are large, open field compartments that support wet grasslands subject to period flooding and provide a mosaic of nesting cover and more open areas for foraging.</p> <p><u>Proposed management measures for breeding lapwing include:</u></p> <ul style="list-style-type: none"> <li>• Maintain the open nature of the fields currently selected by lapwing, minimising scrub encroachment and maximise compartment size without impacting on connectivity for other species like bats.</li> <li>• Remove or cut back any prominent trees, shrubs or features that act a perches for avian predators such as hooded crows and buzzards.</li> <li>• Implement a program of predator control focusing on hooded crows, mink and foxes.</li> <li>• Extensive cattle grazing over the late summer and autumn will be employed to ensure that rank swards do not dominate vegetation cover. When required autumn mowing of wet grassland will be undertaken.</li> <li>• These measures will be implemented in the breeding season prior to construction and will be ongoing for the lifetime of the Proposed Project.</li> <li>• The condition of the fields utilised by breeding lapwing will be monitored in Year 1, 2, 3, 5, 10 and 15 post-construction to assess continued suitability for breeding lapwing. Monitoring will also record the number of territories, approximate locations of nest and breeding success, as well as any negative factors that may potentially limit breeding success.</li> </ul> <p><u>Mitigation measures for breeding snipe</u></p> <p>It is estimated that the Proposed Project Site supports up to five snipe territories, which were assessed as a population of county importance (NRA, 2009). Breeding was associated with very distinct areas holding wetland habitats and three breeding areas were identified with the 500 m proposed turbine buffer; however, only two of these areas are within the Proposed Project Site. This includes the wetland adjacent to T2 on the west bank of River Suir and a field of wet grassland between T7 and T5, east of River Suir – see Figure 7G.1 Appendix 7G. Mitigation by design has ensured core snipe breeding areas are largely avoided by the proposed infrastructure, which will minimise any direct effects during construction and ensures that suitable wetland habitats are retained over the operational phase.</p> <p>For breeding snipe, in the absence of mitigation, operational turbines at the Proposed Project Site were assessed as having the potential to induce a low magnitude effect (1-5%) due to displacement. Breeding season flights were under recorded, however a corrected collision risk model predicted that collision risk (as</p>		

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	<p>corrected) has the potential to exert a low magnitude of effect (1-5%) on breeding snipe. Based on Percival et al. (2009) displacement effects are the main consideration for breeding snipe with densities within 400 m of operational turbines declining by nearly 50%, equating to a displacement effect of 2-3 territories within the Proposed Project Site.</p> <p>Management measures are proposed to improve the quality of the breeding habitat for snipe to maintain baseline breeding densities and potentially increase the number of territories over the lifetime of the Proposed Project. Implementing these measures will offset the low magnitude effects due to predicted displacement. These measures will aim to maintain baseline breeding densities, i.e. five territories with the Proposed Project Site, and this would offset any potential adverse effects due to displacement effects.</p> <p>The areas selected by breeding snipe within the Proposed Project Site are within the large, open field compartments that support a mosaic of swampy, marshy and fen-type habitats (FS1, GM1, PF2) within areas dominated by wet grasslands (GS4) that is subject to period flooding. Optimal breeding snipe habitat includes areas of soft damp ground, with a tussocky sward and large open fields not surrounded by trees.</p> <p><u>Proposed management measures for breeding snipe include:</u></p> <ul style="list-style-type: none"> <li>• Maintain the proportion of marshy grassland and fen/flush habitats within the wetter area of the Proposed Project Site currently selected by breeding snipe.</li> <li>• Maintain the open nature of the fields currently selected by snipe, minimising scrub encroachment and maximise compartment size without impacting on connectivity for other species like bats.</li> <li>• Extensive cattle grazing over the late summer and autumn will be employed to ensure that rank swards do not dominate vegetation cover. When required autumn mowing of wet grassland will be undertaken.</li> <li>• Remove or cut back any prominent trees, shrubs or features that act as perches for avian predators such as hooded crows and buzzards.</li> <li>• The predator control proposed to improve lapwing breeding success will also benefit snipe productivity.</li> <li>• These measures will be implemented in the breeding season prior to construction and will be ongoing for the lifetime of the Proposed Project.</li> <li>• The condition of the areas utilised by breeding snipe will be monitored in post-construction years 1, 2, 3, 5, 10, and 15 to assess continued suitability for breeding snipe. Annual monitoring will also</li> </ul>		

