Volume 2: Environmental Statement

Environmental Statement: Smulgedon Wind Farm

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Chapter 1: Introduction

1. INTRODUCTION

1.1. This Chapter of the Environmental Statement (ES) introduces the Smulgedon Wind Farm Development ("the Proposed Development") and Smulgedon Wind Farm Limited (Ltd) ("The Applicant") and provides details of the project team and the structure of the statement.

Application and Planning History

1.2. This Amendment Application has been prepared by Neo Environmental Limited on behalf of Smulgedon Wind Farm Ltd to amend the previously consented wind farm for which conditions have been discharged and work has already commenced on site. The current development was consented under a planning application that was made to the Northern Ireland Department of the Environment (DOE) Planning Service in February 2009 by Gaelectric Developments Limited to construct, operate and decommission a wind farm known as Smulgedon Wind Farm (Application No. B/2009/0070/F) on land at Smulgedon Hill, south of Legavallon Road, circa 9km to the northeast of Dungiven and 8km west of Garvagh, Co. Derry/Londonderry. The planning application was for: *"a proposal to construct a wind farm to include 7 no. wind turbines with the maximum tip height of 120.5m (hub height and blade diameter of 71m) and ancillary infrastructure including external transformers and associated hardstandings and underground cabling; upgraded site access points from the public highway; new and upgraded on site tracks; a substation and one meteorological mast*."

1.3. The development was consented on the 2nd October 2012 subject to compliance with 30 conditions.

1.4. A second application was lodged on the 19th of September 2013 (B/2013/0196/F) "*to facilitate a new development site entrance, relocation of the combined substation and construction compound area and a revised access track route to service T1, T2, T5 and T6.".* This was planning approved on the 18th of August 2015.

1.5. Further associated applications in relation to the consented development were submitted in 2014 (B/2014/0079/F), 2015 (LA01/2015/1011/F), 2017 (LA01/2017/1136/F) and 2020 (LA01/2020/0462/F). All have been consented apart from the latter application which is currently under consideration with Causeway Coast and Glens Borough Council (CCGBC).

1.6. An application for the grid connection between the site substation and the national grid has been secured separately. Smulgedon Wind Farm will be connecting into the Agivey grid cluster being developed by (System Operator for Northern Ireland) SONI and Northern Ireland Electricity (NIE). This grid substation received planning permission in December 2019.

1.7. The consented site was acquired from Gaeletric Ltd by Smulgedon Wind Farm Limited ("the Applicant") in 2019.

1.8. Neo Environmental Limited has compiled an amendment application, produced in an Environmental Statement ("ES") format as requested by Causeway Coast and Glens Borough Council.

1.9. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads to accommodate the turbines. The Planning (Environmental Impact Assessment) Regulations 2017 provides the procedures which should be adhered to when preparing and assessing planning application which are of an EIA nature. Part 4, section 13 of the Regulations provides the details regarding subsequent applications made where environmental information was previously provided, 13 (2) states that where *'the environmental information previously submitted in relation to the original application is adequate to assess the significant effects of the development on the environment, it shall take that information into consideration in its decision for subsequent consent.'.*

1.10. In accordance with The Planning (Development Management) Regulations (Northern Ireland) 2015, applications for energy infrastructure are considered to be 'Major Developments' where they exceed 5MW. Hence this project is treated as a Major Development. As already stated, this Environmental Statement (ES) has been produced to conform with CCGBC's wishes.

1.11. Further description of the Development is presented below under "The Proposed Project".

The Applicant

1.12. Smulgedon Wind Farm Ltd is part of the Future Renewables Eco plc ("FRE plc") group of companies. Future Renewables is a renewable energy company which was established in 2015 and operates throughout the UK. Its main focus is in delivering small and medium wind projects, solar and biomass developments.

SCOPE OF THE STATEMENT

1.13. This statement details the findings of the assessment of the potential significant environmental effects from the Development during the construction, operational and decommissioning phases of the Development. This assessment forms part of an extensive process which is undertaken to ensure that the likely significant effects, both positive and negative, arising from the Development are considered in full by the decision maker prior to the determination of an application for development consent or planning permission.

1.14. The objectives of this statement are summarised below:

- To identify both positive and negative potential effects that may be significant, resulting from the initial construction, operational and decommissioning phases of the development, taking into consideration the size, nature and location, the sensitivity of the local environment, the requirements of statutory consultees and the concerns of interested parties;
- To establish the existing environmental conditions of the site and surrounding area, where relevant for any likely significant effects;
- To predict the extent and assess the significance of any potential effects;
- To identify and evaluate possible mitigation measures to avoid, reduce or offset any negative, likely significant effects; and
- To identify and assess any residual effects.

STATUTORY REQUIREMENTS

Guidance

1.15. Development that is listed in Schedule 2 requires an EIA if it is likely to have an impact on the environment by virtue of factors such as its size, nature or location. Therefore, any potential effects of the construction, operation and decommissioning of the wind farm, deemed to have significant environmental effects, are subject to an EIA.

1.16. Based on the site area, potential turbine capacity and the known onsite environmental and technical constraints, the original planning application for Smulgedon Wind Farm (Application No. B/2009/0070/F) required an EIA under Schedule 2 of the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (the EIA Regulations).

1.17. EIA is a process by which information about the environmental impacts of a project is collected, evaluated and taken into account in its design and the decision as to whether it should be granted planning permission. The applicant presents the information on the project and its likely environmental impacts in an ES. This enables decision-makers to consider these impacts when determining the related planning application.

1.18. The ES for the proposed wind farm was carried out in accordance with The Planning (Environmental Impact Assessment) (Amendment) Regulations (Northern Ireland) 2017 ("The EIA Regulations").

1.19. Due to the minor amendment to the original application, the findings of the original EIA have been updated and presented within this Environmental Statement which will accompany the planning application submitted to CCGBC.

1.20. This Environmental Statement (ES), offers information on the identification and assessment of the likely significant environmental effects of the development and has been undertaken in line with the EIA Regulations. Additional details on the legislative requirements for EIA are presented in **Chapter 2: Planning and Policy Framework.**

1.21. Individual technical assessments have been undertaken in accordance with a variety of legislation, guidance and best practice. Details are contained within the Legislation, Policy and Guidance section of each technical chapter, Chapters 2-13.

Assessment Methods

1.22. Appropriate methodologies have been used to assess the effects relating to each of the environmental topics that have been investigated as part of the original EIA. These methodologies are based on recognised good practice and guidelines specific to each subject area, details of which are provided within each individual Chapter.

1.23. The design team employed for the consented project used an iterative approach to the design of the proposed Smulgedon Wind Farm where the design evolved throughout the original EIA process, as different constraints and adverse impacts were identified and evaluated. This method is considered best practice as mitigation measures can concurrently be integrated into the design throughout the EIA process. This approach allowed the design team to alleviate or remove adverse impacts and incorporate measures into the design to enhance positive impacts. The final evaluation of significance assesses the residual impacts assuming all mitigation measures are applied. This Environmental Statement is based on the same approach, where applicable. The layout of the Proposed Development has not been altered as the only changes are to the wind turbine rotor sizes, crane pads, foundations and tower heights. The overall tip height of the wind turbines have reduced by 5.6m and the hub height reduced by 16.1m, although the rotor radius has increased by 10.5m.

1.24. Each technical chapter of this ES assesses the impacts that could arise as a result of the Proposed Development. Impacts are assessed as being either adverse, beneficial, permanent, temporary or reversible. Significance is determined by assessing the magnitude and sensitivity of each impact.

1.25. This ES is designed to amend and update the original ES that was submitted as part of the planning application for Smulgedon Wind Farm in 2009 (Application No. B/2009/0070/F). It complies with current planning policy and will be submitted in conjunction with a planning application.

1.26. The ES is designed to provide information for the purpose of assessing the likely impact upon the environment. It should be noted that the redline Application Site boundary only encompasses the wind turbines and the associated crane pads, as these are the only elements of the parent consent (B/2009/0070/F) (which has already been commenced), that will be impacted. However, the original application boundary will be considered and referenced, where relevant.

1.27. An informal scoping meeting was held with CCGBC to discuss the assessments and content of this ES. It was agreed at this meeting that an EIA is not required as per part 4, paragraph 13 of the EIA Regs (2017). An application has been submitted on this basis but in doing so the CCGBC has confirmed that their position on this matter has changed and that an EIA determination will now be required; hence this revision to the submitted document to include a formal Environmental Statement (ES).

STRUCTURE OF THE STATEMENT

1.28. Although this statement is not a formal ES, it has been agreed with the Council that the structure of the statement will follow the standard ES format.

1.29. Schedule 4 of the "EIA Regulations" states that the following must be included within an ES and therefore this is considered relevant for this ES. Where relevant due to the minor changes proposed, certain criteria may not be applicable:

- A description of the development (description of the physical characteristics (site, design and size of the development), land-use requirements, production processes) and an estimate of expected residues and emissions resulting from the operation of the proposed development.
- An outline of the alternatives studied by the applicant and explanation of why the particular option was chosen. Chapter 5 provides these details.
- A description of the aspects of the environment likely to be significantly affected by the development (including population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage and landscape) and the inter-relationship between the above aspects.
- A description of the likely significant effects of the development on the environment (to include direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development).
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- The data required to identify and assess the main effects that the development is likely to have on the environment.
- An indication of any difficulties (technical deficiencies or lack of know-how) encountered.
- A non-technical summary of the information contained within the statement.

1.30. This statement comprises the following Volumes:

- **Volume 1** – Non-Technical Summary (NTS)
- **Volume 2** – Environmental Statement (ES)

- **Volume 3** – Figures; and
- **Volume 4** – Technical Appendices.

1.31. Volume 2 is organised as follows:

- **Chapter 1** – Introduction: provides an introduction to the proposed development, the applicant and the statutory requirements under the EIA Regulations.
- **Chapter 2** – Planning and Policy Framework.

Chapters 3 to 15 statement on topics covered within the ES format. Topics were identified based on what information might usefully assist Planning Service in its determination of the planning application for the development. These topics are covered in the following sections:

- **Chapter 3** – Socio-economics, Recreation and Tourism
- **Chapter 4** – Landscape and Visual Impact Assessment
- **Chapter 5** – Ecology
- **Chapter 6** – Ornithology
- **Chapter 7** – Hydrology and Hydrogeology
- **Chapter 8** – Archaeological, Architectural and Cultural Heritage
- **Chapter 9** - Noise
- **Chapter 10** – Existing Infrastructure and Aviation
- **Chapter 11** – Traffic and Transport
- **Chapter 12** – Miscellaneous Issues
- **Chapter 13** – Shadow Flicker Assessment

1.32. **Volume 3** – Figures: contains the illustrations that accompany the statement.

1.33. **Volume 4** – Technical Appendices: contains technical information relating to the environmental topics. Information includes detailed methodologies, baseline data information and data analysis.

PROJECT TEAM

1.34. This statement has been compiled by Neo Environmental Ltd on behalf of the Applicant, Smulgedon Wind Farm Ltd. Neo Environmental is a specialist environmental consultancy with a proven track record of delivering renewable energy projects over the past 8 years. To date, Neo Environmental Ltd have submitted over 200 applications for renewable energy developments.

1.35. Neo Environmental had overall responsibility for the coordination and production of the Environmental Statement ("ES") and with input from other independent specialist consultants where necessary. Table 1-1 provides details of the authors contributors of each aspect of the statement.

Table 1-1: Authors of each chapter of the ES

ES Chapter		Organisation
Chapter 1	Introductory Chapter	Neo Environmental Ltd
Chapter 2	Planning and Policy Framework	Jodie Kane of LIPS Ltd
Chapter 3	Socio-economics, Recreation and Tourism	Neo Environmental Ltd
Chapter 4	Landscape and Visual Impact Assessment	
Chapter 5	Ecology	
Chapter 6	Ornithology	
Chapter 7	Hydrology and Hydrogeology	
Chapter 8	Archaeological, Architectural & Cultural Heritage	
Chapter 9	Noise	
Chapter 10	Existing Infrastructure and Aviation	
Chapter 11	Traffic and Transport	
Chapter 12	Miscellaneous Issues	
Chapter 13	Shadow Flicker Assessment	
Chapter 14	Residential Amenity Impact Assessment	
Chapter 15	Interactions	

THE DEVELOPMENT SITE

Site Description

1.36. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry/Londonderry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall (consented) development boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

1.37. The area that encompass the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

1.38. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the land holdings are bound by post and wire fencing throughout the area. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the land holdings before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

Landscape Setting

Topography

1.39. The development is located at Smulgedon, approximately 8km west of the village of Garvagh and the Gortnamoyagh Forest surrounds the eastern and southern edge of the site boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

1.40. The 1:50,000 Ordnance Survey of Northern Ireland Map (Sheet 8) shows the turbine envelope to lie on undulating ground rising from approximately 210m Above Ordnance Datum (AOD; approximately sea level) in the west to 290m AOD in the east.

