

Appendix 16.1: Summary of Mitigation Measures

A Construction Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. This document will be developed into a site-specific Tullaghmore Windfarm CEMP post consent/pre-construction once a contractor has been appointed and will cover both the decommissioning of the operational Tullaghmore Windfarm and the construction of the Development. It will include all of the mitigation recommended within the EIAR. For the purpose of this application, a summary of the mitigation measures (and respective chapter location outlined for comprehensive detail) is included. Embedded Mitigation measures are set out in the individual technical chapters of this EIAR.

Table 1: Summary of Significant Effects and Associated Mitigation Measures

Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
Construction Phase					
Chapter 5: Population & Human Health	Personnel	Avoid accidents to personnel	Slight	<ul style="list-style-type: none"> The Client shall appoint a Project Supervisor for the Design Process (PSDP) and a Project Supervisor for the Construction Stage (PSCS). The PSDP shall compile a Preliminary Safety and Health Plan (PSHP), which details general information about the project and envisaged health and safety risks. The PSHP shall be made available to the PSCS. The PSCS shall develop a Construction Stage Health and Safety Plan (CSHSP) which incorporates the information contained in the PSHP and details how safety and health will be managed during the construction of the project. <p>The PSCS may also develop the following documents during the pre-construction stage of the Proposed Development, for implementation during the construction stage:</p> <ul style="list-style-type: none"> Construction and Environmental Management Plan (CEMP) Emergency Response Plan Detailed Traffic Management Plan 	N/A
	Infrastructure	Avoid accidents to infrastructure	Slight	The PSDP shall see that the General Principles of Prevention, outlined under the safety design advice provided by the Health and Safety Authority (HSA), are taken into account for all designs relating to the project.	Negligible
Chapter 6: Biodiversity	All	Water quality, emissions and noise	N/A	All construction works will fully comply with Best Practice/Industry Standards such as from IFI, National Roads Authority, CIEEM, CIRIA and UK Pollution Prevention Guidelines, in respect of the protection of Water Quality, the reduction of emissions and the prevention of noise.	N/A

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	Habitats	Protection of Important Habitats	Significant	<p>The Development will result in the loss of areas of Annex I (and non-Annex I habitats), including 7130* Active Blanket Bog, 7130 Blanket Bog, 4010 Wet Heath and 7150 Transition Mire as. It is essential that the direct loss of any such habitat is fully minimised (notably also taking account of the international/national nature conservation value of these habitats) and so mitigation by avoidance is essential to limit such losses within the footprint of the Development, and its zone of influence. Mitigation in this respect is:</p> <ul style="list-style-type: none"> • The full extent of the infrastructure footprint will be marked out prior to the commencement of works, with an appropriately robust and visible fencing / marker system. Where this meets Annex I habitats, this will also be the full extent of the works corridor, with no machinery access (access will only be allowed on foot and only for the purposes of silt / pollution control if required), storage or other works allowed outside this area. • The efficacy and coherence of the marker system (and required remediation) will form an essential part of the Site operations. • A pre-construction Invasive Species Survey will be conducted during the optimal growing season (May to August immediately prior to works occurring at this site for the Development) and shall include data on all locations, extents and potential construction impacts in relation to scheduled and non-scheduled Alien Invasive Species (IAS). This survey will be completed along with reporting on the best course of action to be implemented to avoid the spread of such IAS on the Site or further afield. Advice will be required from an invasive species specialist, particularly in relation to the appropriate treatment / removal or waste disposal of potentially contaminated materials <p>During the construction phase, the storage of excavated spoil material will be in banded areas at a suitable location away from surface watercourses. Storage areas will be located within grassland habitats. Where possible spoil material excavated during the construction phase will be reinstated following the completion of the construction phase of the proposed development. Surplus spoil material will be integrated into site landscaping. To avoid compaction, the storage of excavated peat will not be stockpiled but will be laid out and regularly watered. Excavated peat material will be used during habitat restoration measures.</p>	Negligible

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	Watercourses	Water quality degradation & adverse impacts to sensitive fauna	Significant	<ul style="list-style-type: none"> • An Ecological Clerk of Works (“ECoW”) will be employed from the commencement to completion of construction works, including Access Tracks, On-site Substation and Control Building, Temporary Construction Compound, Turbine Hardstands and Turbine Foundations and Wind Farm Internal Cabling works at a minimum. • A site-specific CEMP, will be implemented to ensure that potential adverse impacts to upland watercourses flowing through the site are avoided. • For the construction of culverts, all activities must adhere to IFI, (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Section 9 Planning, Design and Construction Issues details on Best Practice guidance for the installation of culverts on watercourses. • All watercourses draining the Site will be examined on a repeated scheduled timeframe (i.e. daily/weekly/fortnightly etc.) as deemed appropriate by the Contractor, NPWS and Inland Fisheries Ireland. A log will be kept of these examinations and a water sampling protocol to monitor key water quality parameters will be established in agreement with the NPWS and Inland Fisheries Ireland. • Uncontaminated surface runoff will be diverted away from construction areas through the installation of interceptor drains up-gradient of construction areas. • Method statements outlining the approach to all surface watercourse crossing will be approved in advance with Inland Fisheries Ireland. • Drainage waters originating in construction areas will be collected in a closed system and treated prior to controlled, diffuse release. Drainage waters from construction areas will be managed through a series of treatment stages that include swales, check dams and settlement/attenuation ponds along with other pollution control measures such as silt fences and silt mats. • A three-stage treatment train will be employed to capture, retain and treat discharges during the construction phase. This treatment train is also proposed for discharges from hard surfaces that will be installed as a result of the Development. • Settlement/attenuation ponds will be used to attenuate and treat runoff. A detailed pre-construction peat stability assessment has considered the appropriate location of settlement/attenuation 	Negligible

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				<p>ponds so that these facilities will not increase the risk of slope failure. These will have permanent open water to minimise the risk of sediment washout. Settlement/attenuation pond side slopes will be constructed at shallow grades such as 1 in 3 side slope. Settlement/attenuation ponds will be designed so that outflows are spread diffusely over a wider area so that increases in run off can be mitigated. Erosion control and detention ponds will be regularly maintained during the construction phase.</p> <ul style="list-style-type: none"> • Standing water from excavations will not be pumped directly into watercourses. Where dewatering of excavations is required, water will be pumped to the head of a treatment train in order to receive full treatment prior to discharge. • Roadside drains will be shallow with moderate gradients to prevent scouring. In steep areas check dams (possibly in conjunction with settlement ponds and / or cross drains) may be necessary to reduce flow rate. • Oil fuel will be stored within containment areas and emergency response measures for oil spillage on site will be prepared. • Refuelling of plant during construction will be carried out at a designated area, a minimum of 50m from watercourses. Drip trays and spill kits will be available on site. Maintenance of all plant and machinery will be undertaken off-site. Only emergency break-down maintenance will be carried out on site. • Cement will be mixed within containment areas and if Readymix vehicles are used these will be washed in the same area and the water cycled. • All vehicles transporting materials to and from the Site will store materials in a contained load so that the potential for emissions or spillage is reduced during journeys and bridge crossing over watercourses. The measures outlined in the UK's Planning Policy Guidance No. 26: Dealing with Spillages on Highways (a Good Practice Guidance notes proposed of the UK EA/SEPA/EHS) will be adhered to in the event of a spillage or accident during the transportation of materials. • All construction personnel will be trained in pollution incident control response. An emergency response plan has been prepared as part of the CEMP for the proposed development and information outlining response procedures and contingency plans to contain pollution, as set out in the CEMP, will be made available on site. 	

