Annex 1.6

Knockastanna Wind Farm Extension of Operational Life

Annex 1.6: Schedule of Mitigation Measures

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1.0 Introduction

This document has been prepared to present a collated and consolidated schedule of all mitigation measures proposed to be implemented in respect of the extended operational life of the Knockastanna Wind Farm.

The Knockastanna Wind Farm is located in Co. Limerick; c. 29km east of Limerick City, c. 6km north of the village of Doon, Co. Limerick, and c. 26km west of Thurles, Co. Tipperary; and comprises a number of individual components, as follows:-

- 4 no. wind turbines;
- Associated turbine foundations and crane hardstandings;
- 1 no. electrical control building with a total footprint of 66 square metres (m^2), including welfare facilities and associated electrical equipment enclosure;
- Underground electrical cabling between each of the existing wind turbines and the electrical control building;
- 1 no. site entrance from the L-5029-419 and 2km of site access tracks; and
- Site drainage infrastructure.

It is proposed to continue to operate the existing wind farm for a further period of 15-years.

1.1 Purpose of this Report

This report has been prepared to provide a concise document of all mitigation measures proposed within the Knockastanna Wind Farm Extension of Operational Life Environmental Impact Assessment Report (EIAR).

Article 8(a)(4) of the Environmental Impact Assessment (EIA) Directive 2014/52/EU states:-

> *'...Member States shall ensure that the features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment are implemented by the developer...'*

This document therefore provides a list of all mitigation measures proposed within **Volume I** of the EIAR, which will be implemented during the operational and decommissioning phases of the proposed development.

1.2 Responsible Personnel

SSE Renewables Generation Ireland Limited **('the Applicant')** can confirm that all mitigation measures outlined below will be implemented except as may be required in order to comply with conditions of consent.

It should be noted that a number of the below measures will be supervised and overseen by personnel who have not yet been appointed. Such personnel may include:-

- Civil Works Contractor;
- Electrical Works Contractor;
- Ecological Clerk of Works; and
- Environmental Manager.

As required, each of the above will be procured by the Applicant who will have ultimate responsibility for the implementation of all mitigation measures.

1.3 Environmental Impact Assessment Report (EIAR) Mitigation Measures

Environmental Impact Assessment Report – Schedule of Mitigation Measures		
Topic	**Mitigation Measure**	**Timing of Implementation**
Population & Human Health	Rigorous safety checks will continue to be conducted on the turbines during operation to ensure their optimal operation.	Operation
Population & Human Health	An operational phase Health and Safety Plan will continue to be implemented during the proposed period of extended operations.	Operation
Population & Human Health	Decommissioning works will be undertaken within the framework of a Decommissioning Plan, which will provide details on day to day works and methodologies. As part of these works, the public and other relevant stakeholders will be provided with updates on construction activities which may affect existing land uses.	Decommissioning
Biodiversity	A risk of direct mortality of bats through collisions with turbines has been identified. It is therefore proposed to undertake monitoring by searching for carcasses at the turbine bases. Carcass searches at the base of turbines will be undertaken in the early morning at times when bird survey work is already being undertaken on the site during the bat active season. A minimum of 3 no. searches per year will be carried out. The results of the carcass monitoring will inform the operation of the wind farm, for example, the need, or otherwise, for curtailment of the wind farm to reduce further mortality. Should significant bat mortality be detected then additional mitigation measures will be implemented to reduce the risk in accordance with NatureScot guidance (NatureScot, 2021).	Operation
Biodiversity	Monitoring of bird populations will continue as they have been during the operation of the wind farm to date, as per Condition No. 4 of the parent permission. This will be extended to include carcass searches while such searches are undertaken for bats which again will inform the operation of the wind farm.	Operation
Biodiversity	Should hen harrier be recorded breeding on Knockastanna Hill then intrusive maintenance operations will be undertaken outside the hen harrier breeding season.	Operation
Biodiversity	During decommissioning, additional care will be required to protect existing habitats and restore habitats when infrastructure is removed due to the location of the proposed development site with the Slievefelim to Silvermines Mountains SPA and	Decommissioning