1.41. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east.

Landscape Character

1.42. The Development itself is located within the Binevenagh Landscape Character Area (LCA) which is defined as long and thin with a series of prominent ridges, uplands and valleys.

1.43. The Development is located in the centre of the Binevenagh LCA, on a small hill – Smulgedon Hill - that is sandwiched between larger summits to the north and south. It is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau at approximately 380m high.

1.44. In broad terms the LCA is of Very High quality because it is a distinctive and extensive upland landscape containing lowlands to east and west. However, the site itself and its adjacent areas are considered to be of lesser physical quality than the overall LCA as it is characterised by large coniferous plantations, degraded field boundaries, former quarry workings and areas of open moorland.

1.45. The LCA is also classified as being highly sensitive because it is an accessible area with national statutory designations at either end for scenic quality and amenity. However, the SPG affords the LCA a high to medium sensitivity as built development could be sensitively accommodated in areas where it does not affect escarpment summits or where it offers opportunities to reverse the decline in landscape condition.

1.46. **Chapter 4** provides further details about the landscape setting.

Statutory Designations

Landscape Designations

1.47. There are three Areas of Outstanding Natural Beauty (AONB) within the study area; Sperrin AONB approximately 1km to the south of the development; Binevenagh AONB approximately 10km north; and a very small part of the Causeway Coast AONB located in the north eastern edge of the study area.

1.48. The Sperrin AONB was first designated in 1968, then re-designated in 2008. It comprises 118,206 ha of extensive upland landscape making it the largest AONB in Northern Ireland. The upland consists of vast expanses of moorland dissected by glens and valleys. The re-designation has increased the AONB boundary slightly in most directions to encompass areas around its previous boundary which share the same scenic qualities. It now includes a sizeable area in the Dunnamanagh foothills in the north west and the lower slopes of Slieve Gallion in the south east. The re-designation has also excluded the foothills around Dunnamore in the south because they no longer meet the designation criteria.

1.49. The Binevenagh AONB is primarily designated for its severe skyline of the cliffs at Binevenagh make a breathtaking contrast with the outstanding expanse of Magilligan Strand Binevenagh cliffs" (EHS), a sandy beach stretching 8km from Downhill to Lough Foyle.

1.50. The Causeway Coast AONB forms a small part of the Supportive Setting for Northern Irelands only World Heritage Site (WHS), Giants Causeway.

1.51. A number of Countryside Policy Areas (CPA) - intended to protect the countryside from development pressure which would adversely affect the rural landscape character - and Local Landscape Policy Areas are identified within the study area outlined in Chapter 4: LVIA (35km radius from the centre of the Proposed Development). The latter are generally located around the edge of settlements and apply strict controls on retaining the character and exceptional high quality within tightly defined areas which are under pressure for development.

1.52. To the west of Inishowen, the tip of an Areas of Especially High Scenic Amenity (AEHSA) lies within the study area. AEHSA's are of the highest landscape quality in the County, characterised by wilderness and few, if any, man-made structures. Additionally, there are bands of Green Belt around the larger settlements in the study area, however the development is not located within these.

1.53. There are various Historic Parks, Gardens and Demesnes within the study area, however none are located within close proximity to the development.

1.54. The landscape and visual effects on these areas are fully considered within **Chapter 4: Landscape and Visual Impact Assessment.**

Nature Conservation Designations

1.55. The proposed wind farm is not located within the boundary of any statutory designated sites of international nature conservation importance. The proposed Smulgedon Wind Farm does not lie within or adjacent to any Special Protection Areas (SPA) or Special Areas of Conservation (SAC). The nearest SAC is the River Roe and Tributaries, lying approximately 1.66km to the south and west. This SAC was confirmed in December 2010 (Site Code UK 0030360). The SAC is 407.6 ha in extent and 87km in length.

1.56. The proposed wind farm is not located within any statutory designated sites of national or local nature conservation importance.

1.57. There are no Sites of Local Nature Conservation Importance (SLNCI) within the site boundary; the closest being Legavannon Pot SLNCI and Legavannon Quarry SLNCI located 0.3km north and east of the site.

1.58. While there are no Areas of Special Scientific Interest (ASSI) within the site boundary, ASSI Smugledon lies to the north of the site.

1.59. Further details about Nature Conservation Designations are included within **Chapter 5: Ecology** and a map illustrating the location of these designations can be found in **Figure 5.1: Nature Conservation Designations.**

Wind Farms considered in the Cumulative Impact Assessments

1.60. **Table 1-3** outlines the single wind turbines within 30km of the consented Smulgedon wind farm and **Table 1-4** details wind farms located within 30km. Further details are found in **Chapter 4: Landscape and Visual Assessment and Figure 4.10.**

Table 1-3: Single wind turbines within 30km of the Proposed Site

Wind Farm	Approximate distance and direction from the boundary of the Site	Status
Kilhoyle Road (60)	c. 1.7km north	Operational
Drumhappy Road (31)	c. 2.8km west - northwest	Operational
Termain Road	c. 4km north - northwest	Consented
Termain Road (37)	c. 4.3km north - northwest	Consented
Cloghan Road (16)	c. 4.5km northwest	Consented
Betts Road (28)	c. 4.6km west - northwest	Operational
Mill Road (26)	c. 5km northwest	Consented (Possibly lapsed)
Drumbane Road	c. 5.3km southeast	Operational
Tirkeeran Road	c. 6km east	Operational
Legavallon Road (132)	c. 6.5km southwest	Operational
Belraugh Road (25)	c. 6.5km northeast	Consented
Belraugh Road (7)/1	c. 7km northeast	Operational
Ballyavellin Road (61)	c. 7.4km northwest	Operational
Edenmore Road (67)	c. 8.5km northwest	Operational
Craigmore Road	c. 8.5km north east	Operational
Craigmore Road (146)		Consented (Possibly Lapsed)
Craigmore Road (121)		
Ringsend Road (84)	c. 9.3km north - northwest	Consented (Possibly Lapsed)

Cam Quarry	c. 9.8km north	Consented
Dunbeg Quarry	c. 11km north	Consented
Croaghan Quarry	c. 12km north - northeast	Operational
Greenhall Highway (60)/1	c. 18km north – northeast	Operational
Greenhall Highway (60)/2	c. 18km north – northeast	Operational
Churchland Lane (20)	c. 18km north - northeast	Operational
Monnaboy	c. 18km west	Operational
Magherafelt	c. 19.5km southeast	Operational
Craig 1	c. 25km east	Consented
Craig 2	c. 25km east	Consented

Table 1-4: Wind Farms within 30km of the Proposed Site

Wind Farm	Approximate distance and direction from the boundary of the Site	Status
Craiggore	c. 1.3- 2.2km north	Consented
Upper Ballyrogan	c. 3.5km northeast	Consented
Evishagran	c. 5km south	Consented
Rigged Hill	c. 5.5km north	In Planning
Brockaghboy	c. 6km south - southeast	Operational
Brockaghboy Extension	c. 7km southeast	Operational
Terrydoo Road 1	c. 7km north	In Planning
Terrydoo Road 2	c. 7km north	In Planning
Corlacky Hill	c. 9km south	In Planning
Cam Burn	c. 10km northeast	Consented
Dunbeg South	c. 10km north - northwest	In Planning
Dunbeg	c. 12km north	Operational
Dunbeg Extension	c. 12km north - northwest	Consented

Dunbeg Extension	c. 12km north - northwest	Consented
Altahullion I	c. 13km east	Operational
Altahullion II	c. 13km east	Operational
Dunmore	c. 13km north	Operational
Dunmore Extension	c. 13.5km north	Consented
Glenconway	c. 14km east	Operational
Ballyhanedin	c. 16km southwest	Consented
Barr Cregg	c. 21km west - southwest	In Planning
Garves	c. 23km east	Operational
Long Mountain	c. 23.5km east	Operational
Draperstown (Brackhaugh)	c. 24km south	Operational
Glenbuck II	c. 24km east	Operational
Glenbuck	c. 25km east	Operational
Eiglish Mountain	c. 27km southwest	Operational
Slieve Kirk	c. 28km west - southwest	Operational
Cloonty	c. 29km northeast	Operational

Existing Conditions

1.61. The main site is currently rough upland grazing land and is approximately 92.4 hectares in size, however the area relevant to this ES is 6.12 ha only (See Figure 1). This accounts for the area around the wind turbine foundations, the associated crane pads as well as the site entrance and the access track. These are the only elements from the parent consent (B/2009/0070/F and other associated consents) which are being amended.

1.62. There are three disused quarries below the Development site in the side of Smulgedon Hill, and a number of other quarries in hillsides in the surrounding area. Gortnamoyagh forest is a large plantation on the south western and north eastern sides of Smulgedon Hill.

1.63. The Development is circumnavigated on its northern and eastern boundaries by the B64 Dungiven - Garvagh road. There is also a narrow rural lane around the south and west sides of the Hill.

Settlements

1.64. The nearest large settlements are the towns of Limavady 10.5km to the north west, Dungiven 9km to the south west and Garvagh 8km to the east. The small village of Drumsurn which lies 4km to the northwest of the Development, is the nearest settlement.

1.65. There are no dwellings immediately adjacent to the Development but there are a small number on the lower eastern slopes of Smulgedon Hill off the B64, however they are visually detached from the Development by Gortnamoyagh Forest and rising topography.

THE PROPOSED & CONSENTED PROJECT

Introduction

1.66. As the whole development is integral to the amendments, this section of the statement provides a description of the proposal and the wind farm site including the turbines, access tracks, electrical components and temporary works associated with the construction phase of the development. This section also provides an overview of the proposed construction methods, the proposed timescale over which various construction activities will take place and provides details of the operational phase of the development. A statement regarding decommissioning of the site after the operational period is also provided. It should be noted that construction (although only very minor elements at this stage) has begun on site.

Development Description

1.67. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

1.68. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

1.69. The overall development (original consent and amendment) comprise the following:

- Seven turbines and associated infrastructure including transformers and crane pads
- Construction of site entrance
- Construction of new access tracks
- Construction of a new temporary site compound
- Construction of a new on-site substation including the control building and underground power cables; and

- Erection of one permanent meteorological mast to monitor wind speed.

1.70. **Table 1-5** below details the co-ordinates of the 7 consented turbines.

Table 1-5: Turbine Co-ordinates

Turbine	Easting	Northing
1	275636	414924
2	276109	415022
3	276465	414968
4	275399	414637
5	275694	414584
6	276069	414735
7	276275	414557

1.71. The Proposed Development will be connected to the local electricity grid via a new substation building on site. An application for the grid connection between the site substation and the national grid will be made separately.

1.72. The Proposed Development will have an operational life of approximately 30 years after commissioning. Following this period, the Proposed Development will be decommissioned in accordance with best practice. Alternatively, the life of the Proposed Development may be extended subject to further environmental studies and new consents.

1.73. To date, wind farms have made an important contribution to Northern Irelands renewable targets and low carbon objectives, and the Applicant is seeking to secure and build on its contribution by proposing to construct and operate a wind farm on Smulgedon Hill, County Derry/Londonderry.

WIND FARM CONSTRUCTION

Construction Works

1.74. The civil engineering works will comprise:

- Site survey and preparation;
- Carry out necessary road improvements and construct site entrance;
- Upgrade existing farm tracks to construction compound location;
- Install the site accommodation and compound;
- Construct access tracks, passing places and crane hard standings;
- Excavate turbine foundations and construct the turbine and transformer bases;
- Construct substation building and compound;
- Excavate cable trenches and lay the power and instrumentation cables;
- Install the grid connection;
- Wind turbine component deliveries and turbine erection;
- Erect the monitoring masts;
- Test and commission the wind turbines and
- Carry out reinstatement works, remove temporary accommodation and clear the site.

1.75. The majority of these operations would be carried out concurrently, although predominantly in the order identified, in order to minimise the overall length of the construction programme. In addition development would be phased so that in different parts of the site civil engineering works would be continuing whilst wind turbines are being erected elsewhere. Site restoration would be programmed and carried out to allow restoration of disturbed areas as early as possible and in a progressive manner. The installation of the grid connection would be the responsibility of Northern Ireland Electricity.

Construction and Decommissioning Method Statement

1.76. A Construction and Decommissioning Method Statement (CMS) will be prepared once planning consent has been gained. This will be submitted to Planning Service prior to any construction works taking place. This will describe the detailed methods of construction and

working practices, work to reinstate the site following completion of construction activities, and methods to reinstate the site post operation.

Construction Schedule

1.77. It is anticipated that the construction phase will take approximately 8 months to complete including commissioning the wind turbines and electrical system. This is subject to the final details of the scheme, weather and ground conditions. Some minor site works have been initiated.