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				<ul style="list-style-type: none"> • Access Tracks and turning areas will be confined to areas of shallow peat where possible and will be constructed on a geotextile layer. These areas will also be kept as level as possible to avoid fast run-off. This can be achieved by following contours where possible. • At the proposed spoil storage area, impermeable berms will be put in place surrounding peat spoil receptor cells. The berms will be established in advance of the deposition of peat surplus material. The berms will be designed to account for a bulking factor of 10% of the surplus peat material to be disposed in these areas. In addition, all existing drainage ditch outflows from cutover blanket bog that will be used as receptor cells for surplus peat will be blocked in advance of the deposition of any surplus material within these cells. This will prevent the ongoing loss of water from these cut areas to receiving lakes to the north and south and also prevent the migration of peat spoilt material from the cells to these lakes. • The Development has been designed to ensure that an adequate buffer zone, of 50m, is provided for between this infrastructure and watercourses. • The design has sought to minimise the requirement for new watercourse crossings, by upgrading the existing crossings • A Surface Water Management Plan (SWMP) has been prepared for the proposed wind farm and this plan aims to implement a suite of measures that will avoid negative impacts to water quality and the hydrological regime of the Owenwee River. • To reduce the amount of silt-laden water generated within the construction footprint, measures will include the provision of clean water catch drains upslope of construction areas and the minimisation of excavation footprints and the time excavations and surfaces are left exposed and denuded. 	
	Designated Sites, Habitats	Spread of Invasive Alien Plant Species	Significant	<p>The mitigation measures for the control of invasive species follow the NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010).</p> <ul style="list-style-type: none"> • Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g., Himalayan Balsam, Japanese Knotweed etc.) by thoroughly washing vehicles prior to leaving any site. • All plant and equipment employed on the construction site (e.g., excavator, footwear, etc.) will be thoroughly cleaned down using 	Negligible

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				<p>a power washer unit prior to arrival on site to prevent the spread of invasive plant species.</p> <ul style="list-style-type: none"> All washing will be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement. Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present. All planting and landscaping associated with the Development shall avoid the use on invasive shrubs such as Rhododendron. 	
	European Sites	Potential for the discharge of pollutants such as sediment or hydrocarbons downstream to European Sites which could affect qualifying habitat and species.	Significant	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation measures will negate the potential for this impact to arise	No residual adverse effects
	Important mammal Species & Herpetofauna	Disturbance to species and breeding areas	Slight	<p>The ECoW for the construction phase will complete a pre-construction survey of the construction footprint in order to confirm the continued absence of mammal breeding and resting places within the construction footprint and within 50m of the construction footprint or identify the presence of newly established breeding/resting places. Based upon the results of these surveys the ECoW will establish whether or not there is a need at that stage for the implementation of further mitigation measures and the requirement for protected species licences.</p> <p>The ECoW for the construction phase will complete a survey of the construction footprint during spring (late February / March / early April) ahead of the proposed works in order to identify any key amphibian breeding areas. This will allow wildlife barriers to be installed where necessary to minimise impacts upon such features where these are likely to be indirectly affected by the works.</p>	Negligible

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	Bats & Trees	Root damage & bat displacement	Slight	Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable. Retained trees should be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.	Negligible
	Habitat	Protection of Annex 1 Blanket bog Habitats	Significant	<p>A Habitat Management is provided as Appendix 6.6 and all measures set out in this plan will be implemented as part of the Development. The restoration of areas of cutover blanket bog within the proposed spoil storage area and the implementation of other measures such as the cessation of turbary activity and the installation of drain blocks within the overall peatland rehabilitation area will aim to achieve the restoration of approximately 6.5ha of cutover blanket bog as well as improving the water balance within an area of approximately 30ha of blanket bog habitat occurring within the peatland rehabilitation area.</p> <p>A number of considerations for the Site have contributed to the choice of routing and design of floating road selection. These are:</p> <ul style="list-style-type: none"> • minimising length of peat or mire to be crossed; • gradient – the shallowest gradients have been sought, using detailed LiDAR mapping. However a shallow gradient assists road drainage; and • design – the construction method, drainage frequency and materials to be used (particularly the type of geogrid). <p>Custom-designed floating road solutions will be used at the Development, which address the site-specific needs of each stretch of track. Where a gradient exists, the permanent drainage for floating roads will be designed with sufficient cross drainage to ensure hydrological connectivity from the upslope side to the downslope side.</p> <p>The construction and loading of stretches of floating road will progress in phases to allow time for settlement and equilibration of underlying peat, which is vital for long term maintenance of peat strength.</p> <p>The design of the floating road will incorporate within-road cross drains in addition to culverts where the floated road will cross existing ditches or preferential flow paths.</p>	N/A

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	Bats	Harm to bats	Slight	<ul style="list-style-type: none"> • Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed. This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power. • Cut-in speed will be increased for turbines T1 and T2 (closest turbine locations to edge ecology) above that set by the manufacturer to reduce the potential for bat/turbine collisions. • Cut-in speeds will be increased during the bat activity season (April-October) and/or where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines. • Cut-in speeds restrictions will be operated according to specific weather conditions: <ol style="list-style-type: none"> 1. When the air temperature is above approximately 10 to 11°C at nacelle height. 2. Generally, bat activity peaks at a wind speed range of 5.0 to 6.5m/s (at nacelle height). 	
Chapter 7: Ornithology	Birds & Bats	Construction noise/visual intrusion disturbance	Slight	<ul style="list-style-type: none"> • A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measure for wind farm developments) will be employed for the duration of the construction phase • Subject to other environmental concerns (e.g., run-off), the removal of vegetation and scrub as well as trimming of trees along the TDR and general wind farm area will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive). • Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. • Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. • Where/if removed or altered, re-instated hedgerows will be planted with locally sourced native species. This will result in habitat enhancement for local species of conservation importance such as meadow pipit. • A re-confirmatory survey (March/April) will be conducted of the proposed turbine locations to assess any evidence of target 	Negligible

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				<p>species activity or occupation of new territories (e.g. in the case of breeding snipe). Should any nesting locations be recorded, works at these locations will be restricted to outside the breeding season (March 1st to August 31st inclusive) or until chicks are deemed to have fledged (following monitoring).</p> <ul style="list-style-type: none"> The use of “white lights” on the turbines will be avoided as these can attract night flying birds such as migrants, and insects, which in turn can attract bats. Certain turbines will be illuminated with medium intensity fixed red obstacle lights of 2000 candelas where required by the IAA Lighting will be fitted with baffles to ensure that the light is directed skywards and will not be discernible from the ground. 	
<p>Chapter 8: Soils and Geology</p>	<p>Soils / Geology</p>	<p>Significant soil and slope stability issues leading to mass movement or landslides</p>	<p>Significant</p>	<ul style="list-style-type: none"> Peat Stability Risk Assessment (Chapter 8: <i>Soils and Geology</i> - Appendix 8.1) indicates that the risk of significant peat or slope stability issues arising on the site is low. Mitigation by avoidance. Areas of deep peat and shallow bedrock have been avoided during construction by careful design of the wind farm. Mitigation by Good Practices. Best practice practice as described in the IWEA and Scottish Best Practice Guidelines will be applied during construction which will minimise the amount of soil and rock excavation. All works will be managed and carried out in accordance with the Construction Environmental Management Plan (CEMP) located in Appendix 2.1, which will be updated by the civil engineering contractor and agreed prior to any works commencing on Site. Excavated peat will mostly be taken off site and used in the restoration of an area of cutover bog located near Maam Cross. Localised areas of landscaping will be sealed and levelled using the back of an excavator bucket to prevent erosion. Mitigation by Reduction. The disturbance of soil, subsoil and bedrock is an unavoidable effect of the Development, but careful design of the Wind Farm layout has been undertaken to ensure that the amount of earth materials excavated is kept to a minimum in order to limit the effect on the geological aspects of the Site (by avoiding areas of deep peat and shallow bedrock where possible 	<p>Negligible/Slight)</p>

