19. INTERACTIONS OF THE FOREGOING

19.1 Introduction

The likely significant effects of the proposed project, together with the mitigation measures proposed to address these effects, are described within this EIAR. Notwithstanding this, any development with the potential to give rise to environmental effects has the potential for interactions between the various environmental factors. Such interactions may result in a change in the significance of effects, either by increasing (in-combination) or reducing their magnitude. In accordance with EIAR requirements, the potential for interaction between effects on the receiving environment has been assessed.

Table 19-1 identifies those environmental factors with the potential to interact as a result of the proposed project during the construction (C), operational (O), and decommissioning (D) phases. Potential interactions were identified at an early stage during the design process. Where a potential for interaction between environmental factors was identified, this has been taken into account within the relevant EIAR chapters as part of the assessment process. Both positive and negative interactions have been considered across all project phases and the respective environmental factors. The identified interactions are described further in Section 19-2.

19.1.1 Statement of Authority

This chapter was co-authored by Lydia Gurley and Dr. John Staunton of TOBIN. Lydia Gurley is an Assistant Project Manager with TOBIN and has a BSc (Hons) and MSc in Chemistry, complemented by postgraduate training in Offshore Renewable Energy and micro-credentials in Project Management and GIS. Lydia brings two years of project-management experience relevant to the planning and development of renewable energy projects. John Staunton is an Associate Project Manager and Environmental Scientist in TOBIN and has 18 years' postgraduate experience in both research and environmental consultancy, with 12 in the latter. John holds a BSc and PhD in Environmental Science, an advanced diploma in Planning and Environmental Law and is a Chartered Environmentalist. He has considerable experience in project managing wind energy developments (for example, Castlebanny Wind Farm, Cloghercor Wind Farm and Scart Mountain Wind Farm) and carrying out EIAR assessments.

This chapter has been reviewed by Orla Fitzpatrick, Technical Director in TOBIN. Orla has over 20 years' experience working in the delivery of EIA projects in environmental consultancy. She is a Chartered Environmentalist and has considerable experience as technical approver of environmental deliverables for major infrastructure and renewable energy projects including Ballyfasy Wind Farm, Scart Mountain Wind Farm and Lissinagroagh Wind Farm.

Table 19-1: Interaction between Environmental Aspects (positive and negative).

Phases include construction (C), operational (O) and decommissioning (D).

Blue denotes identified interactions (which are described in Section 19.2), while grey is used for blocking out part of the table to avoid duplication.

Interaction Matrix (√ = Interaction)	Phase	Population and Human Health	Biodiversity	Ornithology	Land, Soils & Geology	Hydrology & Hydro-Geology	Air Quality	Climate	Noise & Vibration	Landscape & Visual	Archaeology, & Cultural Heritage	Traffic & Transportation	Material Assets	Shadow Flicker
Population and Human Health	C				√	√	√	√	√	√		√		
	O				√	√	√	√	√	√		√	√	√
	D				√	√	√	√	√	√		√		
Biodiversity	C			√	√	√	√	√	√			√		
	O			√		√			√			√		
	D			√	√	√	√	√	√			√		
Ornithology	C				√	√	√	√	√			√		
	O					√								
	D						√	√	√			√		
Land, Soils & Geology	C					√	√			√	√			
	O													
	D					√	√							
Hydrology & Hydrogeology	C						√							
	O													
	D						√							
Air Quality	C											√		
	O											√		

Interaction Matrix (√ = Interaction)	Phase	Population and Human Health	Biodiversity	Ornithology	Land, Soils & Geology	Hydrology & Hydro-Geology	Air Quality	Climate	Noise & Vibration	Landscape & Visual	Archaeology, & Cultural Heritage	Traffic & Transportation	Material Assets	Shadow Flicker
	D											√		
Climate	C											√		
	O											√		
	D											√		
Noise & Vibration	C											√		
	O											√		
	D											√		
Landscape & Visual	C										√			
	O										√			
	D										√			
Archaeology, & Cultural Heritage	C													
	O													
	D													
Traffic & Transportation	C													
	O													
	D													
Material Assets	C													
	O													
	D													
Shadow Flicker	C													

Interaction Matrix (√ = Interaction)	Phase	Population and Human Health	Biodiversity	Ornithology	Land, Soils & Geology	Hydrology & Hydro-Geology	Air Quality	Climate	Noise & Vibration	Landscape & Visual	Archaeology, & Cultural Heritage	Traffic & Transportation	Material Assets	Shadow Flicker
	O													
	D													