1.78. HGV traffic movements will be limited between Monday to Saturday (i.e. none on Sunday) from 07.00 to 19.00. However, during turbine erection and commissioning, and construction of concrete foundations, or during periods of emergency work, site working could extend outside these times but at all times in accordance with the terms of any planning permission that is granted. Chapter 11 provides further details about traffic movements associated with the proposed scheme.

1.79. Table 1-6 shows an indicative schedule for the main construction activities. Should the amendment be granted consent a more detailed programme of works would be produced jointly with the appointed construction contractors and would be agreed with the local authority and any other relevant bodies prior to commencement to ensure compliance with planning conditions put in place to minimise disturbances. Pre-development consultations and condition discharge have been undertaken for the Original Consent, with some works already commenced.

1.80. Prior to the main construction works commencing on-site, enabling works are required. These would be phased into the pre-construction period, with some minor works currently underway as part of the Original Consent, and include:

- Off-site access consultation with regulatory authorities; and
- Detailed site investigation work.

Table 1-6: Indicative Construction Programme

Construction Activity	Month							
	1	2	3	4	5	6	7	8
Survey and Preparation	Underway/ complete							
Access track Work								
Construction Compound								
Foundations and Crane pads								
Substation								
Site Cabling								
Turbine Erection								
Testing and Commissioning								

1.81. In order to ensure that all the mitigation measures outlined in this statement are carried out on site, contractors would be provided with the following documents which must be adhered to throughout the construction process. Again much of this is already underway as part of the Original Consent:

- List of Environmental Requirements of Subcontractors following SEPA/Northern Ireland Environment Agency/Environment Agency Pollution Prevention Guideline PPG6 Working at Construction and Demolition Sites;
- Pollution Prevention Plan, relevant environmental procedures and method statements;
- Noise management plan;
- Traffic management plan;
- Planning conditions and
- Any other requirements of statutory bodies.

1.82. Suitably experienced local contractors will be employed where possible and selection would also be partly based on their record of environmental compliance. It should be noted that all relevant pre-commencement conditions have been discharged to enable the construction works to have commenced.

Infrastructure Layout

1.83. The site boundary associated with the original application (**B/2009/0070/F**) is 92.4 hectares. However, as highlighted previously, the Application Site for this amendment application only encompasses the land that accounts for the area around the wind turbine foundations, the associated crane pads, the site entrance and the access track, which is 6.12 hectares **(See Figure 2).**

1.84. The wind turbines must be spaced apart in order that they do not unduly aerodynamically interfere with each other. The actual land utilised is limited to the wind turbine foundations and associated wind farm infrastructure.

The Wind Turbines

1.85. Each wind turbine would have a maximum height to blade tip of 114.90m above ground level. The turbines will be of the three bladed horizontal axis type, with a maximum hub height of 68.9m and a maximum rotor diameter of 92m. This will allow for turbines with individual generating capacities of 2.35MW and will give a combined installed capacity for the site of up to 16.45MW. This project will provide enough energy for over 9,660 homes and displace over 22,924 tonnes of CO_2 emissions during each year of operation.

1.86. The turbines would be of a variable speed type, so that the turbine rotor speed would vary according to the energy available in the wind. A typical turbine of this type would have a rotational speed of approximately 5 to 17 revolutions per minute generating power for all wind speeds between 3-4m/s and 25m/s (9-56mph or gale force 3 -9 on the Beaufort Scale). They attain their maximum output at 14m/s.

1.87. The turbines will be computer controlled to ensure that at all times the turbine faces directly into the wind to ensure optimum efficiency. The rotors of all seven turbines would rotate in the same direction.

1.88. The blades would be manufactured from fibre-reinforced epoxy, the nacelle houses the gearbox and generator and is mounted on a cylindrical steel tower manufactured from rolled steel. Subject to agreement with the Planning Service the finish and colour of the turbines will be light grey with a semi-matt finish to reduce their contrast with the background sky and minimise reflections. The turbines will be uniform in colour and will not contain any company logos.

1.89. A diagram illustrating the structure of the proposed wind turbine is shown in **Figure 3**.

Turbine Power Output and Transformers

1.90. When operating, the rotational speed of the blades is geared up through the gearbox, which drives the generator. This produces a three-phase power output at 690V, which is transferred from the generator to an external transformer situated at ground level adjacent to each tower

via internal low voltage cables. The external turbine transformer converts the electrical output from the turbine at 690V to a higher voltage of 33kV for grid connection purposes. Stepping up the voltage helps to reduce electrical losses for transmission to the grid via the underground site cable.

1.91. The transformer foundation base will be approximately 4m x 3.2m x 0.2m thick and constructed of reinforced concrete and situated adjacent to the turbine base on the backfill material. The external transformers are contained in compact GRP enclosures. The transformer housings will measure approx. 4.0m x 3.2m x 2.4m.

1.92. The transformer will be a darker colour than the light grey colour of the turbines.

Wind Turbine Foundations

1.93. Soil will be excavated from the foundation, turbine transformer and crane pad areas at each turbine location and re-graded in the locality of the turbine, generally forming sight-line bunds to obscure the base from views from the area. Any topsoil removed from the surface of proposed construction locations around the site would be stored and used as necessary for land reinstatement following construction.

1.94. The turbines would be installed on concrete foundations typically measuring 17.2m in diameter with a concrete depth of approximately 2.7m (see **Figure 4**). The foundation would include a circular steel support plinth to suit the base profile of the tower section. An up stand of about 1.4m would be constructed and embedded in the foundation and would include fixing bolts for the turbine tower and several service ducts to allow electrical and communication cable connections to be made. The whole base would be constructed of reinforced concrete and comprise circa 160m^3 of concrete and approximately 15 tonnes of reinforcing steel.

1.95. On completion of the foundation, the excavation would be backfilled with previously excavated material and compacted and dressed back with subsoil and then topsoil to allow revegetation. The soil would be allowed to regenerate from the seed bank within the topsoil. A gravel access path would be left to the turbine tower entrance and a parking area at the base of the turbine.

1.96. The final foundation design would depend on the results of detailed geotechnical investigations. Turbine foundations could be slightly larger or smaller depending on imposed loadings, ground conditions and drainage designs. A typical turbine foundation is illustrated in **Figure 3**. It is not anticipated that turbines would require piled foundations.

Crane Pads

1.97. Each turbine requires an area of hard standing to be built adjacent to the turbine foundation. This provides a stable base on which to lay down the turbine components ready for assembly and erection and to site the two cranes necessary to lift the three tower sections, nacelle and rotor into place.

1.98. The crane hard standing would be left in place following construction in order to allow for use of similar plant should major components need replacing during the course of the wind farm's operational life. The hard-standing area would be covered with subsoil and topsoil and allowed to naturally re-vegetate. The total area of hard standing at each turbine location, including the turbine foundations and the crane pad would be approximately 1227.92m^2 (24m x 45m). A typical crane hard standing is illustrated in **Figure 5.**

Electrical Cabling

1.99. Underground cabling which formed part of the original consent would link the turbines to each other and to the on-site substation. Detailed construction and trenching specifications would depend on ground conditions encountered. Typically cables would be laid in a trench circa 1m deep and 0.45m wide. The cable routes would generally run between the turbines and would be marked with suitable marker posts. Wherever possible, cabling would follow access track routes. Approximately 3.27km of 33kV underground cables would be required on site to connect the turbines and substation.

1.100. A Supervisory Control and Data Acquisition (SCADA) system would be installed to gather information from the individual wind turbines and provide the facility to control them from a central location. A circa 20mm^2 fibre optic communications cable would run alongside the power cables to link the turbines to the SCADA system. The wind turbines can be monitored remotely via a telephone link to the SCADA system.

Site Access and On-site Access Tracks

1.101. The main site access would be taken from the B69 as shown on **Figure 11.1.17**. The site entrance will have an access gate as per the original consent. The access tracks and access point are not being amended and will be constructed as per the original consents and this application.

1.102. Consultation with the Road Service revealed no objection in principle to the access route proposed. Off-site road considerations and details of the access route to the site are considered in more detail in **Chapter 11: Traffic & Transport**.

1.103. Existing tracks will be upgraded and new access tracks will be constructed to provide construction access to the individual turbines. An estimated 3.278km (3278m) of site access tracks would be required for the wind farm. Of this 0.496km (496m) is widening and upgrading of existing tracks and 2.782km (2782m) is new track construction.

1.104. As per the original consents and this proposal, the site tracks will generally have a 5m wide running surface, widening at bends, junctions and crane hard standings to suit the long turbine delivery vehicles. Bends would also require a swept area for traversing by long loads and all bends would be kept free from obstructions. In addition, passing bays would be constructed (approximately 5m wide and 15m long) alongside the access tracks in positions

to be determined during construction in order to facilitate traffic movement. The surface of the passing bays will be reinstated following construction.

1.105. All new tracks would be unpaved and constructed from local stone. There are different specifications for access track construction dependant on whether it is upgrading of an existing track or new build, the slope of the ground perpendicular to the track and the depth of peat.

1.106. In line with the original consent, where peat is less than 1.5m thick, new access track would be installed on top of the soils lying beneath the peat, and where peat is greater than 1.5m depth, it is proposed that a floating road be considered. Areas where peat is greater than 3m depth would be avoided, where possible.

1.107. Although ground conditions appear generally adequate across most of the site, slightly different track construction and reinstatement methods may be required due to differing ground conditions and the final detailed design would be subject to the findings of further pre-construction site investigation works.

Track Layout Design

1.108. Various constraints have influenced the site track layout design that has been consented, some of which are generic and some of which are site specific. The track is not being amended but proposed in line with the original 2013 consent (B/2013/0196/F).

Track Drainage

1.109. Water crossings have been avoided in the site layout for the original consent as far as possible. However, if required, a simple culvert type construction would be employed. The size of the culvert would depend on the location. Precise details for any additional crossings will be submitted to the appropriate authorities for their prior agreement. However, most work has already been discharged relating to the pre-commencement construction activities.

1.110. In line with the original consents the tracks would have adequate cross-slope to allow rainwater to be shed and where gradients are present lateral drainage would intercept flow. A drainage ditch would be formed on the upslope side of the track dependant on a detailed drainage design.

1.111. Cross pipes would be laid as required in areas where the position of the site track could lead to ponding on one side. As far as possible these would coincide with naturally occurring drainage channels. When the track slopes downhill 'waterbars' would be placed to divert the flow into naturally occurring channels. Silt traps would be installed where necessary. Final track drainage would be determined prior to the commencement of construction of the relevant track section.

1.112. Further details of measures which would be taken to manage run-off and avoid erosion are provided in Chapter 7 Hydrology and Hydrogeology.

Stone and Concrete Requirements and Sourcing

1.113. It is estimated that approximately 12,000m^3 of stone would be required to construct the site tracks, turbine bases, hard standings, substation and temporary site compound.

1.114. Importing stone for the construction while increasing traffic for a short period would prevent the additional visual effects of digging borrow pits onsite and provide some benefits to the local community in terms of indirect economic benefits to the quarries selected.

1.115. Concrete for construction of the turbine foundations and substation would be imported ready mixed. The turbine bases and other structures on site would require a total of circa 4,000m^3 of concrete. This is deemed the maximum quantity required and is dependent on the final turbine foundation design, which will be decided according to further detailed ground investigations. It is anticipated that various local QARMC concrete plants located within about a 15 mile radius of the site would supply the concrete required.

1.116. It has been decided that a concrete batching plant on site would introduce additional environmental effects in terms of visual effects and risks to hydrology and ecology. The batching plant would also require the use of further hard-standing areas for storage of materials which may be extensive. These effects were deemed to be more harmful than the additional traffic generated by importing the concrete ready mixed.

Grid Connection and Substation

1.117. At the site substation the electricity generated by the wind farm would be metered and exported to the local electricity network via the grid connection. Smulgedon Wind Farm will be connecting into the Agivey grid cluster being developed by (System Operator for Northern Ireland) SONI and Northern Ireland Electricity (NIE). This grid substation received planning permission in 2020.

Site Accommodation and Temporary Works

1.118. A temporary construction compound consented under the original application will be used for the construction of the amended crane pads and turbines. The amendments will not result in any changes to this. This would provide space for:

- Temporary portable cabins for office accommodation, monitoring of incoming vehicles and welfare facilities;
- Self contained toilets with provision for sealed waste storage and removal;
- Containerised storage areas for tools, small plants and parts;
- Parking for up to 20 vehicles and storage of larger material items;
- Generator; and

- A bunded area for storing fuels, oils and greases.

1.119. An indicative location was selected for the Original Consent to minimise environmental impacts and visibility as well as for reasons of security, practicality and to obtain suitable ground conditions.

1.120. The precise location and size of the compound within this indicative area will be determined by the appointed construction contractor. The area will be constructed by topsoil excavation in a similar manner to the access tracks, then surfaced with stone to provide an adequate vehicle load-bearing surface. During construction temporary fencing will be erected, as required around the construction compound.