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				<p>and reducing the length of site tracks). The management of geological materials is an important component of controlling dust and sediment and erosion control.</p> <ul style="list-style-type: none"> • Mitigation by Reuse. Bedrock will be re-used for construction of Site Access Tracks wherever possible. The bedrock will comprise predominantly granite and quartzite which, when crushed and graded, will provide a good sub-base for Site Access Track construction. In addition, where excavated, glacial till and gravel will also be re-used for construction of access tracks. Peat, overburden, and rock will be reused wherever possible on Site to reinstate excavated areas. Where possible, the upper vegetative layer will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the landscaped peat. These measures will prevent the erosion of peat in the short and long term. • Mitigation by Remediation. On completion of the construction stage, any areas not required for operation will be reinstated. This will include the Temporary Construction Compound, turning areas and any materials storage areas. Granular material will be removed as required and reinstated with peat or other soils in keeping with the adjacent soils. Drainage will be reinstated, if required, in order to minimise future erosion of the soils and restore the pre-development state of the environment. 	
	Soils / Geology	Localised stability issues arising from excavation activities and vehicular movement (Localised displacement)	Significant	<ul style="list-style-type: none"> • Vehicular movements will be restricted to the footprint of the proposed Development, particularly with respect to the newly constructed Site Access Tracks. This implies that machinery must be kept on tracks and will not move onto areas that are not permitted for the Development. • Vehicular traffic on Site is reduced through the re-use of excavated material on Site which will reduce the need to source material from external quarries. • Localised areas of landscaping will be sealed and levelled using the back of an excavator bucket to prevent erosion. 	Negligible/Slight

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				<ul style="list-style-type: none"> • Avoidance of peat berms in areas of potential instability (highlighted by low safety ratios) • Areas of deep peat and shallow bedrock have been identified and the infrastructure design sought to avoid those areas where possible. In this respect, by minimising volumes of excavation, volumes for storage and stockpiles will also be reduced. • Vehicle movement will be reduced where possible by minimizing the amount of Site traffic required on Site by reducing the access track lengths, excavation volumes and double handling. Similarly, good practice and a robust CEMP will also result in less traffic and a lower potential for fuel spills and leakages. • Excavated peat will only be moved short distances from the point of extraction and will be used locally for landscaping. Landscaping will be sealed and levelled using the back of the excavator bucket to prevent erosion. • Where possible, soil and rock will be re-used on site immediately, thereby reducing the need for double handling, and will also reduce the requirements to stockpile soil. • Generally excavated rock will be used will be used immediately for Site Access Track construction. • Best practice will be applied during construction which will minimise the amount of soil and excavation • Whenever possible stockpiles will be avoided. • Stockpiles of rock on peat soils will be avoided to prevent instability. • Peat will only be stockpiled in areas of thin or absent peat and only in areas which have been assessed for stability by a suitably experienced geotechnical engineer. • Avoidance of floating roads in areas of potential instability (highlighted by low safety ratios). • Additional drainage into areas of construction. • Avoidance of drains discharging onto areas of weak or deep peat or areas of low safety ratios. • Avoidance of blasting within 1km of areas highlighted by low safety ratios. 	

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				<ul style="list-style-type: none"> • The Construction Environmental Management Plan (CEMP) will include an emergency response to be applied in the event of a landslide or ground instability. In particular, catch fences and other physical barriers (i.e. concrete blocks) should be on Site and available in sufficient quantities to be used in the event of ground instability. • A Geotechnical Clerk of Works will be employed during the construction phase to continuously monitor areas of peat, in particular areas of deep peat and the areas of potential instability highlighted in the PSRA. Ongoing physical stability checks and calculations will be undertaken in order to verify that safety standards are being met. • Best practice will be applied during construction which will minimise the risk of ground instability. All works will be managed and conducted in accordance with the Construction Environmental Management Plan (CEMP), which will be updated by the civil engineering contractor and agreed prior to any Site works commencing. • Vehicular access to any areas of deep peat (>1m) during construction will be restricted to low ground pressure vehicles, with all construction vehicles travelling on existing access tracks whenever possible. • At worst case, stockpiling of peat can give rise to increase pore pressures and the possibility of bog burst or peat slide. Careful management of the spoil and ongoing landslide risk assessments will minimise the possibility of a landslide occurring. • Construction activities will not occur during periods of sustained significant rainfall events, or directly after such events (allowing time for work areas to drain excessive surface water loading and discharge rates reduce). • Following heavy rainfall events, and before construction works recommence, the Site will be inspected and corrective measures implemented to ensure safe working conditions, for example; dewatering of standing water in open excavations, etc. 	

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	Soils / Geology	Compaction, erosion and degradation of peat arising from vehicular movement	Moderate	<ul style="list-style-type: none"> Mitigation outlined above for designated sites and water quality. Vehicular movements will be restricted to the footprint of the Development, particularly with respect to the newly constructed Site Access Tracks. This implies that machinery must be kept on tracks and will not move onto areas that are not permitted for the Development and the Operation of Tullaghmore Windfarm wherever and whenever possible. Vehicular access to any areas of deep peat (>1m) during construction will be restricted to low ground pressure vehicles, with all construction vehicles travelling on existing access tracks whenever possible. Floating tracks will be considered where suitable and geotechnically feasible. Vehicle movement will be reduced where possible by minimizing the amount of Site traffic required on Site by reducing the access track lengths, excavation volumes and double handling. Similarly, good practice and a robust CEMP will also result in less traffic and a lower potential for fuel spills and leakages Where possible, the upper vegetative layer will be stored with the vegetative part of the sod facing the right way up to promote the growth of plants and vegetation at the surface of the landscaped peat (This prevents the erosion of peat in the short and long term). 	Negligible
	Soils / Geology	Wastewater Sanitation contamination.	Slight	<ul style="list-style-type: none"> Section 5.6 of the outline CEMP Use of waste materials during construction, operation and decommissioning will be minimised by good site practices and waste management plans. Wastewater/sewerage from the Temporary Construction Compound will be placed in a holding tank, which will be emptied periodically. Chemicals will be used to reduce odours. The holding tank will be fitted with an alarm so that when it reaches a certain capacity an alarm will warn that the tank will need to be emptied. 	Negligible

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				<ul style="list-style-type: none"> The tank will be collected by a licenced waste contractor and treated and disposed of at an appropriate licenced facility, a local wastewater sanitation plant. 	
	Soils / Geology	Soil Contamination - Hydrocarbon contamination	Moderate	<ul style="list-style-type: none"> The CEMP will be developed to include the checking of assets (plant, vehicles, fuel bowsers) on a regular basis during the construction phase of the Development. Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water. Fuel containers will be stored within a secondary system e.g., bund for static tanks or drip tray for mobile stores. Ancillary equipment such as hoses and pipes will be contained within the bund, with taps, nozzles or valves being fitted with a lock system. Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage. Only designated trained operators will be authorized to refuel on site. Good site practice and a robust CEMP will result in less traffic and a lower potential for fuel spills and leakages, Collector drainage & soil berms (Chapter 8: Hydrology and Hydrogeology) will be established to diver surface water runoff from construction areas, into established settlement ponds, buffered discharge point and other surface water runoff control infrastructure. Procedures and contingency plans will be set up to deal with an emergency accidents or spills. In particular an emergency spill kit with oil boom and absorbers will be kept on Site in the event of an accidental spill. All site operatives will be trained in its use. 	Negligible
	Soils / Geology	Construction Material contamination	Slight / Insignificant	<ul style="list-style-type: none"> Section 5.8 outline CEMP will be implemented. No concrete washout will be undertaken on site. Chutes of the trucks will be cleaned prior to leaving the site and will take place at a designated area at the Temporary Compound. All construction materials will be stored in secure areas. Any hazardous materials will be correctly stored within properly 	Negligible