	the hydrological connection to the Bilboa River, part of the Lower River Shannon SAC. This will be addressed through the implementation of the Planning-Stage Decommissioning Plan which details protection and restoration of habitats, and the control of suspended solid (and other) pollution.	
Biodiversity	The most intrusive decommissioning works (such as excavating existing infrastructure and regrading land after the hard standing has been removed) will be timed to occur outside the coldest winter months and the main breeding season (the main breeding season being April to August inclusive).	Decommissioning
Biodiversity	Other decommissioning works will be confined to existing infrastructure and controlled through mechanisms to be set out in the Planning-Stage Decommissioning Plan to avoid disturbance to birds.	Decommissioning
Land & Soils	As a principle, preventing an adverse impact on the land, soil or geology at the site is preferable to dealing with the consequences impacts. Current good practice measures implemented at the site include:- • Site management measures to prevent the erosion of soils; • No hydrocarbons will be stored on the site; • A spill kits and drip trays will be kept at the site to be used in the event of an accidental leak or spill; • Stockpile soils and material on level ground away from drains; and • Undertake any earthworks during drier weather only. Good practice measures will be applied in relation to pollution risk and management of surface runoff at the site which could impact land, soils and geology.	Operation / Decommissioning
Land & Soils	Full details of the existing preventative measures which exist at the existing development are included in the Applicant's Environmental Management System (EMS) for the operation of their sites	Construction / Decommissioning
Land & Soils	Prior to decommissioning, a comprehensive Decommissioning Management Plan will be prepared to detail the control of any activities which could have an adverse impact on the land, soil and geology for the duration of the decommissioning works. The management plan will detail the precise implementation of controls and is likely to include may include silt fences, silt traps and silt bags, check dams and buffered outfalls to prevent the surface water erosion of soils in any works areas; and will detail	Decommissioning

	the appropriate management of hydrocarbons to prevent soil contamination.	
Water	Good practice measures adopted on site, and which will continue to be used on site in relation to pollution prevention include the following:- • refuelling will take place at least 50m from watercourses and, where possible, it will not occur where there is risk that oil from a spill could directly enter the water environment. For example, periods of heavy rainfall or when standing water is present will be avoided; • foul water generated at the existing control room will continue to be managed in accordance with best practice and will discharge to a sealed tank and routinely removed from site; • drip trays will be placed under vehicles which could potentially leak fuel/oils when parked; • areas will be designated for washout of concrete vehicles which are a minimum distance of 50m from a watercourse; • concrete washout water (arising from general operations or from the reinstatement of turbine T05, will be stored in the washout area before being treated and disposed of; • if any water is contaminated with silt or chemicals, run-off will not be permitted to enter a watercourse directly or indirectly and will be passed through a comprehensive surface water treatment system prior to discharge; • water will be prevented, as far as possible, from entering works areas; and • procedures will be adhered to for storage of fuels and other potentially contaminative materials to minimise the likelihood of accidental spillage.	Operation
Water	During the routine maintenance of the site, best practice measures for the management of erosion and sedimentation will include the following: • all stockpiled materials (temporary) will be located out with a 50m buffer from watercourses, including on up gradient sides of tracks and battered to limit instability and erosion; • stockpiled material (temporary) will either be seeded or appropriately covered, minimising the area of exposed bare ground; • monitoring of stockpiles / works areas during rainfall events; • water will be prevented as far as possible, from entering works areas through the use of appropriate measures such as silt fences or temporary silt traps (e.g. straw bales); • if the material is temporarily stockpiled on a slope, silt fences will be located at	Operation

	the toe of the slope to reduce sediment transport; • the amount of ground exposed, and time period during which it is exposed, will be kept to a minimum and appropriate drainage will be in place to prevent surface water entering excavations; • activities involving the movement or use of fine sediment will avoid periods of heavy rainfall where possible; and • personnel and the Principal Contractor will carry out regular visual inspections of watercourses to check for suspended solids.	
Water	Prior to the commencement of decommissioning works; a Decommissioning Plan will be prepared to detail the control of surface water for the duration of the decommissioning works. The Decommissioning Plan will detail the precise implementation of surface water controls and is likely to include may include silt fences, silt traps, silt bags, check dams and buffered outfalls together with the implementation of clean and dirty water drains to direct surface water away from the works area.	Decommissioning
Air & Climate	• A water bowser will be available to spray work areas and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site; • All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport; • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits; • Construction vehicles and machinery will be serviced and in good working order; • Ensure all vehicles switch off engines when stationary – no idling vehicles; and • Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.	Operation
Air & Climate	• A water bowser will be available to spray work areas (wind turbine area and UGL route) and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from	Decommissioning