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	<p>record the number of territories and approximate locations of nest, as well as any negative factors potentially limiting breeding success.</p> <p><u>Mitigation measures for wintering waterbirds</u></p> <p>The River Suir floodplain north of Rossestown Bridge was identified as periodically supporting regionally important flocks of wintering waterbirds, in particular lapwing and golden plover. This area is covered as part of the IWeBS site: River Suir Upper- Brittas [0J302- 0J397]. Peaks in activity were linked to seasonal flooding of the river and the Proposed Project Site was utilised in conjunction with other locations in the wider area. Hunting of wildfowl over the open season (September to January inclusive) was one of the main factors limiting bird usage of the area. This activity results in significant levels of disturbance leading to increasing flushing and flight activity, which has a displacement effects on wintering waterbirds and also has the potential to affects levels of predicted collision risk.</p> <p>The baseline study predicted collision risk of low significance (Percival 2003) for wintering lapwing (1-5% effect at 0.995 avoidance rate), golden plover (1-5% effect at 0.995 avoidance rate), lesser black-backed gulls (1-5% effect at 0.995 avoidance rate) and snipe (1-5% effect, based on corrected hypothetical CRM). Potential for displacement effects of low significance (Percival 2003) was identified for wintering lapwing (6-20% effect, precautionary assessment) and golden plover (6-20% effect, precautionary assessment). In addition, potential for cumulative displacement effects on lapwing were identified in combination with mitigation measures for Borrisbeg Wind Farm, where habitat management measure will be implemented to displace wintering flocks of lapwing of similar size to those at Brittas. Given the separation distance between sites (c. 12.8 km) it is likely that wintering lapwing utilise both locations.</p> <p>At Brittas the positioning of proposed turbines avoids areas prone to flooding and the associate wetlands and open grassland habitats, which is the feature attracting wintering waterbirds to the area. It is anticipated that operational turbines will initially exert a slight displacement effect on flocks of golden plover and lapwing, as well as other waterbirds utilising the area. However, overtime (maximum 2-3 years post-construction) this effect will dissipate, as birds habituate to the operational turbines and usage of the area will return to periodic winter usage recorded over the baseline study period. Habituation then introduces the potential for increased collision risk. The case is made that in reality, golden plover and lapwing exhibit notably high levels of turbine avoidance, with some authorities suggesting that avoidance as high as 99.9% may be applicable for populations of winter birds. However, as NatureScot are still to adopt the recommended alterations to avoidance rate, there is still a level of uncertainty in applying the outputs for collision models using higher rates, as is the case in the ornithological assessment for the Proposed Project.</p> <p><u>Proposed measures for wintering waterbirds include:</u></p>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>The design of the turbine layout for the Proposed Project has been configured so as to facilitate continued utilisation the River Suir floodplain by winter waterbirds, in particular the area within the IWeBS site: River Suir Upper- Brittas [0J302- 0J397].</li> <li>Disturbance of wintering waterbirds within the Proposed Project Site will be minimised by restricting hunting of wildfowl, in particular the area within the northern half of the IWeBS site: River Suir Upper- Brittas [0J302- 0J397], where a no take zone will be implemented.</li> <li>No habitat management measures are required, as the wintering waterbird assemblage is attracted to the area due to flooding events. Measures required during the breeding season for breeding waders will be beneficial to wintering waterbirds, including maintaining the open nature of the fields along the River Suir, north of the Rososestown Bridge, by minimising scrub encroachment and maximising compartment size. If landowners are amenable additional enhancement measures for wintering waterbirds can be implemented, such as wader scrapes; however these are not required for mitigation.</li> <li>Due to uncertainty regarding the application of appropriate avoidance rate within CRMs for lapwing and golden plover, monitoring over the winter will be required. As detailed in Section 7.5.2.2, this will include monitoring of bird usage over the winter and searches of selected turbines for bird strike. The habitat condition of the areas within the I-WeBS site: River Suir Upper - Brittas [0J302- 0J397] will be monitored in post-construction Years 1, 2, 3, 5 10 and 15 to assess continued suitability for wintering waterbirds, including any negative factors potentially limiting bird usage.</li> </ul> <p><u>Mitigation measures for kestrel</u></p> <p>Breeding raptor surveys identified two kestrel breeding territories within the 2 km proposed turbine buffer, with no nest sites located within the 500 m proposed turbine buffer – see Appendix 7G: Figure 7G.4. After buzzard, kestrel was the most active raptor species within the Proposed Project Site. Based on kestrels apparently exhibiting a high level of tolerance to operational turbines, any disturbance and/or displacement effects are unlikely, and collision risk is the main consideration for this species. The baseline study predicted collision risk of low significance (Percival 2003) for local kestrel population (6-20% effect at 0.95 avoidance rate).</p> <p><u>Proposed measures for kestrel include:</u></p> <ul style="list-style-type: none"> <li>For kestrels the provision of nest boxes is proposed as a compensatory measure to increase productivity in the area and offset the potential negative effects due to predicted collision risk during the operational phase of the Proposed Project. This type of enhancement measure is considered appropriate for kestrels, as this species often struggles with inter-specific nest site competition, e.g. with buzzards. Provision of nest boxes at selected sites around the periphery of</li> </ul>		



OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>the Proposed Project Site is proposed to provide this species more nesting options in the area. Initially, five nest boxes will be erected in suitable locations, and will be erected prior to construction, as directed by a suitability experience ornithologist. Depending on the up take of these site, further nest boxes will be provided over the operational life of the Proposed Project.</p> <ul style="list-style-type: none"> <li>• Nest box specification and installation will be in line with those detailed by ACRES (2024).</li> <li>• Nest boxes will be monitored in post-construction Years 1, 2, 3, 5 10 and 15 to record species occupation and breeding success if utilised by breeding kestrel. Note: This measure may also result in occupation of nest boxes by barn owls and long-eared owls, which are known to breed in the wider area, which would be a positive effect on local birds of prey populations.</li> <li>• For kestrels an important consideration will be the ground conditions remaining after the removal of vegetation around turbines to create turbine-bat feature buffers, as any remaining brash or debris can promote the occurrence of rodent populations that will attract foraging kestrels in close proximity to turbines, increasing collision risk. Therefore, all felled timber and brashed material will be removed, any remaining tree stumps will be chipped down to ground level, finely chipped wood and spoil will, as necessary, be broadcast to create a flat surface for re-seeding; and any open field/forestry drains will be piped and filled over. The aim of these actions is to limit prey availability around turbines by creating a uniformly short/cropped vegetation structure maintained through grazing/mowing that will support less prey items (rodents/birds) for foraging kestrels. Importantly, these measures are consistent with maintaining of open area around turbines to discourage bat from foraging in/commuting through the collision risk zone.</li> </ul> <p><u>Mitigation measure for peregrine</u></p> <p>A pair of peregrine breed within 600 m of the closest turbine. No displacement effects are anticipated. Predicted collision risk has the potential for a low magnitude of effect (1-5%) on the local breeding population; and in the context of a stable or expanding national peregrine population any additional turbine mediated mortality will have an imperceptible impact (&lt; 1%) on the regional peregrine population, which will recruit into the local area and replace any birds occasionally lost to turbine mediated mortality. The proximity of the nest to the proposed turbines introduces a level of uncertainty for collision risk to recently fledged birds, especially if dispersal flight behaviour varies from that observed over the baseline.</p> <p>Proposed measures for peregrine include:</p> <ul style="list-style-type: none"> <li>• The employment of post-construction monitoring (Years 1, 2, 3, 5 10 and 15) around fledging time to monitor peregrine chicks fledge and to ensure that they disperse safely. The monitoring protocol is detailed in Section <b>Error! Reference source not found.</b></li> </ul>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p><u>Mitigation measures for swift</u></p> <p>The Proposed Project Site is within the breeding season foraging range of swift breeding sites in surrounding towns and villages and periodically supports foraging birds of county importance (&gt; 5 birds). CRMs run on assumed levels of flight time within CRZ indicate that there is potential for moderate (6-20%) population levels effects on the regional swift population.</p> <p>Proposed measures for swift include the provision of nest boxes is proposed as a compensatory measure to increase productivity in the area and offset the potential negative effects due to predicted collision risk during the operational phase of the Proposed Project. As there is no suitable swift nesting habitat within the Proposed Project Site, financial support will be provided to Swift Conservation Ireland that would be targeted at increasing swift number in the surrounding towns and villages through the implementation nest box schemes on suitable buildings. This will cover the cost of installing 10 swift nest compartments at one or several optimal locations and will including the use of attraction calls. Nest boxes will remain in place through the lifespan of the Proposed Project.</p>		
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Ornithology – Monitoring</p> <p>As mitigation measures are proposed to offset likely significant long-term effects on species like kestrel and swift, post-construction monitoring is required to test the efficacy of these measures. Some monitoring is precautionary, targeting sensitive periods in the life cycles of species like peregrine, where the dispersal of young recently fledged birds There is also a level of uncertainty around the magnitude of cumulative effects of displacement and collision risk to some species, in particular lapwing and golden plover which requires post-construction monitoring.</p> <p>Ornithological monitoring surveys will have start prior to the commencement of construction and as per SNH (2009) guidance, will continue, post-construction, in Years 1, 2, 3, 4, 5, 10 and 15. Start dates for monitoring years should be in line with either the start of the breeding season or non-breeding season; and it is acceptable for the post-construction monitoring year 1 to commence prior to the final close-out of construction, so long as the turbines are erected and turning, i.e. posing a collision risk.</p> <p>Surveys will be conducted, in accordance with SNH (2009, 2017) guidance, by suitably experienced ornithologists and will include the following:</p> <ul style="list-style-type: none"> <li>• Vantage point watches targeting:                         <ul style="list-style-type: none"> <li>a) the peregrine nest site and T10 (re-locate VP1 to south of Brittas Castle);</li> <li>b) the IWeBS site: River Suir Upper from the Rossestown Bridge (VP4);</li> </ul> </li> </ul>	<p>Wind Farn Operator/Owner</p>	<p>Chapter 7</p>