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				<p>bunded areas in accordance with good Site practice and in accordance with the Site Management Plan.</p> <ul style="list-style-type: none"> • Every effort will be made to ensure the amount of earth materials excavated (soil, subsoil, and bedrock) is kept to a minimum in order to limit the effect on geological aspects of the site. The management of geological materials is an important component of controlling dust and sediment/erosion control. • Bedrock will be re-used for construction of Site Access Tracks wherever possible. • Peat, overburden, and rock will be reused where possible on Site to reinstate excavated areas where appropriate. • On completion of the construction phase, any areas not required for operation will be reinstated. This may include the Temporary Construction Compound, turning areas and material storage areas. Granular material will be removed as required and reinstated with peat or other soils in keeping with the adjacent soils. • All materials used on Site and wastes generated on Site will be reduced by good Site practice and attention to the CEMP. A policy of reduce, re-use and recycle will apply. All waste will be segregated and re-used where possible or removed from Site for recycling. Any waste which is not recyclable or compostable will be properly disposed of landfill. Whenever possible, excavated materials will be re-used close to the area of excavation. Careful design will result in minimal excess soil and rock. 	
	Soils / Geology	Storage and Stockpiles	Significant	<ul style="list-style-type: none"> • Areas of deep peat and shallow bedrock were identified, and the infrastructure design sought to avoid those areas where possible. In this respect, by minimising volumes of excavation, volumes for storage and stockpiles will also be reduced, thus reducing the impacts associated with them. • Best practice as described in the IWEA and Scottish Best Practice Guidelines will be applied during construction which will minimise the amount of soil and rock excavation and therefore also reduce storage and stockpile requirements. All works will be managed 	Negligible

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				<p>and carried out in accordance with the Construction and Environmental Management Plan (CEMP in Appendix 2.1), which will be updated by the civil engineering contractor and agreed prior to any Site works commencing.</p> <ul style="list-style-type: none"> Whenever possible, soil and rock will be re-used on the Site immediately, thereby reducing the need for double handling, which will also reduce the requirements to stockpile soils. Generally excavated rock will be used immediately for Site Access Track construction. Topsoil and peat will be transported to the designated storage area located near Maam Cross. Whenever possible stockpiles will be avoided. Stockpiles of rock on peat soils will be avoided to prevent instability. Peat will only be stockpiled temporarily in areas of thin or absent peat and only in areas which have been confirmed for stability by a suitably experienced geotechnical engineer. Vehicular movements will be restricted to the footprint of the proposed Development, particularly with respect to the newly constructed Site Access Tracks. This ensures that machinery must be kept on tracks and will not move onto areas that are not permitted for the Development. Vehicular traffic on Site will be reduced through the re-use of excavated material on Site which will reduce the need to source material from external quarries. Excavation volumes have been reduced during the design phase by avoiding areas of deep peat, shallow bedrock and by avoiding excessive cut and fill during construction. This will result in reduced excavation volumes and therefore reduced Site traffic. Best practice as described in the IWEA and Scottish Best Practice Guidelines will be applied during construction which will minimise double handling, again reducing the Site traffic. All works will be managed and carried out in accordance with the Construction Environmental Management Plan (CEMP in Appendix 2.1), which will be updated by the civil engineering contractor and agreed prior to any Site works commencing. Excavated peat will only be moved a short distance from the point of extraction to the restoration areas near Maam Cross and will be also be used 	

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				locally for landscaping, thus again reducing the on-Site traffic. Excavated rock (and any glacial till) will be used for access track construction as close to the source of extraction as possible.	
Chapter 9: Hydrology and Hydrogeology	Surface water & groundwater quality	Entrainment of suspended solids during earthworks	Moderate to Significant	<ul style="list-style-type: none"> • A self-imposed 50m buffer zone around surface waters and significant drainage features was implemented. The 50m buffer zone is intended to inform the design process by minimising or avoiding the risk to surface water receptors and by restricting construction disturbance to outside these zones. The buffer zone will in turn provide enhanced potential for filtering capacity of runoff and will protect riparian zone vegetation • No permanent or semi-permanent stockpiles will remain on the Site during the construction or operational phase of the Development. Spoil to be taken off site to the designated spoil storage area near Maam Cross • Construction activities will not be carried out during periods of sustained significant rainfall events, or directly after such events. This will allow sufficient time for work areas to drain excessive surface water loading and discharge rates to be reduced • Following heavy rainfall events, and before construction works recommence, the Site will be inspected, and any required corrective measures implemented • An emergency response plan will be developed for the construction phase of the project. The plan, at a minimum, will involve 24-hour advance meteorological forecasting linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded such as a very heavy rainfall at >25mm/hr, planned responses will be undertaken. These responses will include cessation of construction until the storm event, including storm runoff has ceased • Sediment fencing will be erected along proximal and paralleling areas of watercourses, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors • No direct flow paths between stockpiles and watercourses will be permitted at the Site • Excavated material will be backfilled are transported to the spoil storage area as soon as is reasonably practicable to prevent 	Negligible

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				<p>long duration storage at the Site which increases the risk of adverse effects on aquatic environments</p> <ul style="list-style-type: none"> • All mitigation measures related to surface water quality will be implemented before excavation works commence. • Management of excavated material will adhere to the measures related to the management of temporary stockpiles outlined in Chapter 8: Soils and Geology • No permanent or semi-permanent stockpiles will remain on the Site during the construction or operational phase of the Development. Spoil to be taken off site to the designated spoil storage area near Maam Cross • Suitable locations for temporary stockpiles will be identified on an individual basis. The suitability of any particular location will consider Site specific characteristics, including; <ul style="list-style-type: none"> • The location of drainage networks in the vicinity • The slope incline and topography of the downgradient area • Any other relevant characteristics which are likely to facilitate or increase the potential for entrainment by surface water runoff. • Construction activities will not be carried out during periods of sustained significant rainfall events, or directly after such events. This will allow sufficient time for work areas to drain excessive surface water loading and discharge rates to be reduced • Following heavy rainfall events, and before construction works recommence, the Site will be inspected and any required corrective measures implemented • An emergency response plan will be developed for the construction phase of the project. The plan, at a minimum, will involve 24-hour advance meteorological forecasting linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded such as a very heavy rainfall at >25mm/hr, planned responses will be undertaken. These responses will include cessation of construction until the storm event, including storm runoff has ceased • Sediment fencing will be erected along proximal and paralleling areas of watercourses, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors 	

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> No direct flow paths between stockpiles and watercourses will be permitted at the Site Excavated material will be backfilled or transported to the spoil storage area as soon as is reasonably practicable to prevent long duration storage at the Site which increases the risk of adverse effects on aquatic environments All mitigation measures related to surface water quality described throughout Section 9.5 will be implemented before excavation works commence. 	
	Surface water	Increased entrainment of contaminants and other impacts arising due to localised stability issues	Moderate to Significant	<ul style="list-style-type: none"> Mitigation outlined above for designated sites and water quality. Sections 5.1-5.8 of the outline CEMP. Section 8.5 of Chapter 8: <i>Soils and Geology</i> Section 9.5 of Chapter 8: <i>Hydrology and Hydrogeology</i> 	Negligible
	Surface water	Catastrophic impacts arising from significant stability issues (Landslide – worst case)	Potentially Profound	<ul style="list-style-type: none"> Sections 5.1-5.7 of the outline CEMP. Peat Stability Risk Assessment (Chapter 8: <i>Soils and Geology</i> - Appendix 8.1) indicates that the risk of significant peat or slope stability issues arising on the site is low to negligible. Mitigation by avoidance. 	Negligible
	Surface & Ground Water	Dewatering - Water quality impacts	Significant	<ul style="list-style-type: none"> Areas of peat and subsoils to be excavated will be drained ahead of excavation works. This will reduce the volumes of water encountered during excavation works and will therefore reduce the volume of water that is required to be dewatered whilst excavations are being carried out. Engineered drainage and attenuation features outlined in the Surface Water Management Plan attached as Appendix 2.1 will be established ahead of excavation works Dewatering pumping rates will be controlled by an inline gate valve or similar infrastructure which will facilitate a reduction of loading on the receiving environment, thus enhancing the attenuation and settlement of suspended solids The direct discharge of dewatered loads to surface waters will not be permitted under any circumstances 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> All dewatering will follow a strict procedure of pumping to a settlement tank and then to a dewatering bag, or settlement ponds prior to discharging to receiving environment for overland flow Geofabric lined settlement ponds will buffer the run-off discharging from the drainage system which will reduce the hydraulic loading to watercourses. Settlement ponds will be designed to reduce flow velocity to 0.3 m/s at which velocity silt settlement generally occurs. In areas of the Site where the placement of settlement ponds is not feasible, other mitigation measures described below will be implemented Check Dams will be constructed across drains and will reduce the velocity of run-off which will in turn promote settlement of solids upstream of potential surface water receivers. An additional benefit of check dams is that they will reduce the potential for erosion of drains. Rock filter bunds may be used for check dams, wood or hay bales can also be used if properly anchored. It is recommended that multiple check dams are installed, particularly in areas immediately down gradient of construction areas Overland flow paths of the final dewatered discharge will be maximised to the greatest practical extent to avoid prematurely draining to drainage channels or surface waters. This approach will allow for enhanced settling out of suspended solids entrained in the run-off All pumps, tanks, settlement ponds, dewatering bags and check dams used in the dewatering process will be regularly inspected and maintained as necessary to ensure surface water run-off is appropriately treated Sediment fencing will be installed up gradient of water courses which may receive the final overland flow The final treated dewatered discharge will be directed towards heavily vegetated areas to allow for further natural filtration of suspended solids 	