19.2 Potential Interactions

This section summarises key interactions between environmental aspects with the potential for likely significant residual effects from the proposed project, as identified in Table 19-1. Only potential interactions listed in Table 19-1 for each project stage are discussed and each environmental interaction relating to any two-chapter topics is addressed only once. As noted above, where a potential for interaction between environmental factors was identified during the assessment process, this has been taken into account within the relevant EIAR chapters. Section 19.2

As described in Chapter 18, the proposed project may itself present a hazard or interact with other hazards, potentially resulting in a major accident or natural disaster during the construction, operational, or decommissioning phases. All identified hazards and sources of hazard have been considered in the technical assessments presented in Chapters 5 to 18. As a result, any interactions relating to hazards are addressed in Chapter 18 and not repeated in this chapter.

19.2.1 Population and Human Health

The following interactions with Population and Human Health have been identified as having the potential to occur during the construction, operation and/or decommissioning phases of the proposed project.

19.2.1.1 Interactions of Population and Human Health, Land, Soils and Geology, Hydrology and Hydrogeology, Air Quality and Climate

There is potential for short-term interaction between the environmental factors of Population and Human Health, Land Use, Soils and Geology, Hydrology and Hydrogeology, Air Quality and Climate during the construction phase.

These interactions will primarily arise from earthworks and excavation activities e.g. proposed borrow pit, access tracks, hardstands, proposed grid connection route (GCR) and Turbine Delivery Route (TDR) temporary accommodation works.

Potential human health effects associated with soil disturbance relate primarily to dust generation during material extraction and the handling and movement of soils and excavated rock, as outlined in Chapters 14 and Chapter 15. There is also a potential risk of accidental spills or leaks from construction plant and machinery, which could result in localised soil contamination.

Potential effects on human health arising from soil disturbance are assessed as localised, adverse, imperceptible to slight in magnitude, and temporary to short-term in duration, and are not significant.

Given the baseline environmental conditions and the implementation of proposed mitigation measures, no significant adverse effects on Population and Human Health, Air Quality, or Climate are anticipated.

These potential effects, together with the relevant mitigation measures, are described in Chapter 8, Chapter 9 Chapter 14, and Chapter 15 of this EIAR.

During the decommissioning phase, effects will be similar to those identified during construction, but of a lesser magnitude due to reduced ground disturbance. In addition, a substantial proportion of infrastructure will remain in situ, further limiting potential effects.

19.2.1.2 Interactions of Population and Human Health and Shadow Flicker

Chapter 10 presents an assessment of the likely significant shadow flicker effects for the proposed project. The assessment identified the potential for significant effects as a result of shadow flicker on nearby receptors. Mitigation measures proposed in the chapter, include the implementation of an automatic shadow detection system during turbine manufacturing which will then shut down the turbine during periods where shadow flicker is predicted at any of the identified receptors, until the potential for shadow flicker ceases. Effects from shadow flicker will not be significant during the construction and decommissioning phases. During the operational phase, mitigation measures will be implemented to minimise any adverse effects from the turbines. The operational software used to automatically stop turbines will be installed as standard practice and the implementation of the shadow flicker control system will take place. No further interaction will take place.

19.2.1.3 Interactions of Population and Human Health and Material Assets

The findings of the telecommunications assessment indicate that there are nine licensed PTP (Point-to-Point) microwave radio links that cross over the proposed wind farm site. A detailed assessment for the proposed project has been included in Appendix 11-1 (Rooaunalaghta Wind Farm - Telecommunications Impact Assessment Report), which outlines mitigation measures, including the possibility of relaying the radio links via an existing telecommunication mast. In addition, one of the proposed turbines would be located within the 500 m Tetra Ireland (TI) Exclusion Zone. A dedicated evaluation of this constraint has been completed and is presented in Appendix 11-2 (Rooaunalaghta Wind Farm – TETRA Impact Study) Following the implementation of the proposed mitigation measures and compliance with the relevant telecommunications safeguarding requirements, no significant adverse effects on telecommunications infrastructure or services are predicted. The nearest CIE rail-line to the proposed wind farm site is over 10 km away. At this distance there would be no effects on the operation of the CIE radio network due to turbines at the proposed wind farm site. In addition, it should be noted that there are several existing wind farms which are located much nearer to the CIE rail lines than the proposed project at Rooaunalaghta.