1.121. An area of the compound will be used for the storage of fuel and oils, and this would be contained by a small bund constructed out of site arising material and lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table.

1.122. Alternatively, double protection containers / equipment will be used along with drip trays etc, where identified by environmental risk assessment.

1.123. Water for all construction activities would be supplied by water bowser. Temporary effluent disposal facilities would be provided by 'portaloo' type facilities and emptied as required. No mains sewers or water pipes are proposed.

Waste Management

1.124. Permanent welfare facilities will be installed as part of control building / substation facilities. Foul effluent will be treated either via septic tank with soakaway designed to NIEA guidelines (including PPG4), or by the use of chemical facilities with periodic removal for offsite disposal. Any soakaway or other discharge will be subject to Consent to Discharge from NIEA Water Management Unit.

1.125. As far as reasonably practicable excavated stone or soil will be reused on-site, primarily for restoration of disturbed ground. Any materials to be removed from the site would be disposed of to a suitable licensed waste management facility in accordance with duty of care procedures.

1.126. Demolition material removed from the site during decommissioning would also be disposed of as above.

Site Specific Safety and Emergency Procedures

1.127. Prior to commencement of the main construction works the appointed contractor would be required to act as Principal Contractor, as defined under the Construction, Design, and Management Regulations. This would require the preparation of a construction phase Health

& Safety Plan to integrate with the Pre-Construction Health & Safety Plan as prepared by the Planning Supervisor.

1.128. An Operation and Maintenance Manual for the design life of the wind farm would also be prepared by the contractor which would also cover all operational and decommissioning safety related procedures.

1.129. Emergency Services Vehicle access would be addressed within the Pre-Construction Health & Safety Plan. The contractor will liaise with all of the emergency services prior to works commencing, to ensure that access for Emergency Services Vehicles would be maintained at all times and during the construction period.

REINSTATEMENT

Site tracks

1.130. After commissioning of the wind farm, at least 1m of the track shoulders would be graded and reinstated with topsoil and peat. The soil would be allowed to regenerate from the seed bank within the topsoil.

Temporary Construction Compounds, Storage Areas and Crane Pads

1.131. On completion of the construction work these facilities will be removed, hard standing will be excavated and the respective areas will be reinstated by way of re-grading the land with the stockpiled topsoil to a natural profile and allowing the land to regenerate from the seed bank within the topsoil.

Cable Trenches

1.132. Where practicable, vegetation over the width of the cable trench will be lifted as tufts, and replaced after trenching operations, to reduce disturbance. Alternatively, cables may be installed using a cable plough, meaning that no tufts will be needed.

OPERATION AND MAINTENANCE

Wind Farm Control and Monitoring System

1.133. Each turbine will be fitted with an automatic system designed to supervise and control a number of parameters to ensure proper performance (for example, start-up and shut-down, rotor direction, blade angles etc.) and to monitor wellbeing (for example, generator temperatures). The control system would automatically shut the turbine down should the need arise. Sometimes the turbines will re-start automatically, but other shut-downs would require manual investigation and restart.

1.134. Any problems which the computer controller cannot resolve itself, are referred to the operator via the computer's modem link. This communication system enables remote monitoring of the turbines and minimizes the need for on-site attendance.

1.135. Wind farm operations would be overseen by suitably qualified local contractors who would visit the site regularly to carry out maintenance. Routine site maintenance visits would take place approximately twice per week in a four-wheel drive vehicle to ensure that the turbines are operating at their maximum efficiency. The operation and maintenance of the wind farm would provide part time employment for at least one local engineer/fitter.

1.136. Should a fault occur on the HV network, the site manager would diagnose the cause. If repair warranted the wind farm being disconnected from the grid, then the operator would contact NIE. However, this is a highly unlikely occurrence as most faults can be rectified without reference to the utility network by utilising the local switchgear on site.

Servicing and Maintenance

1.137. The following turbine maintenance would be carried out along with any other maintenance required by the manufacturer's specifications:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oils changes; and
- Blade inspections.

1.138. Routine servicing would take place twice per year with a main service at twelve monthly intervals and a minor service at six months throughout the life of the project. This will not usually involve any large machinery and site traffic would be limited to small maintenance vehicles.

1.139. Servicing would include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades, inspection of blade tip brakes, inspection of welds and structural integrity of the tower and maintaining all hydraulic and electrical systems.

1.140. In addition, oil sampling and testing from the main gearbox would be required and oil and components replaced at regular intervals. The gearbox oil is usually changed every 18-24 months. The oil would be disposed of off-site in accordance with current regulations.

1.141. Wind turbines are designed to have a minimum operational life of 25 years and the design requirements are based on the local climatic conditions of a site. During the design life of a turbine it is anticipated that the replacement of a major component, typically a gear box or generator, will be required approximately twice.

1.142. If the replacement of a major component is required it would be necessary to use mobile cranes and heavy vehicles to repair the turbine or replace a major component, and it is these activities which are defined as Non-Routine Maintenance Works.

1.143. Ongoing track maintenance would generally be undertaken in the summer months when tracks are dry. Safe access would be maintained all year round.

Site Signage

1.144. The wind farm would have a series of signs to provide directions and also information on health and safety including a sign at the site entrance showing the Developers logo and name of the wind farm.

1.145. Each of the turbine towers would have a sign indicating turbine number, potential hazards and an emergency contact telephone number. Further signage would be erected at the proposed substation with Randolph Renewables Ltd corporate logo, health and safety information and an emergency telephone number.

1.146. The final location and design of the proposed signage would be agreed prior to the wind farm becoming operational with the relevant authorities.

DECOMMISSIONING

1.147. One of the main advantages of wind power generation over other forms of energy production is the ease of decommissioning and the simple removal of infrastructure from the site. The residual impact on the site is limited to the continued presence of the foundations and access tracks. All above ground structures can be removed from the site.

1.148. The expected productive lifetime of the turbines is estimated at about 30 years. At that time, it would be necessary to decide whether to refurbish, replace or remove the turbines. If refurbished or replaced an application would be made to extend its operational life.

1.149. The wind farm will be decommissioned in accordance with best practice and/or in compliance with any planning conditions. Current best practice includes the removal of all above ground structures; the removal of all underground structures to one metre below ground level; and reinstatement of disturbed areas. Landowners will be given the option to retain the access tracks for their own purposes.

1.150. It is estimated that decommissioning a wind farm of this size would take approximately 8 months.

Chapter 2: Planning Policy

2. PLANNING POLICY

2.1. The following Chapter looks at the need for renewable energy in Northern Ireland (NI) and the relevant policy, legislation and guidance relating to such development.

2.2. As part of the process, the main planning policy documents for NI were consulted in respect of the Proposed Development. This included a review of Planning Policy Statements (PPSs), Local Development Plans, Development Control Advice Notes (DCANs) and other relevant publications.

The Need for Renewable Energy

2.3. Energy underpins virtually every aspect of the economy. However, the use of fossil fuels such as gas and coal, which currently provides the bulk of our energy, releases greenhouse gases (such as carbon dioxide – CO_2) into the atmosphere. Due to factors such as population growth and changes in lifestyle, the demand for energy has increased to levels where the burning of fossil fuels is releasing enough greenhouse gases into the atmosphere to directly affect the climate. There is now scientific consensus that climate change is occurring and that it poses a considerable global threat.

2.4. In 2019, 351.1 million tonnes of CO_2 ($MtCO_2$) are estimated to have been emitted from the UK and emissions from electricity generation power stations contributed 90.1 $MtCO_2$ of the total amount[1].

2.5. Renewable energy is the term used to describe energy flows that occur naturally and continuously in the environment, such as energy from the wind, waves or tides. The origin of the majority of these sources can be traced back to either the sun (energy from the sun helps to drive the earth's weather patterns) or the gravitational effects of the sun and the moon. This means that these sources are continuously replenished. The key issue is how to extract this energy as effectively as possible and convert it into a usable form.

2.6. To help lessen the effects of climate change, greenhouse gas emissions must be reduced. One way of helping to achieve this is by generating energy from sources that emit low or even zero levels of greenhouse gases, such as renewable sources

2.7. Developing a windfarm supports use of the site by a renewables asset, which is vital to Northern Ireland maintaining and building upon its renewable energy and climate change targets, as outlined in the Strategic Framework for Northern Ireland. The development also

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875485/2019_UK_greenhouse_gas_emissions_provisional_figures_statistical_release.pdf#:~:text=2.%20%29%20is%20the%20main%20greenhouse%20gas%2C%20accounting,13.2%20per%20cent%20decrease%20between%202018%20and%202019

presents an opportunity to sustain and create additional jobs and to encourage continued investment in the renewable energy industry in Northern Ireland.

CO2 Savings

2.8. The Development has the potential to displace electricity generated from fossil fuels and consequently prevent CO_2 from being released. The actual amount of CO2 released through electricity generation in the UK relates directly to the generating plant in use at any given time. This mix changes on a daily basis and will change in the future as UK generating plant is replaced and as a consequence it is not possible to predict exactly how much CO2 release the development will prevent over its lifetime.

2.9. Using BEIS's "all fossil fuels" emissions statistic of 446 tonnes of carbon dioxide per gigawatt hour (GWh) of electricity supplied in Table 5E of the *Digest of UK Energy Statistics (July 2020)*[2], the estimated prevention of emissions in CO_2 from the Proposed Development has been calculated both annually and for the estimated lifetime of the wind farm. The estimated figure of energy production for the development is 51.4 GWh.

Table 1-2: Estimated prevention of emissions in tonnes of CO_2.

Estimated Prevention of Emissions in CO_2 (tonnes)	
Annual	Wind Farm Lifetime (30 years)
22,924	687,732

2.10. In addition, the operation of the Development could, based on the same assumptions, also displace other gases related to coal-fired electricity generation including those associated with acid rain such as sulphur dioxide (SO_2) and oxides of nitrogen (NO_X).

International Energy Policy

2.11. International energy policy is based on a global imperative to combat climate change and reduce carbon dioxide (CO2) emissions and, therefore, is relevant to renewable energy development.

2.12. The United Nations Framework Convention on Climate Change (UNFCCC)[3], implemented by the United Nations in May 1992, determined a long term objective to lessen greenhouse gases in the atmosphere, with the purpose of preventing anthropogenic interference with the climatic system. Subsequently, the Kyoto Protocol[4] was implemented in 1973. National

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/905060/DUKES_2020_MASTER.pdf
[3] https://unfccc.int/
[4] https://unfccc.int/kyoto_protocol

governments who signed up to the Kyoto Protocol are committed to reducing their greenhouse gas emissions.

2.13. The Paris Agreement[5] marks the latest step in the development of the UN regime on climate change. Its central objective is to boost global response to climate change, keep global temperature rise low and strengthen efforts to support this. The European Union signed The United Kingdom of Great Britain and Northern Ireland up to the Agreement on 22nd April 2016 and it came into force on the 18th December 2016.

2.14. European and national energy policy has been established from the Kyoto Protocol and Paris Agreement requirements and will continue to be framed by emerging guidance and scientific information. For example, the IPCC 2018 report[6], "Global Warming of 1.5oC", presents a summary for policymakers of the implications of predicted climate change, and potential actions that could limit future climate change, such as "reaching and sustaining net zero global anthropogenic CO2 emissions".

European Energy Policy

2.15. The European Union's (EU) energy policies are set out and powered by three main objectives:

- To ensure all energy providers operate in a competitive environment that ensures affordable prices for homes, businesses, and industries;
- To secure energy supplies to ensure reliable energy delivery whenever and wherever it is needed; and
- To have sustainable energy consumption, through lowering dependence on fossil fuels and decreasing greenhouse gas emissions and pollution.

2.16. The EU produced the Renewable Energy Directive 2009/28/EC[7], revised in 2016, to make the EU a global leader in renewable energy and ensure that the target of the final energy consumption, being at least 27% renewables, is met by 2030.

2.17. Subsequently, in 2015, the EU set itself a long-term goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 baseline levels, by 2050. The Energy Roadmap 20507 sets out the transition and cost-effective pathways for key economic sectors for achieving an 80-95% reduction in EU emissions by 2050. To achieve this goal, significant investment is needed in new low-carbon technologies and infrastructure, energy efficiency and renewable energy.

[5] https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement
[6] https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf
[7] https://www.legislation.gov.uk/eudr/2009/28/contents

UK Energy Policy

2.18. The UK Renewable Energy Strategy[8] sets out to identify how the required growth in renewable energy use could be delivered. The objectives of the Strategy include clearing implementation barriers, increasing investment in emerging technologies and pursuing new sources of renewable energy supply and creating opportunities to harness renewable energy.