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> A programme of water quality monitoring will be implemented during the construction phase which is outlined in detail in Section Error! Reference source not found. No extracted or pumped water will be discharge directly to the surface water network associated with the Site (This is in accordance with The Irish Water Pollution Acts (1977 & 1990)) Any discharges of sediment treated water should meet the requirements of the Surface Water Regulations 2009, as amended. 	
	Surface water and Groundwater	Hydrocarbon contamination	Significant to potentially profound	<ul style="list-style-type: none"> Refuelling of vehicles will be carried out off site to the greatest practical extent. This refuelling policy will mitigate the potential for impacts by avoidance. Due to the remote location nature of the Site, it is unlikely that implementation of this refuelling policy will be practical in all circumstances. In instances where refuelling of vehicles on Site is unavoidable, a designated and controlled refuelling area will be established at the Site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement: <ul style="list-style-type: none"> The designated refuelling area will be located a minimum distance of 50m from any surface waters or Site drainage features The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the Site The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis Any oil contaminated water will be disposed of at an appropriate oil recovery plant or licensed tip site Any minor spillage during this process will be cleaned up immediately Vehicles will not be left unattended whilst refuelling All machinery will be checked regularly for any leaks or signs of wear and tear 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> ○ Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers, and disposed of offsite in an appropriate manner. • Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Development. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard • Spill kits will also be available at construction areas such as at turbine erection locations, the temporary site compound, on-site substation, spoils storage areas and met mast location etc. • Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter • Should an accidental spill occur during the construction or operational phase of the Development, such incidents will be addressed immediately, this will include the cessation of works in the area of the spillage until the issue has been resolved • Spill kits will be kept in each vehicle at the Site and will be readily available to all operators • No materials, contaminated or otherwise will be left on the Site • Suitable receptacles for hydrocarbon contaminated materials will also be available at the Site • A detailed spill response plan will be prepared as part of the Site specific CEMP. • In the first instance, no fuel storage should occur at the Site whenever feasible and refuelling of plant and equipment should occur off site at a controlled fuelling station • In instances where on Site refuelling is unavoidable, then the bunded on Site designated refuelling area must be used. The designated refuelling area must be bunded to 110% volume capacity of fuels stored at the Site 	

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis Any oil contaminated water will be disposed of at an appropriate oil recovery plant or licensed tip Site Any minor spillage during this process will be cleaned up immediately Vehicles will not be left unattended whilst refuelling A Site specific CEMP will be enforced to ensure that equipment, materials and chemical storage areas are inspected and maintained as required on a regular basis All other liquid based chemicals such as paints, thinners, primers and cleaning products etc. will be stored in locked and labelled bunded chemical storage units 	
	Surface water and Groundwater	Wastewater sanitation contamination	Significant	<p>The following mitigation measures are recommended in relation to non-hydrocarbon potential contamination of groundwater:</p> <ul style="list-style-type: none"> Temporary sanitation facilities such as portaloos used during the construction phase will be self-contained and supplied with water by tank trucks. Portaloos will contain water storage tanks and separate wastewater storage tanks which will be routinely emptied by vacuum removal for offsite disposal via a tank truck. All temporary sanitation facilities will be removed from the Site following the completion of the construction phase The controlled attenuation of suspended solids in settlement ponds and check dams etc. will result in inorganic nutrients (if present in elevated concentrations) such as phosphorus and nitrogen being absorbed and retained by the solids in the water column. This will allow for a reduction of peak inorganic discharges in a controlled and stable run off rate. It is noted that the presence of elevated contaminants were not detected during any of the four surface water quality monitoring rounds which are discussed in Section Error! Reference source not found. 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> It is considered that there is a low risk of mobilising trace metals that may naturally be present in low concentrations in the baseline environment. The potential for mobilising trace metals is most likely to result from enhanced water percolation associated with excavated bedrock substrate. To mitigate against this potential impact, water quality should be monitored for trace metal concentrations prior to, during and after the construction phase. The potential for livestock such as cattle and sheep which have been observed grazing at the Site to cause bacteriological contamination of groundwater will be controlled through the implementation of strict grazing control zones, Site perimeter fencing and exclusion zones around all open excavations. 	
	Surface water and Groundwater	Contamination with construction or cementitious materials	Moderate to Significant	<ul style="list-style-type: none"> The procurement, transport and use of any cement or concrete will be planned fully in advance and supervised by appropriately qualified personnel at all times Vehicles transporting cement or concrete to the Site will be visually inspected for signs of excess cementitious material prior to being granted access to the Site. This will prevent the likelihood of cementitious material being accidentally deposited on the Site Access Tracks or elsewhere at the Site. Drivers of such vehicles will be instructed to ensure that all vehicles are washed down in a controlled environment prior to the departure of the source site, such as at concrete batching plants Precast concrete will be used wherever possible, although the use of pre-cast concrete is not viable option for large structures such as Turbine foundations and so concrete will be delivered to the Site Concrete will not be poured during periods of rainfall or if any kind of precipitation is forecast. This policy will limit the potential for freshly poured concrete to adversely impact on surface water runoff. Raw or uncured waste concrete will be disposed of by removal from the Site 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> Washout of concrete trucks shall be strictly confined to the batching facility and shall not be located within the vicinity of watercourses or drainage channels. Only the crutes will be cleaned prior to departure from Site and this will take place at a designated area at the Temporary Site Compound Spill kits will be readily available to Site personnel, and any spillages or deposits will be cleaned up as soon as possible and disposed of appropriately Pouring of concrete into standing water within excavations will be avoided Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place Any surplus concrete will not be stored or deposited anywhere on Site and will be returned to the source location or disposed of appropriately at a suitably licensed facility Any required shuttering installed to contain the concrete during pouring will be fully secured around its perimeter to minimise any potential for leaks. 	
	Surface water and Groundwater	Release and transport of suspended solids – Water quality impacts.	Moderate to Significant	<ul style="list-style-type: none"> Collector drains and soil berms will be implemented to direct and divert surface water runoff from construction areas such as temporary stockpiles into established settlement ponds, buffered discharge points and other surface water runoff control infrastructure. This planning and placement of these control measures will be of fundamental importance, especially for the areas where works within the 50m buffer zone will be unavoidable which is discussed in Section Error! Reference source not found. Sediment control fences will be implemented significantly upgradient of potential receiving waters and as part of the drainage network. Sediment control fences will also be established upgradient of the Sites pre-existing natural and artificial drains in addition to degraded areas of peat that are likely to receive surface water runoff. This practice will reduce the potential for elevated suspended solids entrained in surface water runoff to discharge to surface waters 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> Multiple silt fences will be used in drains discharging to the surface water network. This will be especially important for the areas where works within the 50m buffer zone will be unavoidable which is discussed in section 9.5.1.2 The drainage, attenuation and other surface water runoff management systems will be installed prior to the commencement of construction activities. Whenever possible, drainage and attenuation control measures will be installed during seasonally dry conditions to limit the potential for sediment laden run-off to discharge to surface waters during the installation of these measures Surface water runoff will be discharged to land via buffered drainage outfalls that will contain hardcore material of similar composition to the geology of the bedrock at the Site. This mitigation measure will promote the capture and retention of suspended sediment Buffered drainage outfalls also promote sediment percolation through vegetation in the buffer zone, reducing sediment loading to adjacent watercourses and avoiding direct discharge to the watercourse Buffered drainage outfalls will be placed outside of the 50m buffer zone and will not be positioned in areas with extensive erosion and degradation A relatively high number of discharge points will be established to decrease the loading on any one particular outfall Discharging at regular intervals mimics the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points A Site-specific CEMP will be developed which will mandate regular inspections and maintenance of pollution control measures. Contingency measures outlining urgent protocols to repair or backup any breaches of designed mitigation measures will also be incorporated into the Site-specific CEMP In the event that mitigation measures are failing to reduce suspended solids to acceptable levels, construction works will cease until remediation works are completed Fine solids or colloidal particles are very slow to settle out of waters, it is recommended that coagulant or flocculant is used to promote the settlement of finer solids prior to discharging to surface water networks. Flocculant gel blocks can be placed in 	