The proposed GCR works and TDR temporary accommodation areas do not have likely significant effects on telecommunications links, due to the temporary nature and limited scale of the works.

Therefore, no likely significant effects are anticipated in relation to this interaction.

19.2.1.4 Interactions of Population and Human Health and Noise and Vibration

Noise and vibration effects have been assessed on population receptors in Chapter 12 of this EIAR. The assessment of construction noise and vibration have been conducted in accordance with best practice guidance contained in BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites* – Noise and BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Vibration*.

Residual noise associated with the construction and decommissioning phases are predicted to be below the proposed threshold values presented in Chapter 12. The associated noise and vibration levels are not likely to cause significant effects at any NSL.

Once operational, there will be an interrelated effect between Noise and Human Health as the turbines and the proposed 110 kV substation will generate noise which will propagate into the receiving environment. Noise modelling for the proposed turbine technology has been undertaken in Chapter 12. Having applied relevant industry standards, Guidance and best practice, and the outlined mitigation strategy, the assessment found that the V136 turbine remains within the best practice noise limits recommended in WEDG06 guidelines. Therefore, the proposed project will not result in a significant noise effect following mitigation.

A commitment has been provided that prior to the commissioning of the wind farm; the developer will submit a Noise Compliance Monitoring Programme (NCMP) to the planning authority for written agreement. The NCMP will include a detailed methodology for all noise measurements, the frequency of monitoring, procedures for recording results and a protocol for managing complaints.

Operational noise from the proposed on-site control building and proposed 110 kV substation has been assessed and found to be within the proposed criteria based on a review of the most appropriate guidelines and standards.

No significant vibration effects are associated with the operation of the proposed project.

In summary, no significant noise or vibration effects are likely from the proposed project.

There is no further interaction anticipated beyond that already assessed in Chapter 12.

19.2.1.5 Interactions of Population and Human Health and Landscape and Visual Effects

Construction and decommissioning activities will result in temporary adverse landscape and visual effects arising from site clearance, earthworks, crane operations, construction compounds, traffic movements and vegetation removal. These effects will be localised to the wind farm site and immediate surroundings and may temporarily influence residential amenity, community perception of place, and visual wellbeing. Effects reduce rapidly with distance and are assessed as temporary, localised and not significant in EIA terms.

The principal interaction with Population and Human Health during the operation phase arises from changes to visual amenity and landscape character associated with the presence of 13 turbines and associated infrastructure. The most notable effects occur within approximately 1 km of the turbine array, where turbines become prominent features in local views. Visual effects diminish with increasing distance and are generally Moderate to Imperceptible across settlements, scenic routes, heritage assets and recreational receptors. The project complies with applicable residential setback guidance and the LVIA concludes that residual landscape and visual effects are not significant in EIA terms. Consequently, no significant adverse effects on residential amenity, community wellbeing, recreation or quality of life are predicted.

Landscape and visual effects have the greatest potential to interact with Population and Human Health through changes to residential visual amenity, community amenity, recreational experience, heritage appreciation and overall quality of the living environment. However, given the localised nature of higher-order visual effects, the embedded mitigation measures,

compliance with setback distances, no significant adverse indirect effects on Population and Human Health are predicted during construction, operation or decommissioning.

19.2.1.6 Interactions of Population and Human Health and Traffic and Transportation

Potential effects on the surrounding road network are addressed in Chapter 17. Traffic and transport effects may interact with Population and Human Health through changes in road safety, accessibility, connectivity, journey times and community amenity. During construction and decommissioning, temporary increases in traffic volumes associated with workforce movements, HGVs and turbine delivery or removal activities have the potential to affect local road users and nearby communities. During operation, traffic movements will be limited to occasional maintenance visits and are not anticipated to materially affect the receiving environment. Having regard to the temporary nature of construction and decommissioning activities, the limited operational traffic demand and the implementation of embedded mitigation and traffic management measures, significant adverse indirect effects on Population and Human Health are not considered likely.

19.2.2 Biodiversity

The following interactions with Biodiversity have been identified as having the potential to occur during the construction, operation and decommissioning phases of the proposed project.