2.19. The UK is party to the United Nations Framework Convention on Climate Change (UNFCCC). The Kyoto Protocol, adopted in December 1997 and put into force in February 2005, operationalises the UNFCCC by committing industrialised countries and economies in transition to limit and reduce greenhouse gas ("GHG") emissions in accordance with agreed individual targets. It only binds developed countries, and places a heavier burden on them, under the principle of "common but differentiated responsibility and respective capabilities", because it recognises that they are largely responsible for the current high levels of GHG emissions in the atmosphere.

2.20. The 2016 Paris Climate Agreement marked the latest step in the development of the UN regime with a central objective is to keep the increase in global average temperature to well below 2°C above pre-industrial levels and aims to limit the increase to 1.5°C. The UK formally ratified the agreement in December 2016, signalling major commitment to being part of a global effort to curb the effects of climate change.

2.21. The Climate Change Act 2008[9] established long term statutory targets for the UK to achieve an 80% reduction in greenhouse gases by 2050 against a 1990 baseline. However, following the Government's declaration of an 'Environment and Climate Emergency' in May 2019, they committed the UK to achieving net zero greenhouse gas emissions by 2050. The Committee on Climate Change (CCC) advised that to meet this new target, the UK will require substantial amounts of new, low carbon power sources to be built before 2050, up to four times that of today's levels.

Northern Ireland Energy Policies

2.22. In 2010, the Department for Enterprise, Trade and Investment (DETI) published the Strategic Energy Framework (SEF)[10] which details Northern Ireland's energy future over the next ten years and sets out the renewable electricity targets for 2020 identifying that the equivalent of 40% of national electricity needs must be sourced from renewables.

2.23. The 2010 SEF recognises that electricity generation from onshore wind is the most established, large scale source of renewable energy in Northern Ireland. It is also the lowest cost land-based renewable energy available. Furthermore, it states that onshore wind farms will play a vital role in meeting the new 2020 renewable electricity target.

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228866/7686.pdf
[9] https://www.legislation.gov.uk/ukpga/2008/27/contents
[10] https://www.economy-ni.gov.uk/sites/default/files/publications/deti/sef%202010.pdf

2.24. DETI produced a report in 2013 titled Envisioning the Future: Considering Energy in Northern Ireland to 2050[11] which details a vision for energy supply in Northern Ireland up to 2050. The Vision builds on the SEF and determines what can be achieved by 2050 and what early decision need to made to support the 2050 vision. The scenarios produced in the report envisage that greenhouse gas emissions will be reduced by 55% to 80% by 2050 and that Northern Ireland will become a net exporter of energy. In light of declaring of a 'Climate Emergency' by the UK Government, it is clear that a further review and work towards a new Energy Strategy for Northern Ireland is required.

2.25. Additionally, the Northern Ireland Investment Strategy 2011-2021[12] underlines the importance of renewable sources in electricity generation. It focuses on long-term targets, emphasising that the UK Climate Change Act 2008 legislated for an 80% mandatory reduction in the UK's carbon emissions by 2050 (compared to 1990 baseline levels), with an interim target of 35% by 2025.

2.26. For the 12-month period January 2018 to December 2018, 38.2% of total electricity consumption in Northern Ireland was generated from renewable sources located in Northern Ireland. This represents an increase of 3.5% on the previous 12-month period (January 2017 to December 2017) and is the highest rolling 12-month proportion on record. Additionally, over the 12-month period January 2018 to December 2018, of all the renewable energy generated in Northern Ireland, 83.1% was generated from wind. This compares to 84.3% for the previous 12-month period (January 2017 to December 2017).

2.27. The Onshore Renewable Energy Action Plan (OREAP) 2013-2020[13] recognises the importance of the contribution of onshore renewable technologies to the 40% renewable energy target by 2020. It considers the impact onshore wind has on the energy network in Northern Ireland, referring to the requirement for grid infrastructure upgrades prior to transmission reinforcement, and noting that this is required in order to achieve the 40% target. It also notes "the need to increase the rate of deployment of renewables to achieve the 40% target at least cost to the consumer". The Mid-Term Review of the OREAP15 was published in 2017 and noted progress on actions set out in the OREAP, including towards the removal of grid constraints.

Local Development Plan

2.28. The Northern Ireland Planning System is currently in the midst of a transitional period that will last until such times as the individual Local Authorities have fully adopted Local Development Plans in place.

[11] https://www.economy-ni.gov.uk/sites/default/files/publications/deti/2050%20vision%20report.pdf
[12] http://isni.gov.uk/PDFs/Investment%20Strategy.pdf
[13] https://www.economy-ni.gov.uk/sites/default/files/publications/deti/oreap_-_post_adoption_statement_-_nov_2013.pdf

2.29. On the 1st April 2015, the four councils of Ballymoney, Coleraine, Limavady and Moyle merged to form the new Causeway Coast and Glens Borough Council (the Council). The current plan covering the Causeway Coast and Glens Borough Council (CCAGBC) area is the Northern Area Plan (NAP) 2016[14], which was adopted by the former Department of the Environment (DOE) on 22nd September 2015.

2.30. The Council is currently in the process of preparing their Local Development Plan 2035 (LDP). They are currently working towards Stage 4 of a 10 Stage plan with a view to being in a position for adoption towards the end of 2026. The Plan will set a clear vision for how the Borough should look in the future (up to 2030) by setting out a planning policy framework and details on what type and scale of development should be encouraged and where it should be located. The Plan, when adopted, will replace the NAP and the existing suite of Regional Planning Policy Statements (PPSs). It will also be the key document used when making decisions on planning applications throughout the Borough.

2.31. In this instance, there are no area specific renewable energy policies contained within the NAP document. Where development plans are not yet drafted, or if they are silent or contradict other guidance, precedence should be given to the most recent policy.

Northern Ireland Regional Planning Policy

2.32. The following Regional Policy documents were considered as part of the Application:

- The Regional Development Strategy: Building a Better Future 2035;
- The Strategic Planning Policy Statement (SPPS)
- PPS18: Renewable Energy;
- Wind Energy Development in Northern Ireland's Landscapes - Supplementary Planning Guidance to PPS 18;
- PPS 21: Sustainable Development in the Countryside;
- Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy;

The Regional Development Strategy (RDS) 2035[15]

2.33. This document offers a long-term plan and spatial strategy for NI as a whole. The delivery of a lower carbon economy, a secure and sustainable energy supply and adaption to climate

[14] https://wayback.archive-it.org/11112/20190702191500/https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/nap2016-volume1-strategy-framework.pdf

[15] https://www.planningni.gov.uk/index/policy/rds2035.pdf

change are core elements of the RDS. The document builds upon these with the following specific Strategic Guidance:

RG5: Deliver a sustainable and secure energy supply

"Northern Ireland needs a robust and sustainable energy infrastructure. This should deliver reliable and secure sources of energy to communities and businesses across the Region…

Increase the contribution that renewable energy can make to the overall energy mix.

There will need to be a significant increase in all types of renewable electricity installations and renewable heat installations, including a wide range of renewable resources for electricity generation both onshore and offshore to meet the Region's needs."

Paragraph 3.8

RG9: Reduce our carbon footprint and facilitate mitigation and adaption to climate change whilst improving air quality

"it is important that Northern Ireland plays its part by reducing air pollution and greenhouse gas emissions and preparing for the impacts of climate change."

Paragraph 3.24

"Consideration needs to be given on how to reduce energy consumption and the move to more sustainable methods of energy production."

Paragraph 3.25

"Mitigation

Increase the use of renewable energies.

Energy production from fossil fuels is a major source of greenhouse gas emissions and other pollutants. Northern Ireland is largely dependent on fossil fuel combustion for electricity generation. Energy efficiency along with decarbonisation of the power sector is the key to achieving emissions reduction targets. The Strategic Energy Framework for Northern Ireland 2010 sets a target of 40% of electricity consumption from renewable sources by 2020 as well as achieving 10% penetration of renewable heat. This will require increasing numbers of renewable electricity installations and the grid infrastructure to support them. These must be appropriately sited to minimise their environmental impact.

Utilise local production of heat and/or electricity from low or zero carbon energy sources. In addition to the carbon benefits, increased use of microgeneration plays an important part in diversifying our energy mix and ensuring security of energy supply. It can allow energy to be

produced and consumed locally, help alleviate fuel poverty (especially in off-gas network areas) and play a part in meeting renewable energy targets…."

Paragraph 3.26

The Strategic Planning Policy Statement (SPPS) [16]

2.34. This document consolidates and supersedes some 20No. preceding policy documents and aims to create an improved planning system with sustainable development at its core. The SPPS also recognises that a vibrant and sustainable environment can be a driver of prosperity and job creation whilst also acknowledging that a strong economy and a prosperous society can be good for the environment. The role of the Local Authority is also outlined along with the need for appropriate local planning policy to be implemented at the earliest opportunity. The relevant sections of this document are outlined below:

Section 3: Furthering Sustainable Development

2.35. This section states:

"On the environment – protecting and enhancing the built and natural environment… seeking to ensure the planning system contributes to a reduction in energy… usage, helping to reduce greenhouse gas emissions by continuing to support growth in renewable energy sources; …promoting high quality development and good design…"

Paragraph 3.3

2.36. Under the sub-heading 'Mitigating and Adapting to Climate Change' the SPPS states:

"A central challenge in furthering sustainable development is mitigating and adapting to climate change, whilst improving air quality. This includes the need to reduce emissions of greenhouse gases that contribute to climate change and to respond to the impacts brought about by climate change. A key pledge of the Executive is 'to continue to work towards a reduction in greenhouse gas emissions by at least 35% on 1990 levels by 2025'"

Paragraph 3.10

"Climate change adaptation is the process of adjusting to the changes in our climate and planning how to prepare for the future."

[16] https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf

Paragraph 3.11

"The planning system should therefore help to mitigate and adapt to climate change by: promoting the use of energy efficient, micro-generating and decentralised renewable energy systems"

Paragraph 3.13

Section 4: Core Planning Principles

2.37. This section states that:

"When plan-making and decision-taking, planning authorities must balance and integrate a variety of complex social, economic, environmental and other matters that are in the long-term public interest. This is fundamental to the achievement of sustainable development."

Paragraph 4.1

2.38. Under the sub-heading 'Improving Health and Well-Being' paragraph 4.5 of the SPPS states that, when plan-making and decision-taking, planning authorities should contribute positively to health and well-being through a number of means, the most relevant of which for this proposal are outlined below:

- encouraging and supporting quality, environmentally sustainable design;
- supporting the provision of jobs, services, and economic growth;
- supporting broader government policy aimed at addressing …health and well-being impacts arising through pollution

2.39. Under the sub-heading 'Supporting Sustainable Economic Growth' the SPPS states that:

"A modern, efficient and effective planning system is essential to supporting the Executive, and wider government policy, in its efforts to promote long term economic growth in the interests of all the people in this region."

Paragraph 4.18

2.40. The SPPS continues that:

"…planning authorities must ensure appropriate weight is given to both the public interest of local communities and the wider region."

Paragraph 4.20

2.41. Under the sub-heading 'Supporting Good Design and Positive Place-Making' the SPPS states that:

"Good design can change lives, communities and neighbourhoods for the better… It can further sustainable development and encourage healthier living…"

Paragraph 4.23

"Design involves shaping how all elements of the built and natural environment relate to each other…"

Paragraph 4.24

"Design is an important material consideration in the assessment of all proposals and good design should be the aim of all those involved in the planning process and must be encouraged across the region. Particular weight should be given to the impact of development on existing buildings, especially listed buildings, monuments in state care and scheduled monuments, and on the character of areas recognised for their landscape or townscape value, such as Areas of Outstanding Natural Beauty, Conservation Areas, Areas of Townscape Character and Areas of Special Archaeological Interest."

Paragraph 4.26

"Where the design of proposed development is consistent with relevant LPD policies and/or supplementary design guidance, planning authorities should not refuse permission on design grounds, unless there are exceptional circumstances…"

Paragraph 4.27

"All proposals for development in the countryside must be sited and designed to integrate sympathetically with their surroundings, including the natural topography, and to meet other planning policy and environmental considerations, including the policy approach to cluster, consolidate and group new development with existing established buildings."

Paragraph 4.30

2.42. Under the sub-heading 'Preserving and Improving the Built and Natural Environment' the SPPS states that:

"Our environment must therefore be managed in a sustainable manner in accordance with the Executive's commitment to preserve and improve the built and natural environment and halt the loss of biodiversity."

Paragraph 4.38

"…It is therefore critical that this vital asset is preserved and improved for the enjoyment and benefit of future generations."

Paragraph 4.39

Section 6: Subject Policies

2.43. Under the sub-heading of 'Development in the Countryside' the SPPS states:

"To maintain and enhance the attractiveness of the countryside as a place to invest, live and work, the countryside requires a sustainable approach to new development, consistent with the Regional Development Strategy 2035 (RDS)."