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<p>drainage channels, these are passive systems that are self-dosing, self-limiting and are environmentally friendly. Flocculant gel blocks bind elevated levels of silt and associated contaminants into masses that are easily separated, captured and then removed from the water</p> <ul style="list-style-type: none"> • Surface water runoff controls will be checked and maintained on a regular basis. Check dams and settlement ponds will be maintained and emptied on a regular basis. • Following the completion of the construction phase, inspection of silt traps, buffered outfalls and drainage channels will be periodically inspected during maintenance visits to the Site when the operational phase water quality monitoring will also be carried out 	
	Ground & Surface water	Water quality pollution from horizontal directional drilling (frac-out)	Slight to moderate	<ul style="list-style-type: none"> • Clearbore, which is not toxic to aquatic organisms and is biodegradable will be the drilling fluid used. • Mud mixing will be monitored to suit the ground conditions encountered and will initially be based on a mud programme developed by the specialised HDD Contractor, the drilling fluid supplier and an Environmental Clerk of Works. • The drilling fluids will be constantly monitored, any changes required to the mix will be performed on site by specialised HDD Contractor upon consultation with the drilling fluid supplier and Environmental Clerk of Works. • Mud testing equipment will be available at all times during drilling operations to monitor key mud parameters. • All equipment will be carefully checked on a daily basis by the Site Supervisor prior to use to ensure plant and machinery is in good working order with no leaks or potential for spillages. • Spill kits, including an appropriate hydrocarbon boom will be available on the site in the event of any unforeseen hydrocarbon spillages and all staff shall be trained in their use. • All plant, materials and wastes will be removed from site following the HDD works. 	Imperceptible to slight

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> The launch pit will be reinstated to the original land surface condition and the normal duct trench will continue from this point. Should any dewatering be required, it should be carried out in accordance with a site-specific CEMP. Test pits and boreholes should not be located directly on, or extend through, the proposed alignment, as these weak points may serve as conduits where inadvertent fluid returns or frac outs occur. At least a 3m offset be provided between the boreholes and pipe alignment. 	
	Surface water (Owenree River)	Water quality pollution at Watercrossings	Significant	<ul style="list-style-type: none"> The design of the proposed crossings and a method statement for the proposed construction will be agreed in advance with Inland Fisheries Ireland (IFI) This design of all crossings will adhere to relevant available guidance and will be reviewed through consultation with the OPW which will mitigate against any significant impact on surface water flow and in turn the risk of localised or downstream flooding. Crossings will be designed to minimise in so far as practical and to the extent deemed acceptable by the competent authority, the disturbance or alteration of water flow, erosion and sedimentation patterns and rates A detailed construction management plan, and risk assessment and method statement (RAMS), will be prepared. These plans will include comprehensive details of the bridge design and construction methodology, including the environmental risk/s involved which have been identified and assessed in this EIAR. Detailed site specific mitigation measures and best practice techniques will be contained in the construction management plan and RAMS for the proposed crossings The construction management plan and RAMS will form part of the application submitted to the OPW requesting consent to construct the watercourse crossings Vehicles and plant used in the construction of the proposed crossings will only be refuelled at the Sites bunded and designated refuelling area, no refuelling will be permitted within 50m of any watercourse at the Site 	Imperceptible

Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> To mitigate against the potential risk of accidental leaks or spillages from plant and equipment, an emergency response plan for such incidents will be developed. Multiple spill kits will be maintained on the Site at all times within the cabs of vehicles and placed strategically at environmentally sensitive locations across the Site. Spill kits will be routinely inspected to ensure that they are fully stocked with oil absorbent booms and pads at all times. Oil absorbent booms will be installed downstream of channel crossing work areas within 25m of the works location prior to the commencement of works. 	
	Surface & groundwater	Water quality contamination	Slight	<ul style="list-style-type: none"> A detailed programme of water quality inspection and monitoring outlining the selected parameters and monitoring frequency should be agreed with Inland Fisheries Ireland and Galway County Council prior to the commencement of construction and will be outlined in the Site-specific Construction Environmental Management Plan (CEMP). It is recommended that a programme of operational phase water quality monitoring is also implemented at a monitoring frequency agreed with the competent authority in order to aid the detection of any potential operational phase impacts on surface water quality 	Negligible
Chapter 10: Noise	Humans	Noise from turbine construction	Negligible	<ul style="list-style-type: none"> General guidance for controlling construction noise through the use of good practice given in BS 5228 will be followed. Construction and Decommissioning of the Development shall be limited to working times given 	Negligible
Chapter 12: Material Assets	Aviation traffic	No potential effects predicted	Negligible	<p>Although no potential effects were identified, the following mitigation measures are proposed to be implemented in accordance with ICAO Annex 15:</p> <ul style="list-style-type: none"> any obstacle 100m or greater will be installed with a warning light system under direct specification and in accordance with ICAO Annex 15; An aeronautical lighting scheme for the Development will be agreed with the Irish Aviation Authority (IAA) and will be installed; 	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> As-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location will be provided to the IAA; The IAA will be notified of intention to erect any infrastructure greater than 100m with at least 30 days prior notification of their erection. The IAA will be notified of intention to commence crane operations with at least 30 days prior notification of their erection. 	
	Environment	Construction and cementitious materials leakage	Slight	<p>During the construction phase:</p> <ul style="list-style-type: none"> Precast concrete will be used wherever possible i.e., formed offsite. Where the use of precast concrete is not possible the following mitigation measures will apply. The acquisition, transport and use of any cement or concrete on site will be planned fully in advance and supervised at all times. Vehicles transporting such material will be relatively clean upon arrival on site, that is; vehicles will be washed/rinsed removing cementitious material leaving the source location of the material. There will be no excess cementitious material on the vehicle which could be deposited on trackways or anywhere else on site. To this end, vehicles will undergo a visual inspection prior to being permitted to drive onto the proposed site or progress beyond the contractor's yard. Vehicles will also be in good working order. Any shuttering installed to contain the concrete during pouring will be installed to a high standard with minimal potential for leaks. Additional measures will be taken to ensure this, for example the use of plastic sheeting or other sealing products at joints. Concrete will be poured during meteorologically dry periods/seasons. This will reduce the potential for surface water run off being significantly affected by freshly poured concrete. This will require limiting these works to dry meteorological conditions i.e. avoid foreseen sustained rainfall 	Negligible