19.2.2.1 Interactions of Biodiversity and Land, Soils and Geology

Land, soils and geology has the potential to interact with biodiversity through habitat loss, soil disturbance, erosion, sediment generation, accidental contamination, and changes to geological or karst features that support ecological receptors. During construction, excavation works, soil handling, access track construction, cabling and borrow pit activities have the potential to affect habitats and species through localised disturbance of soils and subsoils; however, the design of the proposed project has avoided sensitive ecological and geological features where possible, including identified karst features and limestone pavement habitats, and incorporates measures to control erosion and contamination. During operation, interactions are limited to occasional maintenance activities and the continued presence of permanent infrastructure, with no significant effects on land, soils and geology identified that would be likely to result in significant indirect effects on biodiversity. During decommissioning, temporary soil disturbance and construction-type activities may give rise to similar but reduced interactions. Having regard to the findings of Chapter 8 Land, Soils and Geology, the absence of peat within the wind farm site, the avoidance of sensitive receptors through design, and the implementation of embedded mitigation and environmental management measures, likely significant adverse effects on biodiversity arising through the land, soils and geology pathway are not considered likely.

19.2.2.2 Interactions of Biodiversity and Hydrology and Hydrogeology

Biodiversity and Hydrology and Hydrogeology interact in relation to mitigation measures aimed at protecting water quality. Both topics share a combined potential effect relating to water quality impacts during the construction and operational phases of the proposed project.

Construction phase activities including excavation, ground works, movement and storage of spoil, site drainage, and the use and storage of potential contaminants have the potential, if not

appropriately managed or mitigated, to impact nearby habitats and aquatic environments. This gives rise to a potential interaction between Biodiversity and Hydrology and Hydrogeology.

These potential effects, together with the proposed mitigation measures, are addressed in detail in Chapter 9, Chapter 6, as well as in the Construction Environmental Management Plan (CEMP) (see Appendix 2-2) of the EIAR. Implementation of these measures will reduce the potential for direct and indirect effects on Biodiversity from project-related activities.

The embedded mitigation SuDS measures will control the movement of run-off from project infrastructure across the entirety of the proposed wind farm site during the operational phase.

Likely significant effects are not anticipated considering the embedded mitigation measures for the protection of water quality.

19.2.2.3 Interactions of Biodiversity and Air Quality and Climate

There is an interaction between biodiversity and air quality in terms of mitigation of potential dust effects. The two topics share a combined potential effect due to potential dust impacts during construction and decommissioning phases of the proposed project.

Activity during the construction phase, primarily relating to excavation, ground works, movement and storage of spoil, has the potential, if not properly managed or mitigated for, to impact on nearby habitats and aquatic environments, resulting in a potential interaction between Biodiversity and Air Quality.

These potential effects, along with proposed mitigation measures, are discussed in detail within Chapter 6, Chapter 8, Chapter 14 and Chapter 15 and the CEMP (see Appendix 2-2) of the EIAR. The proposed mitigation measures will reduce the potential direct and indirect effect from dust on Biodiversity from activity associated with the proposed project.

Section 14.5 of Chapter 14 further outlines mitigation measures.

Therefore, with proposed mitigation measures, the potential effects from the interactions between Biodiversity and Air Quality are considered not significant.

19.2.2.4 Interactions of Biodiversity and Ornithology

Chapter 6 Biodiversity and Chapter 7 Ornithology are intrinsically linked, with bird species forming a key component of the ecological receptors assessed within the receiving environment. During construction, potential interactions may arise through habitat loss, habitat disturbance, displacement, temporary reductions in habitat suitability, and indirect effects associated with noise, human activity and changes to supporting habitats. During operation, interactions are primarily associated with potential disturbance, displacement, habitat use changes, barrier effects and collision risk for certain bird species, particularly waterbirds, waders, gulls and raptors. The ornithology assessment identifies that bird activity within the proposed wind farm site is generally limited, with core breeding, roosting and wintering areas principally associated with off-site wetlands, turloughs and designated sites. During decommissioning, temporary interactions similar to those identified during construction may occur as a result of dismantling activities and associated disturbance. With regard to the findings of the Biodiversity and Ornithology assessments, the avoidance of key ecological receptors through the design process, the implementation of embedded mitigation measures, significant adverse indirect effects between biodiversity and ornithology are not considered likely during the construction, operational or decommissioning phases of the proposed development.