Paragraph 6.62

"The aim of the SPPS with regard to the countryside is to manage development in a manner which strikes a balance between protection of the environment from inappropriate development, while supporting and sustaining rural communities consistent with the RDS"

Paragraph 6.65

2.44. This Section, specifically Paragraph 6.66, also outlines the policy objectives for development in the countryside which includes *"…facilitate development which contributes to a sustainable rural economy…"*

2.45. In terms of Regional Strategic Policy, the SPPS defines a number of Residential and Non-Residential policy sub-headings, but the subject proposal does not fall into the remit of any of these and therefore it is advocated in Paragraph 6.74 that the development should be "…considered as part of the development plan process in line with the other policies set out within the SPPS."

2.46. Under the sub-heading of 'Economic Development, Industry and Commerce' the SPPS states:

"Growing a sustainable economy and investing in the future is a key strategic priority…"

Paragraph 6.79

"…the aim of this SPPS is to facilitate the economic development needs of Northern Ireland in ways consistent with the protection of the environment and the principles of sustainable development."

Paragraph 6.81

2.47. This Section, specifically Paragraph 6.82, outlines the regional strategic objectives for facilitating economic development through the planning system, which include:

- Promotion of sustainable economic development in an environmentally sensitive manner
- Sustaining a vibrant rural community by supporting rural economic development of an appropriate nature and scale
- Supporting the re-use of previously developed economic development sites
- Ensuring a high standard of quality and design for new economic development

2.48. In terms of Regional Strategic Policy, the SPPS states the following:

"The guiding principle for policies and proposals for economic development in the countryside is to facilitate proposals likely to benefit the rural economy and support rural communities, while protecting or enhancing rural character and the environment, consistent with strategic policy elsewhere in the SPPS"

Paragraph 6.87

2.49. Under the sub-heading 'Renewable Energy' the SPPS states that:

"Northern Ireland has significant renewable energy resources and a vibrant renewable energy industry that makes an important contribution towards achieving sustainable development and is a significant provider of jobs and investment across the region."

Paragraph 6.214

"Making appropriate use of renewable energy sources is supported by wider government policy, including the Regional Development Strategy 2035 (RDS) which emphasises the need

to increase the contribution that renewable energy can make to overall energy mix. This commitment is affirmed by the Department of Enterprise, Trade and Investment's (DETI) strategic aim for a more secure and sustainable energy system, as contained within the Strategic Energy Framework for Northern Ireland 2010."

Paragraph 6.215

"Renewable energy technologies support the wider Northern Ireland economy and also offer new opportunities for additional investment and employment, as well as benefitting our health and well being, and our quality of life."

Paragraph 6.216

"The aim of the SPPS in relation to renewable energy is to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment in order to achieve Northern Ireland's renewable energy targets and to realise the benefits of renewable energy without compromising other environmental assets of acknowledged importance."

Paragraph 6.218

2.50. This Section, specifically Paragraph 6.219, outlines the regional strategic objectives for renewable energy development, which include:

- ensuring that the environmental, landscape, visual and amenity impacts associated with or arising from renewable energy development are adequately addressed;
- ensuring adequate protection of the region's built, natural, and cultural heritage features;

2.51. In terms of Regional Strategic Policy, the SPPS states the following:

"Development that generates energy from renewable resources will be permitted where the proposal and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on the following planning considerations:

- public safety, human health, or residential amenity;
- *visual amenity and landscape character;*
- *biodiversity, nature conservation or built heritage interests;*
- *local natural resources, such as air quality, water quality or quantity; and,*

- *public access to the countryside."*

Paragraph 6.224

"The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given appropriate weight in determining whether planning permission should be granted."

Paragraph 6.225

Planning Policy Statement 18: Renewable Energy (PPS18) [17]

2.52. This document sets out planning policy for development that generates energy from renewable resources and that requires the submission of a planning application. Section 3 of the PPS is titled 'Policy Objectives' and states that:

"The aim of this Statement is to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment in order to achieve Northern Ireland's renewable energy targets and to realise the benefits of renewable energy."

Paragraph 3.1

2.53. And continues that the objectives of the Statement are:

"to ensure that the environmental, landscape, visual and amenity impacts associated with or arising from renewable energy development are adequately addressed;

to ensure adequate protection of the Region's built and natural, and cultural heritage features; and

to facilitate the integration of renewable energy technology into the design, siting and layout of new development and promote greater application of the principles of Passive Solar Design"

Paragraph 3.2

2.54. The relevant Policy contained within the PPS is 'Policy RE 1 Renewable Energy Development' and this has been outlined below:

[17] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18__renewable_energy.pdf

"Development that generates energy from renewable resources will be permitted provided the proposal, and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on:

(a) public safety, human health, or residential amenity;

(b) visual amenity and landscape character;

(c) biodiversity, nature conservation or built heritage interests;

(d) local natural resources, such as air quality or water quality; and

(e) public access to the countryside.

Proposals will be expected to be located at, or as close as possible to, the source of the resource needed for that particular technology, unless, in the case of a Combined Heat and Power scheme or a biomass heating scheme, it can be demonstrated that the benefits of the scheme outweigh the need for transportation and an end user is identified. Where any project is likely to result in unavoidable damage during its installation, operation or decommissioning, the application will need to indicate how this will be minimised and mitigated, including details of any proposed compensatory measures, such as a habitat management plan or the creation of a new habitat. This matter will need to be agreed before planning permission is granted.

The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given significant weight in determining whether planning permission should be granted.

The publication Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy' will be taken into account in assessing proposals.

Wind Energy Development

Applications for wind energy development will also be required to demonstrate all of the following:

(i) that the development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size and siting of turbines;

(ii) that the development has taken into consideration the cumulative impact of existing wind turbines, those which have permissions and those that are currently the subject of valid but undetermined applications;

(iii) that the development will not create a significant risk of landslide or bog burst;

(iv) that no part of the development will give rise to unacceptable electromagnetic interference to communications installations; radar or air traffic control systems; emergency services communications; or other telecommunication systems;

(v) that no part of the development will have an unacceptable impact on roads, rail or aviation safety;

(vi) that the development will not cause significant harm to the safety or amenity of any sensitive receptors (i.e. habitable residential accommodation, hospitals, schools and churches) (including future occupants of committed developments) arising from noise; shadow flicker; ice throw; and reflected light; and

(vii) that above-ground redundant plant (including turbines), buildings and associated infrastructure shall be removed and the site restored to an agreed standard appropriate to its location.

Any development on active peatland will not be permitted unless there are imperative reasons of overriding public interest.

For wind farm development a separation distance of 10 times rotor diameter to occupied property, with a minimum distance not less than 500m, will generally apply.

The supplementary planning guidance 'Wind Energy Development in Northern Ireland's Landscapes' will be taken into account in assessing all wind turbine proposals."

Best Practice Guidance (BPG) to Planning Policy Statement 18 'Renewable Energy'[18]

2.55. This guide, which should be read in conjunction with PPS18, provides background information on the various renewable energy technologies that may come forward in Northern Ireland and is designed to contribute to the development management process. Section 1 of the guide deals specifically with wind and outlines general background information and all Planning issues that may be of relevance to development proposals.

Supplementary Planning Guidance 'Wind Energy Development in Northern Ireland's Landscapes (August 2010) [19]

2.56. The SPG provides broad, strategic guidance in relation to the visual and landscape impacts of wind energy development. The guidance is based on the sensitivity of Northern Ireland's landscapes to wind energy development and contains an assessment of each of the 130 Landscape Character Areas (LCAs) in Northern Ireland by referencing the characteristics and values associated with each LCA. It also does the following:

[18] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18__renewable_energy__best_practice_guidance.pdf

[19] www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/spg_other/wind_energy_development_in_northern_irelands_landscapes_spg_for_pps18-2.pdf

- Sets out the background to the landscapes of Northern Ireland, and to wind energy development in these landscapes;
- Explains the approach and methodology that was used to assess wind energy development in relation to the landscape of each Landscape Character Area;
- Contains general principles and guidance relating to wind energy development in the landscape and associated sensitivities, opportunities and challenges. This includes principles and guidance relating to site selection, siting, layout and design and the assessment of landscape, visual and cumulative impacts;
- Considers cumulative wind energy development in Northern Ireland's distinctive landscapes in October 2007 and highlights landscape issues that need to be carefully considered in the future;
- Provides practical guidance relating to the use of this guidance and the preparation and submission of wind energy proposals.

Planning Policy Statement 21: Sustainable Development in the Countryside (PPS21) [20]

2.57. This document sets out planning policy for development in the countryside. i.e. land lying outside of the settlement limits identified in development plans. The Policy Objectives of PPS21 are outlined as follows:

"to manage growth in the countryside to achieve appropriate and sustainable patterns of development that meet the essential needs of a vibrant rural community;

to conserve the landscape and natural resources of the rural area and to protect it from excessive, inappropriate or obtrusive development and from the actual or potential effects of pollution;

to facilitate development necessary to achieve a sustainable rural economy; including appropriate farm diversification and other economic activity; and

to promote high standards in the design, siting and landscaping of development in the countryside."

Paragraph 3.2

[20] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_21__pps21__sustainable_development_in_the_countryside-3.pdf

2.58. The relevant Policy contained within the PPS is 'Policy CTY1 – Development of Countryside' and the relevant sections of this have been outlined below:

"There are a range of types of development which in principle are considered to be acceptable in the countryside and that will contribute to the aims of sustainable development. Details of these are set out below.

Other types of development will only be permitted where there are overriding reasons why that development is essential and could not be located in a settlement, or it is otherwise allocated for development in a development plan.

All proposals for development in the countryside must be sited and designed to integrate sympathetically with their surroundings and to meet other planning and environmental considerations including those for drainage, access and road safety. Access arrangements must be in accordance with the Department's published guidance.

Where a Special Countryside Area (SCA) is designated in a development plan, no development will be permitted unless it complies with the specific policy provisions of the relevant plan.

Non-Residential Development

Planning permission will be granted for non-residential development in the countryside in the following cases:

- *renewable energy projects in accordance with PPS 18"*

Other Material Planning Consideration

2.59. Although the abovementioned policies have been focused on for the purpose of this Chapter, as detailed throughout this ES, the following Planning Policy Statements (PPSs)[21] have also been considered relevant and have been taken into account when formulating the proposed development:

- PPS 2: Natural Heritage
- PPS 3: Access, Movement and Parking
- PPS 6: Planning, Archaeology and Built Heritage
- PPS 13: Transport and Land Use

[21] https://www.infrastructure-ni.gov.uk/publications/retained-planning-policy

- PPS 15: Planning and Flood Risk

2.60. The following Development Control Advice Notes (DCANs)[22] has been considered relevant and taken into account:

- DCAN 15: (2nd Edition) Vehicular Access Standards

[22] https://www.infrastructure-ni.gov.uk/publications/development-control-advice-notes

Chapter 3: Socio Economics, Recreation and Tourism

3. SOCIO-ECONOMICS, RECREATION & TOURISM

INTRODUCTION

3.1. This chapter of the Environmental Statement (ES) evaluates the impacts and hence, effects associated with the Proposed Smulgedon Wind Farm ("the Development") on the socio-economic, tourism, recreation and land-use resource of the local area. The chapter firstly examines the effect of the Development on the land-use within and surrounding the Development, secondly it considers the potential effects on the local economy of the Causeway Coast and Glens Borough and lastly it reflects the potential effects on tourist attractions and recreation facilities in and around the Development (excluding landscape and visual effects which are considered in Chapter 4: Landscape and Visual Impact Assessment.

3.2. The key objectives of the assessment are:

- To identify the principal social and economic impacts that may result from the wind farm and assess the significance of their associated effects;
- To recommend measures for avoiding or reducing any identified adverse impacts, and / or enhancing any positive impacts; and
- To highlight any residual negative impacts that cannot be mitigated.

3.3. This chapter contains the following sections:

- Assessment Methodology and Significance Criteria - describing the methods used in baseline surveys and in the assessment of the significance of effects;
- Baseline Description - a description of the socio-economic, tourism, recreation and land-use resource of the development site and the surrounding area based on the result of desk information;
- Potential Effects and Mitigation Measures - identifying ways in which socioeconomics, recreation and land-use could be affected by the development and recommending ways to minimise any adverse effects;
- Summary of Effects; and

- Statement of Significance.