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				<p>(any foreseen rainfall event longer than 4-hour duration) and/or any foreseen intense rainfall event (>3mm/hour, yellow on Met Éireann rain forecast maps), and do not proceed during any yellow (or worse) rainfall warning issued by Met Éireann. This also will avoid such conditions while concrete is curing, in so far as practical.</p> <ul style="list-style-type: none"> • Ground crew will have a spill kit readily available, and any spillages or deposits will be cleaned/removed as soon as possible and disposed of appropriately. • Pouring of concrete into standing water within excavations will be avoided. Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place. • Temporary storage of cement bound sand (if required) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been banded e.g., using sand-bags and geotextile sheeting or silt fencing to contain any solids in run-off. • No surplus concrete will be stored or deposited anywhere on site. Such material will be returned to the source location or disposed of off-site appropriately. 	
	Telecommunications infrastructure	Electromagnetic interference with telecommunications signals	Unlikely but possible Negligible	<ul style="list-style-type: none"> • Compliance with the EMC Directive 2014/30/EU • Buffers from telecommunications companies (Three & Eir) incorporated into design phase of the Development <p>In the unlikely event of interference with television or telecommunications reception:</p> <ul style="list-style-type: none"> • Decipher which windfarm/turbine is responsible • Re-align or replace TV antenna • Re-tune to alternative TV transmitter • Provision of subscription free satellite television services 	Not Significant
	Aquatic Environment	Water pollution, by chemicals, fuels and oils	Moderate	All storage containers of over 200 litres will have a secondary containment of 110% capacity to ensure that any leakage is contained	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<p>A Chemical and Waste Inventory will be kept. This inventory will include:</p> <ul style="list-style-type: none"> • List of all substances stored on-site (volume and description); • Procedures and location details for storage of all materials listed; and • Waste disposal records, including copies of all Waste Transfer Notes detailing disposal routes and waste carriers used. • Any tap or valve permanently fixed to the mobile unit through which oil can be discharged to the open or when delivered through a flexible pipe which is fitted permanently to the mobile unit, will be fitted with a lock and locked shut when not in use. • Sight gauges will be fitted with a valve or tap, which will be shut when not in use. Sight gauge tubes, if used will be well supported and fitted with a valve. • Mobile units must have secondary containment when in use/out on site. <ul style="list-style-type: none"> ○ Where mobile bowsers are used on site guidelines will be followed so that: ○ Any flexible pipe, tap or valve will be fitted with a lock where it leaves the container and be locked shut when not in use; ○ Flexible delivery pipes will be fitted with manually operated pumps or a valve at the delivery end that closes automatically when not in use. Where possible, a nozzle designed to dispense oil is used; and ○ The pump or valve will have a lock and be locked shut when not in use. <p>Diesel is classified as a dangerous substance. Under the EU Directive 95/55/EC all such dangerous substances will be conveyed in a container that complies with the ADR. As such, the manufacturer of each bowser will provide certification to contractors of the following:</p> <ul style="list-style-type: none"> • A leak-proof test certificate • A copy of the IBC approval certificate • An identification plate attached to the container 	

Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<p>For loads in excess of 1,000 litres (220 gallons), the bowser vehicle driver will have undergone training and hold a special license.</p> <p>The use of non-permeable High-density Polyethylene (HDPE) membrane beneath essential refuelling of vehicles which cannot be re-fuelled within the temporary compound re-fuelling area, e.g., cranes. This re-fuelling will not be within 65m of any watercourse.</p>	
	Residential Amenity	Shadow flicker	Significant	<ul style="list-style-type: none"> Each turbine is fitted with an automatic shadow flicker detection system, that will shut down the turbine if it calculates the possibility of shadow reception on any surrounding houses. WindPro software is used to determine periods of shadow flicker, to prevent it. 	Not significant
	Environment; including hydrological and geological environments	Non-hazardous waste released to environment	Not Significant	<p>For general waste:</p> <ul style="list-style-type: none"> Waste stored safely away from wind, rain and wild animals Separate waste streams, e.g. cardboard & paper may be recycled <p>For sewage waste:</p> <ul style="list-style-type: none"> Self-contained port-a-loos located temporarily in site compound Managed & serviced regularly by removal of the contents to a designated sewage treatment plant Removed from site once construction is completed 	Not Significant
Chapter 13: Cultural Heritage	Sub-surface archaeological features	-	-	<p>Ground works during the construction phase of the Development will be subject to archaeological monitoring under licence by the National Monuments Service.</p> <p>Should any unknown archaeological features within the Site be discovered during the construction, the National Monuments Service will be consulted to determine the appropriate mitigation measures:</p> <ul style="list-style-type: none"> Preservation in situ within the site, or; Proper and adequate recording of this resource by full archaeological excavation 	Imperceptible to moderate
	Language	Short-term English speakers in Gaeltacht area	Negligible	Any signage erected within the public realm in the Galway Gaeltacht area of the grid connection route works will include Irish and English text	Negligible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
Chapter 14: Traffic and Transport	Pedestrians and road users.	Congestion on narrow local roads.	Significant	<ul style="list-style-type: none"> • Section 5.14 of the outline CEMP. • A Traffic Management Plan (TMP) will be developed for the initial decommissioning and construction phases to determine working hours, routes and this will be prepared in consultation with Galway County Council and An Garda Síochána as necessary. Where possible, HGV trips should be scheduled to avoid peak times. All drivers will be made aware of the location and presence of sensitive receptors at an induction session prior to construction activities taking place. • Access for the public and emergency services shall be provided at all times through the works. • The contractor shall appoint a liaison officer who will inform the public of the location and expected duration of works on the public road network. • All works on the public road network shall be carried out under a road opening licence and an approved traffic management plan. The location of works shall be signposted in accordance with the Traffic Signs Manual. Works shall be carried out within a dedicated work zone and fenced to prevent unauthorised access. • Construction vehicles shall be parked in dedicated parking areas within the work zone when working on the public road. • Turbine deliveries will be carried out during off peak hours at times agreed with An Garda Síochána and Galway County Council to minimise disruption. The movement of abnormal loads to site will be subject to abnormal load permits and vehicles will be escorted by support teams and An Garda Síochána who provide routine and emergency traffic management for the convoy vehicles in sensitive areas • Abnormal load deliveries will be carried out with an abnormal load permit. The abnormal load convoys will be accompanied by escorts who will provide routine and emergency traffic management for abnormal load convoys. • The appointed contractor will be responsible for seeing that HGV drivers travelling to and from the Site obey the designated speed limits, rules of the road and that they only use the designated Civil Construction Haul Route. • Prior to delivery of abnormal loads i.e. turbine components, the Applicant or their representatives, will consult with An Garda Síochána and Galway County Council to discuss the 	Not Significant

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<p>requirement for a Garda escort. The Applicant will also outline the intended timescale for deliveries and efforts can be made to avoid peak times such as school drop off times, church services, peak traffic times where it is considered this may lead to unnecessary disruption, and abnormal loads may travel at night and outside the normal construction times as may be required by An Garda Síochána. Local residents along the affected route will be notified of the timescale for abnormal load deliveries.</p> <ul style="list-style-type: none"> • A survey of the Turbine Component Haul Route will be undertaken to identify any overhead lines to identify if any overhead lines will need to be lifted along the route to allow abnormal loads such as tower sections and nacelles to be delivered. • Turbine component deliveries will be timed to avoid peak times and in particular, times when pupils will be dropped off and picked up from the various schools on the turbine component Haul Route. • During the wind farm construction and decommissioning phases, road works signs in accordance with the requirements of Chapter 8 of the traffic Signs Manual will be erected at the wind farm site entrance on the N59 and at all locations on the haul route which are being modified to facilitate turbine delivery. • Security gates will be sufficiently set back from the road, so that vehicles entering the site will stop well clear of the public road, thus obviating the queuing of construction traffic on the public road network. • Monitoring will be undertaken on the Civil Construction and Turbine Component Haul Route to identify any damage which may have been caused by traffic from the Development so that maintenance works are carried out as soon as practicable to avoid issues for other road users and the local population of the area. Alternative pedestrian arrangements will be put in place should the pedestrian route at the works location be altered. This will have no effect on pedestrian safety. • Grid connection works will proceed at a rate of approximately 100m per work shift, the rate will depend on the ground conditions and the number of existing services encountered in the excavation. The works area will be fully enclosed within the 	