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>c) the northwestern part for the 500 m turbine buffer including Clonamuckoge Beg/Killillahara from the bridge over the railway line (re-locate VP3 to bridge over railway); and,</p> <p>d) the northeastern part of the 500 m turbine buffer (VP2).</p> <p>Note: The positions of VP1 and VP3 will be re-located to provide optimal coverage of the 500 m turbine buffer.</p> <ul style="list-style-type: none"> <li>• Wider area wintering waterbird surveys covering suitable habitat in the 500 m turbine buffer twice per month and an area extending out to 2-3 km once per month, which will target counts at waterbird sites identified during the baseline surveys. Monitoring will incorporate habitat condition assessment of areas within the I-WeBS site: River Suir Upper- Brittas [OJ302- OJ397].</li> <li>• Breeding season surveys of the 500m turbine buffer for breeding waders – snipe and lapwing. Monitoring will incorporate habitat condition assessment of areas utilised by breeding waders.</li> <li>• Breeding season monitoring of peregrine nest, including dispersal of young.</li> <li>• Wider area breeding raptors surveys covering 2 km turbine buffer to monitor potential displacement effects on breeding kestrels, and will also record the occurrence of other breeding birds of prey, including barn owl (1 km buffer) and long-eared owl (500 m buffer).</li> <li>• Monitoring of kestrel nest boxes.</li> <li>• Monitoring of bird strikes (to be conducted conjunction with bat fatality monitoring).</li> </ul> <p>After Year 3 post-construction monitoring, the results will be reviewed, and survey requirements and mitigation will be altered accordingly based on the findings.</p> <p>Further details of ornithological monitoring requirements are detailed in the following sections.</p> <p><u>Vantage Point watches</u></p> <p>For each VP 36 hours of watches will be conducted in each season, i.e. a total of 72 hours per VP per monitoring year:</p> <ul style="list-style-type: none"> <li>• 36 hours per VP during the breeding season</li> <li>• 36 hours per VP during the non-breeding season</li> </ul> <p>Flight data will be collected for specified target species and will include: species, number, time of detection, flight height, mapped flight path and duration of flight. In addition, flight behaviour in relation to turbines and</p>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>the wind farm envelope will be recorded following, for example, categories employed in Meredith et al. (2002) . In summary, primary target species will include:</p> <ul style="list-style-type: none"> <li>• Any species listed on Annex I of the Birds Directive</li> <li>• All waterbird species</li> <li>• All birds of prey</li> <li>• Any species deemed to be at risk of collision or displacement that is listed as Red or Amber on the Birds of Conservation in Ireland (BoCCI), including swift, stock dove.</li> </ul> <p>A list of all species encountered within the environs of the development area will also be compiled during vantage point watches.</p> <p><u>Wider area wintering waterbird surveys</u></p> <ul style="list-style-type: none"> <li>• Counts of wintering waterbirds, including location, behaviour and habitat use.</li> <li>• Surveys covering suitable habitat within the 500 m turbine buffer will be undertaken twice per month, one these will be incorporated with the larger survey area.</li> <li>• Surveys covering an area extending out to 2-3 km will be undertaken once per month, which will target counts at waterbird sites identified during the baseline surveys, as well as the Proposed Project Site.</li> <li>• Monitoring will incorporate habitat condition assessment of areas within the I-WeBS site: River Suir Upper- Brittas [0J302- 0J397], including any disturbance factors.</li> </ul> <p><u>Breeding wader surveys</u></p> <ul style="list-style-type: none"> <li>• Breeding season surveys of the 500m turbine buffer for breeding waders – snipe and lapwing.</li> <li>• Surveys to record displaying/territorial snipe (drumming/chipping birds) will employ methodologies detailed in O'Brien &amp; Smith (1992) incorporating pre-dawn/dusk visits targeting the known snipe breeding sites and other wetter areas capable of supporting snipe. A minimum of three visits at last 10 days apart will be undertaken from mid-April onwards, up until mid-June. Surveying can extend over a period, either 3 hours after first light (dawn) or 3 hours before last light (dusk). To optimise the chance of registering drumming or chipping activity surveyors should aim to stay in areas of suitable habitat for as long as possible, with a minimum of 20 minutes suggested. Days with light wind conditions (&lt; 19 km/hr, 5.5 m/s, Force 3) should be selected for surveying and drizzle or light rain are acceptable during surveys, as these can result in increased</li> </ul>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>display activity. The application of thermal imagery cameras mounted to drones can be investigated as a complementary methodology to provide greater accuracy on nesting locations and numbers.</p> <ul style="list-style-type: none"> <li>• Lapwing surveys will employ methodologies detailed in O’Brien &amp; Smith (1992). Three visits will be undertaken to locate the territories and then monitor breeding success. Care will be taken not to disturb incubating birds and surveyors will maintain at appropriate standoffs.</li> <li>• Monitoring will incorporate an annual habitat condition assessment of areas utilised by breeding waders, including any disturbance factors.</li> </ul> <p><u>Peregrine monitoring</u></p> <ul style="list-style-type: none"> <li>• Breeding season monitoring of the peregrine nest to ensure safe dispersal of young, involves intensive, sometimes full day (18 hour), tracking of birds over the fledging period.</li> <li>• Early season visits will confirm occupancy of the nest and provide an estimate of fledging dates.</li> <li>• Based on estimated fledging dates, surveyors commence intensive nest site monitoring, with adjustments to duration of watches implemented based on behaviours observed. In addition, on days with low wind speeds monitoring may not be required.</li> <li>• Monitoring of fledged young is continued until the juveniles are judged to be proficient at flying, so as to avoid collisions and/or have dispersed away from the natal site. Over this period turbine searches are also undertaken, and these are implemented, as soon as the fledglings start flying away from the nest site.