Policy and Guidance

3.4. Consideration has been given to the relevant policies outline below. These include but are not limited to:

- Envisioning the Future – Considering Energy in Northern Ireland to 2050 (2013) - DETI[1]
- Building a Better Future, Regional Development Strategy for Northern Ireland 2035, Department for Regional Development (DRD)[2];
- Everyone's Involved Sustainable Development Strategy[3] (Northern Ireland Executive);
- Strategic Planning Policy Statement for Northern Ireland (SPPS): Planning for Sustainable Development[4] (2015) (DoE);
- Planning Policy Statement (PPS) 16: Tourism[5] (2013) (DoE);
- PPS 18: Renewable Energy[6] (2009) (DoE);
- PPS 21: Sustainable Development in the Countryside[7] (2010);
- Causeway Coast and Glens Borough Local Development Plan 2030 – Tourism Topic Paper 14 (Causeway Coasts and Glens Borough Council)[8];

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[1] https://www.economy-ni.gov.uk/sites/default/files/publications/deti/2050%20vision%20report.pdf

[2] https://www.planningni.gov.uk/index/policy/rds2035.pdf

[3] https://www.nienvironmentlink.org/cmsfiles/policy-hub/files/documentation/Waste/Sustainable-Development-Strategy.pdf

[4] https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf

[5] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/final_pps16_tourism__june_2013_pdf.pdf

[6] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18__renewable_energy.pdf

[7] https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_21__pps21__sustainable_development_in_the_countryside-3.pdf

[8] https://www.causewaycoastandglens.gov.uk/uploads/general/Discussion_Paper_14_-_Tourism.pdf

- Northern Area Plan (2016)[9]

Envisioning the Future – Considering Energy in Northern Ireland to 2050 (DETI)

3.5. In 2013, the Department for Enterprise, Trade and Investment (now replaced by the Department of the Economy) published a report outlining different scenarios for Northern Ireland's energy system up to 2050 and how early decisions can affect its development.

3.6. The main conclusions of the report are that an ambitious reduction in greenhouse gas emissions would require:

- Renewable electricity as the main form of generation;
- A higher uptake of renewable heat;
- Improved energy efficiency; and
- Higher uptake of electric vehicles.

3.7. If these aims were to be achieved, this would reduce greenhouse gas emissions by 55% to 80%, while reducing fossil fuel imports from 96% of energy demand to 41% of energy demand in 2050. Further advances would be necessary, including increased deployment of renewable energy and a reinforced grid with integrated battery storage.

Building a Better Future – Regional Development Strategy (2035)

3.8. The Regional Development Strategy (RDS) sets out the framework for spatial development of the Region (Northern Ireland) up to 2035. The strategy aims to take account of the economic ambitions and needs of the Region, and put in place spatial planning, transport and housing priorities that will support and enable the aspirations of the Region to be met. Key policies of relevance to the Development include:

- RG5: Deliver a Sustainable and Secure Energy Supply;
- RG9: Deliver our Carbon Footprint and Facilitate Mitigation and Adaptation to Climate Change Whilst Improving Air Quality; and
- RG11: Conserve, Protect and, where possible, Enhance Our Built Heritage and our Natural Environment.

[9] https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/nap2016-volume1-strategy-framework.pdf

Everyone's Involved Sustainable Development Strategy 2010 (NIE)

3.9. The strategy has adopted the following schemes:

- Economic Prosperity
- Social Cohesion
- Environmental Protection
- Meeting our national and international responsibilities

3.10. This strategy vows to "*continue to take forward mutually beneficial and practical co-operation with other administrations to help us deliver real benefits, particularly on infrastructure, trade and business, tourism, agriculture and health service provision and in tackling major issues that confront us all.*"

Strategic Planning Policy for Northern Ireland (SPPS):

3.11. The SPPS for Northern Ireland was published in September 2015 and contains Planning Policy Statements (PPS) which set out the policies of the Department of the Environment on particular aspects of land use planning and apply to the whole of Northern Ireland.

3.12. PPS16: Tourism highlights the contribution tourism makes to the Northern Ireland economy in terms of revenues it generates, employment opportunities and the potential it creates for economic growth. PPS16 states that planning permission will not be granted for development that would in itself or in combination with existing and approved development in the locality have an adverse effect on a tourism asset such as to significantly comprise its tourism value. The supporting text states that a tourism asset is defined as any feature associated with the built or natural environment which is of intrinsic interest to tourists.

3.13. PPS18: Renewable Energy states "*greater use of renewable energy technologies will reduce our dependence on imported fossil fuels and will bring diversity and security of supply to our energy infrastructure. It will also help Northern Ireland achieve its targets for reducing carbon emissions*". This policy also stresses that the varied nature of renewable energy technologies presents the potential to develop an indigenous renewable energy industry and provides a range of opportunities to support Northern Irelands economy including;

- direct and indirect employment opportunities during the construction and operational phases;
- revenue to the owners of the land on which they are built;
- employment in the manufacture of components and services

- opportunities for rural diversification, the alternative agricultural use of land and employment in the production of biomass crops;
- a beneficial route for the utilisation of residues and wastes that might otherwise be difficult or expensive to dispose of; and
- an improved source of electricity in remote locations

3.14. Policy CTY1 of **PPS21: Sustainable Development in the Countryside** states "There are a range of types of development which in principle are considered to be acceptable in the countryside and that will contribute to the aims of sustainable development... Planning permission will be granted for non-residential development in the countryside in the following cases…renewable energy projects in accordance with PPS18".

Local Development Plans

The Northern Area Plan (NAP) 2016

3.15. On the 1st April 2015, the four councils of Ballymoney, Coleraine, Limavady and Moyle merged to form the new Causeway Coast and Glens Borough Council (the Council). The current plan covering the Causeway Coast and Glens Borough Council (CCAGBC) area is the Northern Area Plan (NAP) 2016[10], which was adopted by the former Department of the Environment (DOE) on 22nd September 2015.

3.16. This NAP supersedes the previous statutory plans covering the Borough and provides the broad land use planning framework however it does not contain any specific policies on wind energy or renewable energy developments. As detailed within the Northern Area Plan, the project is located outside the Antrim Coasts and Glens AONB and any environmentally designated areas.

Causeway Coast and Glens Local Development Plan 2030.

3.17. The Causeway Coast and Glens Borough Development Planning Team are in the process of preparing a new Local Development Plan (LDP), but this is yet to be adopted. They are currently working towards Stage 4 of a 10 Stage plan to adopt the new LDP. The Plan will set a clear vision for how the Borough should look in the future (up to 2030) by setting out a planning policy framework and details on what type and scale of development should be encouraged and where it should be located.

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[10] https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/nap2016-volume1-strategy-framework.pdf

3.18. A revised timetable for the LDP 2035 was issued in November 2019[11]. The new timetable states that the plan strategy is currently timetabled to be issued for consultation between Winter 2018 and Summer 2020 and is anticipated these will be adopted in Spring / Summer 2023 after independent examination.

3.19. The Draft Local Policies Plan will be published for consultation in Autumn / Winter 2023 and it is anticipated to be adopted in Autumn / Winter 2026. To date the following relevant Topic Papers have been presented to the Committee:

- Population and Growth
- Environment
- Employment and Town Centres
- Landscape Character
- Settlement Evaluation
- Public Utiliites
- Open Space, Sport and Outdoor Recreation
- Coast
- Minerals
- Education, Health and Community Facilities
- Transportation
- Housing
- Countryside Pressure Analysis
- Tourism

Consultation

3.20. As part of the original application's scoping process, relevant organisations were contacted with regard to the proposal. Table 3-1 outlines the responses received. These responses are

[11]https://www.causewaycoastandglens.gov.uk/uploads/general/LDP_Revised_Timetable_(2)_-_Final_(Published)_251119.pdf

still considered relevant within this ES as only minor amendments are being made to the original application.

Table 3-1: Consultation

Consultation	Scoping
Agri-Environment Scheme Management Branch, Department of Agriculture and Rural Development	The scoping response confirmed that the land within the Development site boundary is agricultural land grade 4 which falls outside the best and most versatile land classification.
Northern Ireland Tourist Board (NITB)	The NITB accepts the Government's rationale behind the Non-Fossil Fuel Obligation (NFFO), however it has reservations against the development of commercial onshore wind turbines in areas of primary designation such as (Areas of Outstanding Natural Beauty) and on adjacent sites that are clearly visible from the primary designated areas.

Field Survey Methodology

3.21. Field Survey work was not required to inform the assessment of potential socio-economic impacts.

Methodology for the Assessments of Effects and Significance Criteria

3.22. There are no established guidelines to inform the assessment of social and economic impacts of proposed wind farms, therefore professional judgement informed by desk-based research has been used throughout the assessment.

3.23. The baseline social and economic environment is identified by reviewing the most recent census data. The assessment process aims to be objective and quantifies effects as far as possible; however, some effects can only be evaluated on a qualitative basis.

3.24. Although this is not considered to be an EIA development, an EIA fee has been paid and we await the CCGBC determination on this issue. As such, relevant EIA legislation and guidance is referenced where applicable.

Types of Effect

3.25. Effects on land-use resources, tourism, recreation and socio-economic resources can be described as direct, indirect, cumulative or residual as outlined in Table 3-2.

Table 3-2: Type of Effect

Type of Effect	Description
Direct	*For example:* • Jobs created during the decommissioning/construction, and operational phases of the Development; • Physical disturbance to the land-use resource within the initial decommissioning/construction phases, such as the footprint of the Development or decommissioning/construction activities impacting on any rights of access.
Indirect	*For example:* • Jobs created by the additional expenditure of wages into the local and wider economy and the purchasing of basic materials, equipment and office or accommodation space for staff as a result of the Development; • Visual effects of the Development on viewpoints and users of nearby tourism and recreational receptors.
Cumulative	Cumulative effects are those where the combined effect of two or more developments (be they operational or proposed) are of greater significance than those of the Development itself.
Residual	Residual effects are those that remain following the implementation of mitigation measures designed to avoid or reduce adverse effects.

3.26. Effects can also be categorised as below:

- Short-term (construction or decommissioning) and long term (operation) effects;
- Permanent and reversible effects; and
- Beneficial or adverse effects.

Sensitivity of Receptors

3.27. The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site, or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance and professional judgement. Table 3-3 details the framework for determining the sensitivity of receptors.

Table 3-3: Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	Assets / receptors of international importance (e.g. European).
High	Assets / receptors of national importance (e.g. UK).
Medium	Assets / receptors of regional importance (e.g. Northern Ireland)
Low	Assets / receptors of local importance (e.g. Causeway Coast and Glens).
Negligible	Assets / receptors of negligible importance (e.g. a receptor that is not afforded protection under the Local Plan or other policy).

Magnitude of Effect

3.28. The magnitude of potential effects will be identified through the anticipated degree of change to baseline conditions as a result of the Development, along with the duration and reversibility of an effect. The criteria for assessing the magnitude of an effect are presented in Table 3-4 below.

Table 3-4: Magnitude of Effects

Magnitude of Effects	Definition
High	Total loss or major alteration of the socio-economic, land-use, tourism or recreational asset / receptor.
Medium	Loss of, or alteration to, one or more key elements of the socio-economic, land-use, tourism or recreational asset / receptor.
Low	Slight alteration of the socio-economic, land-use, tourism or recreational asset / receptor.
Negligible	Barely, perceptible alternation of the socio-economic, land-use, tourism or recreational asset / receptor

Significance of Effect

3.29. The significance of effect that the Development may have will be influenced by a combination of the sensitivity of the environment and the predicted degree of alteration (the 'magnitude') from the baseline state (both beneficial and adverse).

3.30. Table 3-5 summarises guideline criteria for assessing the significance of effects.

Table 3-5: Significance of Effects

Magnitude of Effect	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

3.31. For the purposes of environmental assessment, 'effects' are generally identified as being one of the following categories of significance:

- **Not significant (Negligible)** – no detectable or material change to a location, environment, species or sensitive receptor
- **Minor** – a detectable but non-material change to a location, environment, species or sensitive receptor
- **Moderate** – a material, but non-fundamental change to a location, environment, species or sensitive receptor
- **Major** – a fundamental change to a location, environment, species or sensitive receptor.

3.32. Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of 'major' or 'moderate' significance. However, please note this is not expected to merit an EIA.

3.33. In terms of socio-economic factors, potential effects would be significant if the Development resulted in any fundamental or material changes in population, structure of the local community, and local economic activity during the different phases of development.

3.34. With respect to tourism and recreation, significant potential effects are those where the Development would lead to permanent or significant impacts on facilities or where the proposal would affect recreational resources that have more than local use or importance.

3.35. Significant effects on the existing land-use resource would be those which resulted in a fundamental change in the current and predominant land-use of the site.

BASELINE METHODOLOGY

3.36. This section presents information on the existing social and economic conditions in the Causeway Coast and Glens Borough Council (CCGBT) area in terms of population, demographics and employment. It also provides details on known recreation and tourism activities in the area and information on the current land-use of the site.

Socio-Economic Baseline

Socio-Economic Baseline Methodology

3.37. The following sources of information have been used to inform the socio-economic baseline description set out in this chapter:

- Northern Ireland Statistics and Research Agency[12] (www.nisra.gov.uk);
- Department for the Economy Northern Ireland[13] (www.economy-ni.gov.uk); and
- Office for National Statistics[14] (www.ons.gov.uk).

3.38. It should be noted that this is only an amendment application and that the only changes are to the output (increased), the turbines, crane pads and the foundations. The layout changes are only very minor and the conclusions reached within the Original Consented Development remain valid. These were deemed acceptable and construction has commenced.