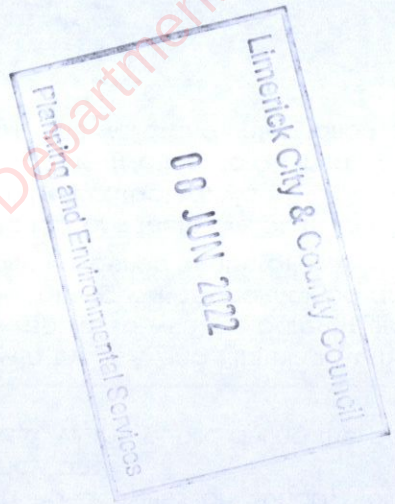
	the site; • All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport; • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits; • Construction vehicles and machinery will be serviced and in good working order; • Wheel washing facilities will be provided at the entrance/exit point of the proposed wind farm site; and • The developer in association with the contractor will be required to implement a dust control plan.	
Landscape	The Applicant is committed to increase the biodiversity value of the proposed development site, which may also result in positive visual and landscape effects. In order to achieve this, those actions appropriate to the site, as set out in the All-Ireland Pollinator Plan – Pollinator-friendly management of Wind Farms, will, where possible, be implemented	Operation
Landscape	As part of this phase, it is proposed to demolish and remove all structures above ground level and to grub the turbine foundations and hard standing areas up to a depth of 1m below ground level. The areas will be profiled to match the surrounding ground, shall be covered with topsoil and seeded with a suitable grass mix or allowed to vegetate naturally. These proposed works will result in a reduction/removal of the existing landscape and visual effects and will therefore be positive in nature. A 2-year monitoring period (visual inspection only with intervention only where required) following the completion of the decommissioning works is proposed to ensure that the regraded areas successfully establish a grass sward or heathland cover similar to that surrounding these areas.	Decommissioning
Cultural Heritage	As the proposed development does not comprise the construction of additional infrastructure, and no previously undisturbed ground will be affected by the continued operation of the wind farm, no archaeological mitigation works, or monitoring is required or proposed.	N/A

Noise & Vibration	Notwithstanding that significant noise and vibration effects are not assessed as likely, all maintenance activities will be completed in accordance with the provisions, where relevant, of *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise* which offers detailed guidance on the control of noise & vibration. The relevant practices to be adopted during maintenance works shall include:- • Limiting the hours during which site activities likely to create noticeable levels of noise or vibration are permitted; • Establishing channels of communication between the Applicant or contractor, Local Authorities and residents; • Selection of plant with low inherent potential for generation of noise and/or vibration; • No plant or machinery will be permitted to cause a public nuisance due to noise; • The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of works; • Compressors will be attenuated models fitted with properly lined 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; • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use; and • The hours of maintenance works (and associated traffic movements) will, insofar as possible, be limited to avoid unsociable hours. Activities shall generally be restricted to between 07:00hrs and 19:00hrs Monday to Friday and between 07:00hrs and 13:00hrs on Saturdays, with no activities on Sundays or public holidays unless in the event of an emergency.	Operation
Noise & Vibration	The findings of the post-commissioning noise monitoring campaign confirm that operational phase noise levels are below the limits set out in the planning consent for the existing development. Other than the continuation of a rigorous turbine maintenance programme in accordance with the manufacturer's specifications, no specific noise mitigation measures are required or proposed.	Operation
Noise & Vibration	No specific mitigation measures are proposed for the decommissioning phase. Those measures listed in respect of maintenance works, as they relate to the use of plant	Decommissioning