</li> <li>• After three years of monitoring, if it can be demonstrated that dispersal patterns of fledgling peregrines to do not lead inexperienced towards the turbines, then ongoing annual monitoring will not be required and monitoring years, as per SNH (2009) will apply, i.e. monitoring in Years 5, 10 and 15.</li> </ul> <p><u>Wider area breeding raptors and owl surveys</u></p> <ul style="list-style-type: none"> <li>• A combination of ‘mini-VPs’, as well as driven and walked transects will be used to search potential nesting habitats for breeding raptors within the 2 km turbine buffer.</li> <li>• Clear days in early spring will be targeted to survey for displaying/soaring/territorial birds of prey. Depending on the species these possible breeding sites will be investigated further to determine occupancy. The main target species is kestrel.</li> </ul>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>• The known barn owl site to the northwest of the proposed development site will be monitored for occupancy.</li> <li>• Dusk surveys, in spring and late summer, covering the woodland in the southern part of the Proposed Development Site will be employed to survey for the presence of long-eared owl.</li> </ul> <p><u>Monitoring bird strike</u></p> <p>Turbine searches will be implemented to detect any fatalities (and possibly injured animals) due to collisions with turbines. Currently, there are no standardised methodologies for monitoring of wind farm collisions in Ireland and the following protocol should be modified, as and when guidelines are established.</p> <ul style="list-style-type: none"> <li>• The extents of search areas around turbines are justified based on the findings from previous studies, with the frequency and timings of searches designed to target the species identified as being at risk of colliding with the turbine.</li> <li>• Monitoring should commence once turbines are erected with blades turning and the following turbines will be targeted over the following periods:                         <ul style="list-style-type: none"> <li>○ Wintering waterbirds: T01, T02, T03, T07, T08- a total of six rounds of searches, October to March (April if birds regularly occur on passage) approximately a month apart. Frequency of rounds can be altered, if the area becomes particularly busy with bird activity.</li> <li>○ Breeding waders: T2, T3, T5, T7- a total of 4 rounds of searches targeting early spring (March) for lapwing display period and April/May for snipe display period.</li> <li>○ Peregrine: T10, with selection of additional turbines to be informed by monitoring of dispersal- intensive searches will be employed for approximately two week period covering peregrine fledging and dispersal- commence once fledglings are on the wing and until they are judged to be proficient at flying, so as to avoid collisions.</li> </ul> </li> <li>• A minimum search area of 50 m around each turbine will be searched by specifically trained teams of dogs and handlers. Well-selected dogs, trained by an experienced professional should be employed. Trained wildlife detection dogs have been shown to be significantly more effective than humans in detecting fatalities from collision. Dogs will not be over worked and will be rested appropriately between and during searches.</li> <li>• During turbine searches any remains of animals (birds and bats) will be recorded and the following information was collected:                         <ul style="list-style-type: none"> <li>○ Detailed photographs of remains in situ</li> </ul> </li> </ul>		

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<ul style="list-style-type: none"> <li>○ Description of remains, including: species identification, if possible age and sex, if possible carcass condition, including estimated age of remains and any evidence of trauma, suspected cause of death, if possible (often not clear), turbine number and distance/bearing from turbine, GPS coordinates of carcass location.</li> <li>• Searcher efficiency trials: A trial to provide an indicative measurement of searcher efficiency will be undertaken during each round of searches.</li> <li>• Carcass persistence trails: An estimate for scavenging rates across the wind farm site will be established by employing time/date stamped motion sensitive cameras (trip cams) baited with a range of carcass types. This will determine what scavengers are active on the site and how long baits remain in situ.</li> </ul>			
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Land and Soils</p>	<p><u>Soils and Geology</u></p> <ul style="list-style-type: none"> <li>- All vehicular movement during operation and maintenance will be restricted to the areas of hardstanding and existing/newly constructed access tracks.</li> <li>- No excavation works are expected during the operational phase unless there is some contaminated soil that needs to be removed, repairs to roads and foundations needed, or some turbine blades need to be repaired and the two temporary hard stands needed to facilitate turbine deliver need to be reinstated. In this case the same mitigation measures for the construction phase will apply (see mitigation measures in Sections 8.4.1.1 and 8.4.1.2).</li> </ul> <p><u>Accidental Spills and Contamination/Pollution</u></p> <p>Mitigation measures for oils and fuels remain the same as the construction phase, however, will be significantly reduced during the operation stage as maintenance of the turbines, substation and maintenance vehicles is all that is required. Turbine transformers will be located within the turbines, so any leak of oil would be contained within or adjacent to the turbine. Minimal refuelling or maintenance of operational vehicles or plant will take place on site. Off- site refuelling will occur at a controlled fuelling station. Any on site re-fuelling will be undertaken using a double skinned bowser with spill kits at the ready for accidental leakages or spillages. A minimal amount of fuels will be stored on site. Storage areas where required will be bunded appropriately for the fuel storage volume during the operational phase and will be fitted with a storm drainage system and an appropriate oil interceptor. The plant used will be regularly inspected for leaks and fitness for purpose. These measures will be sufficient to reduce the risk of contamination to soils and subsoils, and groundwater and surface water quality. An emergency plan for the operational phase to deal with accidental spillages will be prepared and will be communicated to</p>	<p>Wind Farm Operator/Owner</p>	<p>Chapter 8</p>