19.2.2.5 Interactions of Biodiversity, Noise and Vibration, and Traffic and Transportation

There is potential for interaction between Biodiversity, Noise and Vibration, and Traffic and Transportation during the construction, operational, and decommissioning phases of the proposed project. Traffic movements and site activities during the construction and decommissioning phases have the potential to generate noise, which may give rise to disturbance effects for fauna.

Disturbance from noise, vibration, machinery movement and increased human presence during construction could also displace foraging individuals or cause breeding mammals to temporarily abandon natal sites. No otters were recorded within 150 m of the proposed wind farm site. Otter activity was only noted along the Black River, which forms part of the Lough Corrib SAC and lies approximately 280 m from the nearest element of the wind farm site. The GCR also crosses the Black River, but no otters were observed during surveys in this area. There are also abundant displacement foraging habitats for these species in the wider area.

Overall, with the implementation of mitigation measures, potential effects arising from the interaction between Biodiversity, Noise and Vibration, and Traffic and Transportation are considered not significant.

19.2.3 Ornithology

The following interactions with Ornithology have been identified as having the potential to occur during the construction, operation and decommissioning phases of the proposed project.

19.2.3.1 Interactions of Ornithology, Lands, Soils and Geology, and Hydrology and Hydrogeology

Exposing soils during the construction and decommissioning phase has the potential, if not properly managed, to cause the sedimentation of nearby watercourses, which could lead to indirect effects on birds and their prey species through disturbance and deterioration of aquatic habitat quality.

There is potential for some disturbance to foraging birds during construction and decommissioning; however, this is unlikely to be significant due to the temporary and localised nature of any disturbance and availability of extensive alternative foraging habitat in the wider area.

The embedded mitigation SuDS measures will control the movement of run-off from project infrastructure across the entirety of the proposed wind farm site during the operational phase.

Interactions are assessed in Chapter 7, Chapter 8 and Chapter 9. No further interactions have been identified.

19.2.3.2 Interactions of Ornithology, Noise and Vibration, and Traffic and Transportation

There is potential for interaction between Chapter 7 Ornithology, Chapter 12 Noise and Vibration, and Chapter 17 Traffic and Transportation during the construction and decommissioning phases of the proposed project. Noise and vibration have the potential to interact with biodiversity through disturbance and displacement of fauna, particularly birds, mammals and other noise-sensitive species, as well as through temporary alterations to habitat

utilisation patterns. During construction, activities such as site clearance, excavation, rock breaking, traffic movements, turbine erection and, if required, blasting activities have the potential to generate temporary noise and vibration that may affect ecological receptors in proximity to works areas.

Traffic and transport have the potential to interact with biodiversity through habitat disturbance, disturbance to fauna from increased vehicle movements, temporary barriers to species movement, and the risk of wildlife mortality associated with construction traffic. Increased traffic volumes associated with workforce travel, HGV movements, turbine deliveries and grid connection works may result in temporary disturbance to ecological receptors along transport routes and within the vicinity of the proposed project. During operation, traffic generation will be limited to occasional maintenance activities and is unlikely to result in adverse effects on biodiversity.

With the implementation of embedded mitigation measures and environmental management controls, significant adverse indirect effects on biodiversity arising through noise and vibration and traffic and transport pathways are considered not significant during the construction, operational or decommissioning phases of the proposed project.

19.2.3.3 Interactions of Ornithology and Air Quality and Climate

Chapter 14 Air quality and Chapter 15 Climate have the potential to interact with ornithological receptors through changes in air pollutant deposition, habitat quality, ecosystem functioning and longer-term climatic influences on bird populations and species distribution. During construction and decommissioning, dust generation and vehicle emissions have the potential to affect habitats used by bird species, particularly where sensitive ecological receptors occur in proximity to works areas. Chapter 14 Air Quality concludes that, following implementation of embedded mitigation and dust suppression measures, residual effects on air quality and ecological receptors will be short-term, localised and not significant. During operation, the proposed development will generate renewable electricity, reducing reliance on fossil fuel-based energy generation and contributing to reductions in national greenhouse gas and atmospheric pollutant emissions. These indirect beneficial climate and air quality effects have the potential to support the long-term protection of habitats and ecological conditions upon which bird populations depend. Having regard to the findings of the Ornithology, Air Quality and Climate assessments, the implementation of mitigation measures, significant adverse indirect effects on ornithological receptors arising through air quality or climate pathways are not considered likely during the construction, operational or decommissioning phases of the proposed project.