	and machinery, will be implemented as relevant during the decommissioning phase.	
Shadow Flicker	The assessment has concluded that the proposed development will not result in likely significant shadow flicker effects. The predicted effects have been assessed to be 'slight'; particularly given the extremely low predicted annual-levels of shadow flicker. Therefore, given that 2 no. of the affected receptors are currently unoccupied and/or derelict, the remaining receptor is heavily screened from the wind turbines by mature vegetation, and in the context of the low levels of 'expected' shadow flicker; it is assessed that no mitigation measures are warranted, and none are proposed. It should also be noted that no mitigation measures are currently being implemented in respect of the existing wind farm and we refer to the fact that the Applicant is unaware of any shadow flicker complaints having been received since the commencement of operations. This serves to further confirm that significant effects are not being experienced; and, given that no modifications are proposed to the wind turbines, significant future effects are not assessed as likely. Notwithstanding the above, in the event that a complaint is received and subsequent investigation identifies significant levels (i.e. in excess of the limits prescribed in the 2006 Guidelines) of shadow flicker being experienced at a receptor, appropriate mitigation measures will be implemented. Should mitigation be required, technological solutions are available, and widely implemented, on wind farm developments where shadow flicker levels are proven to be causing a significant effect. These mitigation measures effectively limit (curtail) the operation of turbines during the infrequent and rare periods when shadow flicker occurs. In short, if a particular turbine is creating shadow flicker effects at a particular receptor, then the operation of that turbine may be temporarily curtailed. This is usually achieved by turning off the turbines at predetermined times, as predicted by the shadow flicker model, when shadow flicker is proven to occur. It is important to once again reiterate that mitigation measures are not assessed as likely to be required given the results of the assessment undertaken	Operation
Material Assets (Transport & Access)	Given that the proposed development is not assessed as likely to generate significant volumes of vehicular traffic, specific mitigation measures are not deemed to be necessary. However, in order to ensure that road safety is maintained throughout the proposed period of operations, the following mitigation measures will	Operation / Decommissioning

	be implemented:- • Adequate signage shall be provided at entrances providing access, safety and warning information; • Speed limit compliance; particularly along the L-5029-419; will be emphasised to all staff and contractors access the proposed development site; • The hours of maintenance works (and associated traffic movements) will, where possible, be limited to avoid unsociable hours. Activities shall generally be restricted to between 07:00hrs and 19:00hrs Monday to Friday and between 07:00hrs and 13:00hrs on Saturdays, with no activities on Sundays or public holidays unless in the event of an emergency; and • The site shall be closed, and strictly secured, to the public during the period of additional operations.	
Material Assets (Aviation)	The existing wind turbines have, as agreed with the IAA and Planning Authority as part of the discharge of planning conditions associated with the parent permission, been fitted with aviation warning lighting. This lighting will be maintained and shall continue to operate during the proposed additional period of operations. In the event that the obstacle warning lighting fails or if there are plans to withdraw them from use for a period of time, the IAA will be contacted, via AISOPs@iaa.ie, as a matter of urgency, to request that a NOTAM (Notice to Airmen) is issued concerning the absence of obstacle lights. The following information will be provided to the IAA:- • Obstacle ID; • Obstacle type; • Obstacle Position; • Elevation; and • Colour of Light. The Department of Defence shall also be notified in the event of a failure of the installed warning lights. As described above, the IAA shall receive prior notification of intended crane operations associated with the reinstatement of turbine T05.	Operation
Material Assets (Telecommunications)	Extensive consultation with telecommunications providers has confirmed that significant adverse effects on existing telecommunication links are unlikely to arise from the operation of the proposed development. While assessed to be unlikely, should significant signal interference in any form be	Operation

	identified and assessed as being directly attributable to the proposed development, appropriate remedial measures will immediately be undertaken. A range of technical measures are available to mitigate any instances of interference including signal amplifiers, active deflectors and relay transmitters, repeater stations, booster units, realignment of domestic aerials, installation of higher quality aerials and the installation of suppression equipment. Remedial works will be promptly undertaken to ensure uninterrupted telecommunication, broadcasting and mobile phone service provision.	



Annex 3.1