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	<p>plant operatives. Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.</p> <p>The substation transformer oil storage tanks will be in a concrete bund capable of holding 110% of the oil in the transformer and storage tanks.</p> <p><u>Grid Connection, Substation and BESS Compound</u></p> <p>No excavation activities are expected during the operational phase. The only possible excavation works that may be required would be related to contamination or repair works. In this case, the mitigation will include:</p> <ul style="list-style-type: none"> <li>○ Use of temporary excavations over the shortest distances possible; and</li> <li>○ All excavated material will be stored and reused during reinstatement.</li> </ul>			
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Protection of Water Quality – Management of Domestic Effluent</p>	<p>The measures for control of runoff and sediment relate to the construction phase of the project when there is continuous movement of site vehicles and delivery vehicles moving around the proposed wind farm. During the operational phase, the amount of on-site traffic will be very low and there will be negligible risk of sediment runoff. It is therefore proposed to partly fill the sediment ponds with stone so that they will not present a long-term safety risk. Runoff from the tracks, hard-standings, and other works areas will continue to be directed to these ponds and from there to the outfall weirs. Check dams within the drainage channels will also remain in place. The retention of this drainage infrastructure will ensure that runoff continues to be attenuated and dispersed across existing vegetation before reaching the downstream receiving waters. This infrastructure will be inspected regularly by the operational maintenance personnel.</p> <p>The regular inspections during the operational phase will ensure culverts are free from blockages, and there is no damage or erosion of the stream crossing wing walls, particularly after storm events. Silt ponds will also be inspected and maintained before the drains and verges have vegetated.</p> <p>Potential effects on water quality due to the operation and maintenance of the wind farm is principally related to the minor risk of oil spillages. This risk is mitigated by design through the provision of adequate bunding and implemented in the construction stage.</p> <p>All vehicular movement during operation and maintenance will be restricted to the internal access tracks and hardstands.</p>	<p>Wind Farn Operator/Owner</p>	<p>Chapter 9</p>



OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Cultural Heritage</p>	<p>There are no archaeological effects anticipated during the operational phase of the proposed turbines. Potential subsurface archaeological issues will have been adequately resolved by the mitigation measures in advance of construction phase of the project, i.e., pre-development testing and archaeological monitoring of ground works associated with the construction phase of the wind farm development.</p>	<p>Wind Farm Operator/Owner</p>	<p>Chapter 11</p>
<p><b>POST CONSTRUCTION /OPERATIONAL PHASE</b></p>	<p>Noise</p>	<p>An assessment of the operation noise levels has been undertaken in accordance with best practice guidelines and procedure as outlined in the following guidelines and policy documents:</p> <ul style="list-style-type: none"> <li>- Wind Energy Development Guidelines for Planning Authorities published by the Department of the Environment, Heritage and Local Government in 2006 (WEDG-06)</li> <li>- The Assessment and Rating of Noise from Wind Farms (ETSU-R-97).</li> <li>- A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (GPG), 2013, Institute of Acoustics.</li> <li>- Draft Revised Wind Energy Development Guidelines December 2019 (DRWEDG19)</li> <li>- WHO Environmental Noise Guidelines for the European Region (2018)</li> </ul> <p>As has been demonstrated the operation of the proposed project is not expected to exceed the daytime or night-time noise criteria at any of the NSLs considered, and therefore no specific mitigation measures need apply.</p> <p>Furthermore, if the proposed project is permitted and constructed, a post-commissioning noise survey with the selected wind turbines operating will be carried out and any exceedances of the planning conditions which can be attributed to the Wind Farm will be mitigated by curtailment.</p> <p>In the unlikely event that an issue with any special audible characteristic is associated with the proposed project, an appropriate detailed investigation will be undertaken and due consideration shall be given to the appropriate guidance on conducting such an investigation outlined below:</p> <ul style="list-style-type: none"> <li>- Infrasound and Low Frequency: University of Salford Proposed Criteria for the Assessment of Low Frequency Noise Disturbance, Revision 1</li> <li>- Amplitude Modulation: IOA Noise Working Group (Wind Turbine Noise) Amplitude Modulation Working Group Final Report, A Method for Rating Amplitude Modulation in Wind Turbine Noise</li> <li>- Tonal: ISO/PAS 20065:2016 Acoustics — Objective method for assessing the audibility of tones in noise — Engineering method.</li> </ul> <p>Should a complaint arise once a development is operational, these characteristics can be assessed using the relative techniques and, if necessary, appropriate mitigations applied. For example, implementation of</p>	<p>Wind Farm Operator/Owner</p>	<p>Chapter 12</p>

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	operational modes resulting in curtailment of turbine operations can be implemented for specific turbines in specific wind conditions to ensure noise levels are within the relevant noise criterion/planning conditions.			