19.2.4 Land Soils and Geology

The following interactions with Land, Soils and Geology have been identified as having the potential to occur during the construction and decommissioning phases of the proposed project.

19.2.4.1 Interactions of Land, Soils and Geology, Hydrology and Hydrogeology and Air Quality and Climate

During the construction phase, excavations for proposed infrastructure have the potential to mobilise suspended solids and influence surface-water run-off. Construction activities also have the potential to interact with groundwater pathways, as assessed in Chapter 9. However, no significant karstification was recorded during site investigations, and mitigation measures have

been incorporated into the project design to protect groundwater receptors. Soil stripping, compaction and localised landform modification may interact with biodiversity receptors, particularly in areas of sensitive limestone pavement and associated habitats, as described in Chapter 7. Borrow pit development and aggregate extraction are intrinsically linked to geological resources, as rock and aggregate will be sourced from the site for use as construction material within the proposed project (see Chapter 8).

No interactions are predicted between Land, Soils and Geology, Hydrology and Hydrogeology and Air Quality and Climate are predicted during the operational phase.

Embedded mitigation measures, including drainage controls, surface-water management, peat and soil handling protocols, and pollution prevention measures are designed to manage run-off and protect water quality during the construction and decommissioning phases.

Likely significant effects are not anticipated considering the embedded mitigation measures for the protection of water quality.

Interactions have been assessed and presented in Chapter 8, Chapter 9 and Chapters 14 and Chapter 15.

19.2.4.2 Interactions of Land, Soils and Geology and Landscape and Visual

During construction, land, soils and geology have the potential to interact with landscape and visual receptors through temporary ground disturbance associated with excavations, access track construction, crane hardstands, turbine foundations, borrow pit development, the control building, substation works and associated soil and rock handling activities. These works may result in localised alterations to landform, exposure of subsoils and bedrock, vegetation removal, temporary stockpiling of materials and the presence of construction compounds, all of which have the potential to influence landscape character and visual amenity within and immediately surrounding the site. Chapter 13 LVIA concludes that construction-stage landscape and visual effects are largely confined to the site and its immediate surroundings, reducing rapidly with distance and being temporary in nature. Having regard to the limited extent of landform modification, the restoration of temporary working areas, the implementation of embedded environmental and construction management measures, and the findings of the Land, Soils and Geology and LVIA assessments, significant adverse indirect effects between land, soils and geology and landscape and visual receptors are not considered likely during the construction phase of the proposed development.

19.2.4.3 Interactions of Lands, Soils and Geology and Archaeology and Cultural Heritage

There is potential for interaction between Land, Soils and Geology and Archaeology and Cultural Heritage where excavations or material removal occurs, particularly if previously unrecorded subsurface archaeological artefacts or features are present.

Prior to the commencement of construction, a programme of archaeological test trenching will be carried out at the greenfield locations that will be impacted by the construction of infrastructure across the proposed wind farm site.

Chapter 16 states that, following the implementation of mitigation measures, no significant residual effects are predicted on previously unrecorded archaeological, architectural or cultural heritage resources arising from ground disturbance during construction. This is because any

remains encountered during archaeological monitoring or test trenching will be subject to preservation by record or preservation in situ.

Residual indirect effects will persist in relation to the setting of archaeological, architectural, or cultural heritage sites, as effects on setting cannot be fully mitigated. Chapter 16 identifies significant residual adverse effects on enclosure AH97 and hillfort AH98 arising from changes to their setting during the operational phase of the Proposed Development. However, these effects are indirect and long-term rather than permanent and would be removed following the decommissioning of the turbines.

Therefore, with mitigation in place, the potential effects arising from the interaction between Land, Soils and Geology and Archaeology and Cultural Heritage are considered not significant in relation to direct impacts on previously unrecorded archaeological remains and cultural heritage resources during construction. However, significant indirect residual effects on the setting of AH97 and AH98 remain, as identified in Chapter 16.