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<p>traffic management system. Traffic management using temporary traffic lights shall be kept to the minimum length necessary to accommodate the works being undertaken and to minimise delays to the public.</p> <ul style="list-style-type: none"> The 38kV cable trench shall be excavated using a rubber tyre excavator on all public roads. The sides of the trench shall be supported to prevent damage to the road. Material arising from trench excavations may be stored at a safe location within the works area and used to backfill trenches, surplus excavated material shall be removed from site and disposed at licenced landfills. All excavated trenches in the public road network are to be reinstated at the end of the work shift, A temporary reinstatement shall be carried out in the event that the works are not completed at the end of the work shift. 	
	Site security	Securing / Health and safety breach	Slight	<ul style="list-style-type: none"> Access to the construction site will be controlled by on Site personnel and all visitors will be asked to sign in and out of the Site by security/Site personnel on entering and exiting the site. All Site visitors will undergo a Site induction covering Health and Safety issues at the Contractor's temporary compound and will be required to wear appropriate Personal Protective Equipment (PPE) while onsite. 	Imperceptible
	Human Health	Excess dust reducing air quality & Noise	Slight	<ul style="list-style-type: none"> Wheel cleaning equipment will be used at the exit to the Site on the Site Access Track near the site entrance to prevent any mud and/or stones being transferred from Site to the public road network. All drivers will be required to see that their vehicle is free from dirt and stones prior to departure from the construction site. To reduce dust emissions, vehicle containers/loads will be covered during both entrance and egress to the Site where required. In addition, any dust generating activities will be minimised where practical during windy conditions, and drivers will adopt driving practices to minimise the creation of dust. Where conditions exist for dust to become friable, techniques such as damping down of the potentially affected areas may be employed. To reduce dust emissions, vehicle containers/loads 	Imperceptible to slight

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				will be covered during both entrance and egress to the Site where required. <ul style="list-style-type: none"> Construction HGV's, LGV's and private vehicles are subject to government HCV, LCV and NCT emissions tests 	
Chapter 15: Air and Climate	Human health	Excess dust reducing air quality	Slight	See Chapter 14: Traffic and Transport for mitigation measures for dust	Imperceptible to slight
Operational Phase					
Chapter 5: Population & Human Health	Turbine	Fault occurs – hinders the development's performance	Imperceptible	<ul style="list-style-type: none"> A Supervisory Control and Data Acquisition ("SCADA") system will monitor the Development's performance. If a fault occurs, then a message is automatically sent to the operations personnel preventing emergency situations. Warning signs and security infrastructure will be in place around the onsite switchgear and control building to provide for public safety. 	Imperceptible
Chapter 6: Biodiversity	Watercourses	Degradation of watercourses	Slight	<ul style="list-style-type: none"> Re-seeding / re-vegetation of all areas of bare ground or the placement of Geo-jute (or similar) matting should take place as practically possible at the start of the operational phase to prevent run-off. Silt traps erected during the construction phase within roadside and artificial drainage should be replaced with stone check dams for the lifetime of the project. These stone check dams should only be placed within artificial drainage systems such as roadside drains and not natural streams or ditches. A full review of construction stage temporary drainage will be undertaken by the Developer (in conjunction with the Project Hydrologist/ Site Engineer and the Project Ecologist) following the completion of construction, and drainage removed or appropriately blocked where this will not interfere with infrastructure. The Temporary Construction Compound / office must house all chemicals within a secure bunded COSSH store for the operational phase of the project. 	Imperceptible

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Chapter	Receptor	Predicted Effect	Potential Significance prior to Mitigation	Mitigation Proposed	Residual Effect
				<ul style="list-style-type: none"> All onsite wastewater treatment facilities should be as per regulations to prevent nutrient overloading of aquatic environments. 	
Chapter 8: Soils and Geology	Soils / Geology	Waste contamination - Hydrocarbon contamination	Slight	<ul style="list-style-type: none"> The operational team will put in place control measures to mitigate the risk of hydrocarbon or oil spills during the operational phase of the windfarm. Any vehicles utilised during the operational phase will be maintained on a weekly basis and checked daily to ensure any damages or leakages are corrected. Potential effects will be limited by the size of fuel tank for vehicles permitted on site. 	Negligible
Chapter 9: Hydrology & Hydrogeology	Surface water	Increase in runoff of rainwater	Imperceptible	<ul style="list-style-type: none"> Ensuring that pre-existing and newly established drainage infrastructure is sufficiently maintained for the discharge rates associated with all areas of the site. All blockages which may adversely impact upon the drainage regime at the site will be immediately removed. 	Imperceptible

Table 2: Summary of Mitigation Measures for Non-Significant Effects

Chapter	Receptor	Predicted Effect	Significance prior to Mitigation	Mitigation	Residual Effect
Operation Phase					
Chapter 7: Ornithology	Birds	Indirect impacts (lighting)	Slight to Moderate	<ul style="list-style-type: none"> White lights will not be used on the turbines as these can attract night flying birds, insects, and thus bats Certain turbines will be illuminated with medium intensity fixed red obstacle lights of 2000 candelas where required by the IAA Lighting will be fitted with baffles to ensure the light is directed skywards and will not be discernible from the ground. 	Negligible
Chapter 12: Air and Climate	Air Quality and human health	Improved Air quality	Not Significant	<ul style="list-style-type: none"> The Development will have a significant positive effect on carbon savings and cumulatively, a significant positive effect when considered with Ireland's renewable energy deployment. 	Not Significant
Chapter 12: Material Assets	Telecommunications	Temporary electromagnetic emissions	Not Significant	<ul style="list-style-type: none"> Embedded mitigation in the design phase. Embedded measures were undertaken in the design phase following consultation with telecommunications operators. As a result, the Development avoided interference with existing transmission links crossing the Site. 	Not Significant
Decommissioning Phase					
Chapter 8: Soils and Geology	Soils and Geology	Construction material contamination	Insignificant	<ul style="list-style-type: none"> After decommissioning of the wind farm, all Site Access Tracks and areas of hardstanding will be returned to as close to their natural state as possible, again if it is geotechnically and environmentally feasible. 	Negligible
Chapter 9: Hydrology & Hydrogeology	Surface & groundwater	Impact water quality	Moderate	<p>Mitigation measures for spills of fuels hazardous chemicals as previously mentioned.</p> <ul style="list-style-type: none"> A site-specific Decommissioning Phase Management Plan (DPMP) will be developed prior to the commencement of any decommissioning activities. 	Imperceptible
	Surface water	Soil creep associated erosion and potential	Slight	<ul style="list-style-type: none"> Mitigation measures described in <i>Chapter 9 Hydrology and Hydrogeology</i> to reduce the potential for run-off of elevated suspended solids will be implemented 	Imperceptible

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Chapter	Receptor	Predicted Effect	Significance prior to Mitigation	Mitigation	Residual Effect
		entrainment of elevated suspended solids in surface water run-off		<ul style="list-style-type: none"> • It is recommended that sediment fences should be implemented along the perimeter of all access tracks and hardstand areas during the reinstatement works • Additional precautions such as the implementation of check dams, secured straw bales, sandbags, or settlement ponds should be implemented at areas where surface water runoff is likely to be intercepted by both natural and artificial drainage features • Any drains or outfalls which have the potential to draw water from reinstatement areas, or promote preferential surface water runoff flow paths through reinstatement areas will be removed, blocked or decommissioned as required • The mitigation measures for the preparation of the hardstand area surfaces prior to material being deposited discussed in <i>Chapter 8: Soils and Geology</i> will be implemented <p>It is recommended that monitoring and maintenance of the reinstated areas should be conducted regularly following the initial stages of establishment to ensure that the potential for excessive surface water runoff eroding deposited material along preferential pathways is minimised.</p>	