<b>POST CONSTRUCTION /OPERATIONAL PHASE</b>	Air / Climate	It is not expected that any significant adverse effects to the climate and air quality will occur during the operational phase, therefore no mitigation measures are required.	Wind Farm Operator/Owner	Chapter 14
<b>POST CONSTRUCTION /OPERATIONAL PHASE</b>	Landscape and Visual	<p>Turbines are large structures in the landscape and not easily screened, except, where possible, with siting. Mitigation by design has been carried out where possible, with regard to the guidance in the DoEHLG (2006) and the Draft (2019).</p> <ul style="list-style-type: none"> <li>● Mitigation measures applied by design and avoidance include a choice of appropriate grey or off-white turbine colour, sensitive siting and design of the turbines and associated elements. It also includes minimising vegetation removal, such as hedgerows and trees, and avoiding sensitive elements in the site, such as the archaeological monuments to the east and southwest of the site.</li> <li>● Mitigation measures include the re-instatement of the areas following the construction phase. It also includes replanting 1.4ha of woodland, as well as 4086m of hedgerow. The new planting will help to strengthen field boundaries, restore riparian planting along the Suir River and, overall, provide greater ecological connectivity and biodiversity strength through the site.</li> <li>● The borrow pit will be filled in with excess material generated during the construction works and regenerated/ returned to its current pasture use.</li> <li>● Topsoil will be saved from the construction areas and reused across the site to restore the landscape</li> </ul> <p>Enhancement measures are set out in the BEMP (see Appendix 6?) and referred to in Chapter 6 Biodiversity. Those aiding in landscape and visual effects include:</p> <ul style="list-style-type: none"> <li>● Existing retained internal treelines and hedgerows will be enhanced within the site, where possible. This includes planting up any large gaps with appropriate native shrubs and trees;</li> <li>● Linear sections adjacent to the proposed internal access tracks, and reinstated areas around turbines will be allowed to be colonised with local plants through natural dispersion and germination.</li> </ul>	Wind Farm Operator/Owner	Chapter 15

OPERATIONAL PHASE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
	Traffic and Roads	Due to the relatively low operational traffic associated with operations and maintenance of the proposed wind farm, effects on traffic and transport are envisaged to be imperceptible. As such, no mitigation measures are proposed for the operation and maintenance of the wind farm and associated generated recreational traffic. In the event that a turbine component requires replacing during operations, the current Turbine Delivery Route will be re-assessed as road conditions may change over time. Any movement of large components during the operational period will be agreed with the local authority prior to delivery.	Wind Farm Operator/Owner	Chapter 16

## 18.6 Decommissioning Phase Mitigation and Monitoring Measures

**Table 18-4: Schedule of Decommissioning Phase Environmental Mitigation & Monitoring Measures**

DECOMMISSIONING PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<b>DE-COMMISSIONING</b>	Biodiversity Mitigations	<p>The implementation of similar mitigation measures, as detailed for the construction phase will help ensure that all such impacts are avoided. Therefore, it is proposed that a Decommissioning Plan be drafted prior to removal of the development infrastructure. This will detail the specific actions aimed at protecting KERs. As for the construction phase, these include limitations on the working corridor, minimised impact on vegetation, protection of water quality and protection of roosting bats. The NIS outlines decommissioning mitigation measures for the protection of affected QIs in the Lower River Suir SAC (APEM, 2024) as The decommissioning phase will follow mitigation measures outlined for the construction phase.</p> <p>A pre-decommissioning walkover survey should be undertaken with the specific objective of identifying any species of nature conservation importance that may be affected by the decommissioning phase and works timed accordingly to avoid sensitive periods.</p>	Wind Farn Operator/Owner and Principal Contractor Appointed Ecological Clerk of Works	Chapter 6
<b>DE-COMMISSIONING</b>	Land and Soils	Where appropriate, mitigation measures used during decommissioning activities shall be comparable to those used during construction. By keeping some development components in place, when necessary, some of the effects will be avoided. In order to recover vegetation and lessen the effects of runoff and sedimentation, the turbine bases will be rehabilitated by being covered with local topsoil. Access tracks that are not needed for farming or forestry will also be allowed to naturally revert to vegetation. The wind farm's materials and equipment will all be removed from the site and disposed of or repurposed in a way that is environmentally responsible. The same relevant mitigation measures proposed for the construction phase will be applied during the decommissioning phase to prevent potential pollution from fuel leaks and soil compaction caused by nearby plants.	Wind Farn Operator/Owner and Principal Contractor Appointed Ecological Clerk of Works	Chapter 8