19.2.5 Hydrology and Hydrogeology

Interactions with Hydrology and Hydrogeology that have been identified as having the potential to occur during the construction, operation and/or decommissioning phases of the proposed project have been discussed in the following sections of this chapter:

- Section 19.2.1.1 Interactions of Population and Human Health;
- Section 19.2.2.2 Interactions of Biodiversity;
- Section 19.2.3.1 Interactions of Ornithology; and,
- Section 19.2.4.1 Interactions of Land, Soils and Geology and Air Quality.

19.2.6 Shadow Flicker

Interaction of Shadow Flicker and Population and Human Health has been discussed under section 19.2.1.2 in this Chapter.

19.2.7 Material Assets

Interactions between Material Assets and Air Quality and Climate have the potential to occur during construction. Waste management measures will be implemented to minimise the volume of waste sent to landfill, as landfill disposal is associated with higher embodied carbon emissions compared with alternatives such as reuse and recycling. Where feasible, materials will be reused onsite or removed for recycling.

Waste management for the proposed project is described in Chapter 11 and in the CEMP (Appendix 2-2) of this EIAR. The effects arising from the interaction between waste and climate are considered not significant.

The potential interaction between Material Assets and Human Health has been addressed in Section 19.2.1.3 above.

19.2.8 Noise and Vibration

The potential interaction between Noise and Vibration and other specialist chapters in the EIAR is primarily limited to Chapter 5, Chapter 6, Chapter 7 and Chapter 17. The Noise and Vibration

assessment has accounted for interactions with traffic and transportation. No further interactions have been identified.

Interactions with Noise and Vibration that have the potential to occur during the construction, operation, and decommissioning phases of the proposed project are addressed in the following sections of this chapter:

- Section 19.2.1.4 – Interactions with Population and Human Health;
- Section 19.2.2.5 – Interactions with Biodiversity; and
- Section 19.2.3.2 – Interactions with Ornithology.

19.2.9 Landscape and Visual

19.2.9.1 Interactions of Landscape and Visual and Archaeology and Cultural Heritage

Landscape and visual receptors and cultural heritage assets are intrinsically linked, as the significance, setting and appreciation of many archaeological, architectural and cultural heritage features is influenced by the surrounding landscape and views. During construction and Decommissioning, temporary interactions may arise through ground disturbance, vegetation clearance, construction compounds, crane operations, excavations and the presence of construction plant, which may alter views from or towards cultural heritage assets and temporarily affect their setting and appreciation. During operation, the principal interaction relates to changes in the setting of heritage assets and cultural landscapes arising from the visibility of the proposed turbines and associated infrastructure. Chapter 13 LVIA and Chapter 16 Cultural Heritage assessments identify that effects on the setting of heritage assets generally reduce with distance and vary according to the sensitivity, significance and visibility of individual receptors. Having regard to the findings of Chapter 13 LVIA and Chapter 16 Cultural Heritage, the avoidance of direct impacts on known heritage assets through the design process, and the implementation of embedded mitigation measures, additional significant adverse indirect effects between landscape and visual receptors and cultural heritage assets are not considered likely during the construction, operational or decommissioning phases of the proposed development.

Interactions with Landscape and Visual Impact that have been identified as having the potential to occur during the construction, operation and/or decommissioning phases of the proposed project have been discussed in the following sections of this chapter:

- Section 19.2.1.5 Interactions of Population and Human Health; and
- Section 19.2.4.2 Interactions of Land, Soils and Geology.

19.2.10 Air Quality and Climate

Interactions with Air Quality and Climate mainly relate to an increase in emissions, particularly dust emissions through works on site or traffic. The following interactions with Air Quality and Climate have the potential to occur during the construction, operation and decommissioning phases of the proposed project and have been discussed in the following sections of this chapter:

- Section 19.2.1.1 - Interactions of Population and Human Health;
- Section 19.2.2.3 - Interactions of Biodiversity;
- Section 19.2.3.3 - Interactions of Ornithology;

19.2.10.1 Interactions of Air Quality and Climate and Traffic and Transport

Traffic and transport have the potential to interact with air quality and climate through vehicle exhaust emissions, dust generation, fuel consumption and associated greenhouse gas emissions. During construction, increased traffic volumes associated with workforce movements, HGVs, abnormal loads and the transport of construction materials have the potential to give rise to temporary increases in traffic-related emissions and dust along sections of the transport network and within the vicinity of construction activities. These interactions are primarily short-term and localised in nature and are managed through embedded mitigation measures, construction environmental management procedures and traffic management controls. During operation, traffic generation will be limited to occasional maintenance visits and is not anticipated to result in any material effects on local air quality or climate. During decommissioning, temporary traffic-related emissions and dust may arise from the removal of infrastructure and associated vehicle movements, although effects would be similar in nature to, and generally less intensive than, those experienced during construction. Having regard to the findings of Chapter 17 Traffic and Transport, Chapter 14 Air Quality and Chapter 15 Climate assessments, the temporary nature of construction and decommissioning traffic, the implementation of mitigation measures, the limited operational traffic demand, significant adverse indirect effects between traffic and transport and air quality and climate are not considered likely during the construction, operational or decommissioning phases of the proposed development.

19.2.11 Archaeology and Cultural Heritage

Interactions with Archaeology and Cultural Heritage that have been identified as having the potential to occur during the construction, operation and/or decommissioning phases of the proposed project have been discussed in the following sections of this chapter:

- Section 19.2.9.1 - Interactions of Landscape and Visual;
- Section 19.2.4.3 - Interactions of Land, Soils and Geology.

19.2.12 Traffic and Transportation

Interactions with Traffic and Transportation mainly relate to an increase in traffic for the proposed project. The following interactions with Traffic and Transportation have the potential to occur during the construction, operation and decommissioning phases of the proposed project and have been discussed in the following sections of this chapter:

- Section 19.2.1.6 - Interactions of Population and Human Health (also addressed interactions with noise and dust);
- Section 19.2.2.5 - Interactions of Biodiversity; and,
- Section 19.2.3.2 - Interactions of Ornithology,
- Section 19.2.10.1 – Interactions of Air Quality and Climate.

During the construction, operational and decommissioning phases, there is the potential for interactions between climate, air quality and traffic. Vehicles accessing the site will result in emissions of CO_2, a greenhouse gas. The effects of the proposed project on climate are assessed by reviewing the change in annual average daily traffic on roads close to the site.

19.2.13 Major Accidents and Natural Disasters

No further interactions have been identified outside of those assessed in Chapter 18.

19.3 Positive Interactions of Elements

The proposed project has potential to give rise to positive effects on the receiving environment. In addition to the interactions between environmental factors identified above, the following beneficial interactions are anticipated:

- The introduction of wind energy generation as a land use within the site will facilitate the provision of renewable electricity to the national grid, thereby reducing reliance on fossil fuels and contributing to a reduction in emissions associated with climate change. This represents a positive interaction between Material Assets (i.e. energy infrastructure), Air Quality, Climate, Population and Human Health, and Biodiversity.
- Employment generated by the proposed project, together with the use of local services and facilities by project personnel during all phases, will result in a positive interaction between Material Assets (i.e. electrical infrastructure) and Population and Human Health, particularly in terms of the local economy, employment and socio-economic effects.
- The establishment of a Community Benefit Fund will result in a positive interaction between Material Assets (i.e. energy infrastructure) and Population and Human Health, with regard to socio-economic conditions, residential amenity and tourism. The Fund will be positive for those residing in the local area and enhance the local economy. Further detail is provided in Chapter 5, Population and Human Health.
- The development of wind energy infrastructure, in conjunction with associated community benefit initiatives, has the potential to contribute positively to the perception of the area as an environmentally sustainable location. The proposed project will support local projects through the Community Benefit Fund, which may have associated positive effects on the local community and those living in closest proximity. Consideration of public and visitor attitudes, amenity and community benefit is provided in Chapter 5.

19.4 Conclusion

Interactions between environmental factors will occur to a certain extent. The principal interactions are likely to arise between population and human health; land, soils and geology; hydrology and hydrogeology; landscape and visual; noise; air quality and climate; traffic and transportation; and biodiversity. All of which have been assessed in the relevant chapters of the EIAR.

Assessment of potential interactions during the construction, operational and decommissioning phases indicates that significant cumulative or synergistic effects are not anticipated. No additional interactions, beyond those identified and assessed in this chapter, are predicted to give rise to further effects.

The proposed project is expected to result in **positive effects** at international, national, regional and local levels, particularly in contributing to the achievement of renewable energy targets and enhancing domestic energy security. Positive effects are also anticipated through the implementation of a Community Benefit Fund to support local initiatives.

Overall, the assessment concludes that interactions between environmental factors are not predicted to result in likely significant adverse effects.