<b>DE-COMMISSIONING</b>	Protection of Water Quality	The potential effects on the water environment during the decommissioning stage will be similar to those during the construction phase, and as such the proposed mitigation for the decommissioning phase are similar to those outlined previously. Moreover, due to the relative long life of the wind farm infrastructure, it is likely that a revised/updated environmental assessment will be required at the time of decommissioning to account for any changes in baseline conditions at the proposed project site, and potential changes in assessment guidelines and legislation and technology and advancements.	Wind Farn Operator/Owner and Principal Contractor Appointed Ecological Clerk of Works	Chapter 9

DECOMMISSIONING PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DE-COMMISSIONING	Cultural Heritage	All townland / parish / barony boundaries affected by the construction of the Proposed project should revert to their pre-construction phase.	Wind Farm Operator/Owner and Principal Contractor Appointed Ecological Clerk of Works	Chapter 11
DE-COMMISSIONING	Noise & Vibration	Activities and noise levels associated with the decommissioning phase are expected to be similar to the construction phase. The mitigation measures that will be considered in relation to any decommissioning of the site are the same as those proposed for the construction phase of the development.  Noise and vibration monitoring in accordance with the guidance contained in BS 5228-1:2009 during the decommissioning phases shall be undertaken to ensure compliance with the criteria or if noise complaints are received.	Wind farm Operator/Owner and Principal Contractor	Chapter 12
DE-COMMISSIONING	Air / Climate	Effects resulting from the decommissioning phase are expected to be similar in nature, however smaller in scale in comparison to the construction phase. A decommissioning plan will be agreed with the planning authority prior to the commencement of decommissioning. This plan will include the following measures: <ul style="list-style-type: none"> <li>Water will be used as a dust suppressant where required e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise;</li> <li>Public roads will be inspected regularly for cleanliness and cleaned as necessary;</li> <li>All loads entering and leaving the site will be covered during dry periods, the protect from dust;</li> <li>Vehicle speeds will be controlled when passing over access tracks and crane hardstanding areas within the site;</li> <li>Daily site inspections will take place to examine dust measures and their effectiveness.</li> </ul> Decommissioning traffic emissions will be reduced using the following measures that will be implemented in full: <ul style="list-style-type: none"> <li>Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently;</li> <li>All site vehicles and machinery will be switched off when not in use, and no idling of engines will be permitted;</li> </ul>	Wind farm Operator/Owner and Principal Contractor	Chapter 14

DECOMMISSIONING PHASE		ENVIRONMENTAL MITIGATION / RECOMMENDATION	PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
<b>DE-COMMISSIONING</b>	Landscape and Visual	<p>At the end of the estimated 35-year lifespan of the proposed project, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning permission application. If planning permission is not sought after the end of life of the turbines, the removal of infrastructure will be undertaken in line with landowner and regulatory requirements applicable at the time. Access tracks will be left for use by the landowners.</p> <p>Cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. Wastes generated during the decommissioning phase will be taken off site and disposed of at an authorised waste facility. Any materials suitable for recycling will be disposed of in an appropriate manner.</p> <p>At present it is anticipated that internal underground cables connecting the proposed turbines to the proposed on-site substation will be cut back and left underground. The cables will not be removed if an environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The assessment will be carried out closer to the time to take into account environmental changes over the project life. Hardstand and turbine foundation areas will be left in situ and covered with soil to match the existing landscape. Access roads will be left in situ. for agricultural use.</p> <p>Overall, the impacts of decommissioning a wind farm will comprise temporary visual disturbance such as cranes and on-site machinery. Once decommissioned, however, the visual effects of the turbines will be reversed, and while viewers at close proximity may still see the access tracks, the hardstands will gradually re-vegetate.</p>	Wind farm Operator/Owner and Principal Contractor	Chapter 15
<b>DE-COMMISSIONING</b>	Traffic and Roads	<p>On decommissioning of the wind farm, a decommissioning plan will be prepared and agreed with the local authority. The plan will be implemented to minimise the effects on traffic and transport during the decommissioning phase. The decommissioning phase will employ similar mitigation measures as the construction phase. As the decommissioning phase is envisaged to be over 35 years from now, a new TMP will be undertaken to take account of any changes to the road network and legal requirements.</p>	Wind farm Operator/Owner and Principal Contractor	Chapter 16