Baseline Description

3.39. The development site is located approximately approximately 9km to the northeast of Dungiven and 8km west of Garvagh in County Londonderry, within the Causeway Coast and Glens Borough Council area. The Borough Council area was established on the 1st April 2015 and replaced Ballymoney Borough Council, Coleraine Borough Council, Limavady Borough Council and Moyle District Council. The area within the Borough totals 2,796 km2 and spans across Co. Antrim and Derry/Londonderry.

[12] www.nisra.gov.uk

[13] www.economy-ni.gov.uk

[14] www.ons.gov.uk

Population

3.40. Socio-economic and census data from 2018 indicates that there was a resident population of 143,246, of which 71,497 (49.6%) were male and 72,749 (50.4%) were female[15].

3.41. Table 3-6 shows an age demographic breakdown for the Causeway Coast and Glens Borough Council Area.

Table 3-6: Age demographics of Causeway Coast and Glens LDG.

	Causeway Coast and Glens LGD	Northern Ireland
Total Population (2018)	144,246	1,881,641
Children (0-15 years)	28,372	393,510
Young Working Age (16-39 years)	41,909	579,513
Older Working Age (40-64 years)	47,863	600,421
Older (65+ years)	26,102	308,197
Population Change % (2008-2018)	3.8	5.8

3.42. Recent population growth in this area has been lower than the Northern Ireland average, with an increase of 3.8% compared to 5.8%.

Economics and Employment

3.43. This Census data indicates that in 2018, 62.24% of the population in the Causeway Coast and Glens LGD were of working age. It was estimated that 70.7% of those aged 16-64 were economically active (either employed or unemployed), with 29.3 % economically inactive (people who are neither in employment nor unemployed). This group includes, for example, all those who were looking after a home or retired, long term sick or disabled.)

3.44. The Census from 2011 noted that only 63.64% of the population aged 16 – 64 (employment age) were economically active, with 36.6% economically inactive. Of this, 5.59% were unemployed and 45.85% were long-term unemployed (those who have not worked since 2009 or earlier).

[15] https://www.ninis2.nisra.gov.uk/public/AreaProfileReportViewer.aspx?tabchangeReportName=Local%20Government%20District%20(2014)?

3.45. In 2018/19, there were 3,558 vacancies notified in Causeway Coast and Glens LGD to Jobs and Benefits Offices, Job Centres and Department for Communities.

3.46. The Business register and Employment Survey provides information on the nature and characteristics of the businesses in Northern Ireland. In September 2018, employee jobs in Causeway Coast and Glens Borough Council Area was 42,991, a 2.9% increase from 2017[16].

3.47. The largest employment sectors for the region in 2018 included distribution, production and other services (81.4%). 10.7% of employment was in Manufacturing; 6.3% in Construction and 1.7% in other industries.

3.48. The latest Council Area Profile for the Causeway Coast and Glens from Invest Northern Ireland was published in July 2019. It compares the industry of employment across the district council with those across Northern Ireland as a whole in 2018. See **Table 3-7** below.

Table 3-7: Industry of employment (2018)

	All Jobs	% of all NI Jobs	Construction	Manufacturing	Services	Other	Public Sector	Private Sector
Causeway Coast and Glens LGD (Sector as percentage of all jobs in CC & G LGD)	41,733	5	6	11	81	2	25	75
Northern Ireland (Sector as percentage of all jobs in NI)	759,358	100	5	11	82	1	27	73

3.49. In 2015, over 2,650 employee jobs were in the energy sector in Northern Ireland, a 19% rise in jobs in this sector since 2013. Additionally, the total number of energy sector enterprises in Northern Ireland increased from 375 in 2013 to 705 in 2017, an increase of 88%. This was the largest percentage increase of all UK countries[17].

[16] https://www.nisra.gov.uk/system/files/statistics/BRES-2018-publication.pdf

[17] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/energy-northern-ireland-2018.pdf

Deprivation

3.50. The Northern Ireland Multiple Deprivation Measure 2017 (NIMDM 2017)[18] provides a mechanism for ranking areas within Northern Ireland in the order of the most deprived to the least deprived. However, they do not quantify the extent to which one area is more or less deprived than another.

3.51. There are 7 domains of deprivation:

- Income deprivation
- Employment deprivation
- Health and disability deprivation
- Education, skills and training deprivation
- Access to services deprivation
- Living environment deprivation; and
- Crime and disorder deprivation.

3.52. The indicators in each domain are analysed to produce a domain specific deprivation ranking of the 890 Super Output Areas (SOA) in Northern Ireland.

3.53. All SOAs in Northern Ireland are ranked, with a rank of 1 denoting the most deprived SOA (East in Derry City and Strabane) and 890 denoting the least deprived SOA (Belmont 1 in Belfast). SOAs with ranks of 89 or lower are in the top 10% most deprived SOAs in Northern Ireland.

3.54. The Proposed Development is located within Dungiven Super Output Area. Dungiven SOA has an overall rank of 145 / 890. This means Dungiven is outside the top 10% most deprived SOAs. Dungivens rank of 145 places it in the 15% to 20% deprivation band.

3.55. The Multiple Deprivation Measure (MDM) combines the 7 deprivation domains to rank areas based on types of deprivation. Causeway Coast and Glens LGD have 72 SOAs, with 3 of them (4%) being classed as within the 100 most deprived SOAs across Northern Ireland. Greystone, within the Causeway Coast and Glens LGD rates as number 11 on the "20 most deprived SOAs by MDM".

[18] https://www.nisra.gov.uk/publications/nimdm17-soa-level-results

Table 3-8: Number of SOAs in Causeway Coast and Glens LGD classed as within the "100 most deprived SOAs" for each domain.

LGD	Income Deprivation	Employment Deprivation	Health and Disability Deprivation	Education, Skills and Training Deprivation	Access to Services Deprivation	Living Environment Deprivation	Crime and Disorder Deprivation
Causeway Coast and Glens	12 (17%)	5 (7%)	3 (4%)	2 (3%)	12 (17%)	4 (6%)	9 (13%)

3.56. The NIMDM notes that the highest levels of deprivation in the Causeway Coast and Glens LDG are income deprivation and access to services deprivation, both with 12 SOAs falling with the 100 most deprived across Northern Ireland in those domains.

Economic Value of the UK Renewable Industry

3.57. In 2018, businesses activity in the UK low carbon and renewable energy (LCREE) economy generated £46.7 billion in turnover, up from £44.6 billion in 2017 and employment in the UK LCREE was estimated to be 224,800 full-time equivalent (FTE), up from 219,900 in 2017[19] (Table 3-9)

3.58. The LCREE accounted for around 1% of total UK non-financial turnover and employment in 2018, similar to 2015 to 2017. This figure was slightly higher for Scotland, Wales and Northern Ireland than England and the UK as a whole, suggesting that the LCREE is relatively more important in those regions.

Table 3-9: Turnover and Employees in the LCREE.

	Low Carbon and Renewable Energy Economy		
	2016	2017	2018
Turnover (£ billions)			
UK	41.1	44.6	46.7
England	31.9	35.8	37.1
Scotland	5.9	6.0	6.4
Wales	2.4	1.9	2.2
Northern Ireland	0.9	1.0	1.1

[19] https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2018

Employees (FTE)			
UK	211,000	219,900	224,800
England	167,900	181,800	185,000
Scotland	24,000	22,100	23,100
Wales	12,900	10,100	11,400
Northern Ireland	6,200	6,000	5,400

Source: Office for National Statistics – Low Carbon and Renewable Energy Economy Survey
https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2018

Limitations:

- Figures have been rounded up so may not correlate fully. Regional estimates may not correlate to UK totals where it was not possible to allocate activity to a region.
- The difference between the 2015, 2016 and 2017 estimates should be interpreted with caution due to the precision of survey-based estimates.
- Number of full-time equivalent (FTE) employees is rounded to the nearest 100, all other variables are rounded to the nearest £0.1 billion.

3.59. The onshore wind sector accounted for £3.7 billion (7.9% of UK LCRE) turnover and employed 5,500 (2.4% of UK LCRE) FTEs in 2018.

3.60. The Northern Ireland Economic Strategy[20] sets out Northern Irelands priorities for sustainable growth and prosperity up to the year 2030 and energy infrastructure is one of the types of economic infrastructure highlighted as helping to achieve this.

3.61. The Strategic Energy Framework outlines Northern Ireland's direction for energy policy and recognises the country's dependence on imported fossil fuels to meet energy needs which impacts the security of the supply. The Framework also recognises onshore wind as the most established source of renewable energy in Northern Ireland.

3.62. The Department of Enterprise, Trade and Investment (DETI) has established the aim of developing a more secure and sustainable energy system where:

[20] https://www.northernireland.gov.uk/sites/default/files/publications/nigov/ni-economic-strategy-revised-130312_0.pdf

- Energy is as competitively prices as possible alongside robust security of supply;
- Much more energy is from renewable sources and the resulting economic opportunities are fully exploited; and
- Energy efficiency is maximised.

3.63. The UK Climate Change Act sets a target for the year 2050 for a reduction in greenhouse gas emissions by 80% lower than the 1990 baseline year. A recent amendment to the act (dated 26th June 2019[21]), to be introduced from July 2019 onwards, commits the UK to a reduction in greenhouse gases by 100% lower than the 1990 baseline. This amendment has had direct implications on Northern Irish Energy Policy.

Tourism and Recreation Baseline

Tourism and Recreation Baseline Methodology

3.64. Tourism and recreation effects will be considered based on the guidance from Guidelines for Environmental Impact Assessment and consider:

- Tourism; and
- Public attitudes to wind farms.

3.65. The following sources of information have been used to inform the tourism and recreation baseline description set out in this Chapter:

- Tourism Northern Ireland (https://tourismni.com/)
- Northern Ireland Statistics and Research Agency (https://www.nisra.gov.uk/)
- Economy Northern Ireland (https://www.economy-ni.gov.uk/)
- Department for Business, Energy and Industrial Strategy (gov UK) (https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy)

3.66. Information concerning the public's perception of wind farms has been gathered from studies undertaken across the UK and the Republic of Ireland.

[21] https://www.legislation.gov.uk/ukdsi/2019/9780111187654

Baseline Description

3.67. Tourism performance data released by NISRA indicates that between January and September 2019, 3.6 million trips were taken in Northern Ireland by residents, Britons and other overseas visitors. Visitors spent £712m, up by £56m (+9%) on Jan-Sep 2018. While all markets spent more, the increase is largely due to the significant growth in GB spend (+18%). Some £2.6m was spent on average each day during the first nine months of 2019[22].

3.68. The latest local government district tourism statistics for 2018 were published on 6th June 2019[23]. The Causeway Coast and Glens had the second largest number of estimated overnight trips after Belfast which was estimated to have had 1.7 million overnight trips.

3.69. The district hosted 20% of Northern Irelands trips; 19% of nights and 18% expenditure. The estimated number of trips for all visitors in Causeway Coast and Glens Local Government District was 1,011,485 with an associated number of 3,177,570 nights stayed and expenditure of £172.34 million.

3.70. **Table 3.10** below shows the statistics for the Council area.

Table 3.10: Tourism Estimates 2018[24]

	TRIPS	% of NI Trips	NIGHTS	% of NI Nights	SPEND (£)	% of NI spend	Average spend per trip (£)	Average spend per night (£)	Average number of nights
Causeway Coast and Glens LGD	1,011,485	20	3,177,569	19	172,343,288	18	170.39	54.24	3.1
Northern Ireland	5,112,993	100	16,296,184	100	968,252,291	100	189.37	59.42	3.2

[22] https://tourismni.com/facts-and-figures/tourism-performance-statistics/ni-annual-and-quarterly-tourism-performance/

[23] https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/Northern-Ireland-Local-Government-District-Tourism-Statistics-2018.pdf

[24] https://tourismni.com/globalassets/facts-and-figures/research-reports/tourism-performance-statistics/local-government-district-tourism-statistics/lgd-summary-tourism-estimates-2018.pdf

3.71. Survey respondents are also asked the reason they stayed overnight in Northern Ireland. The estimates for all overnight trips (from both domestic and external visitors) are shown in **Table 3.11 below.**

Table 3.11: Overnight trips by reason for visit (average 2016 – 2018).[25]

	Holiday/Leisure			Visiting Friends / Relatives (VFR)			Business			Other		
	Trips	% of all holiday trips	% of LGD trips	Trips	% of all VFR trips	% of LGD trips	Trips	% of all business trips	% of all LGD trips	Trips	% of all other trips	% of LGD trips
Causeway Coast and Glens LGD	727,529	29	76	194,138	10	20	29,961	7	3	9,998	8	1
Northern Ireland	2,498,0404	100	50	1,896,706	100	38	426,279	100	9	127,428	100	3

3.72. Estimates suggest overnight trips for holiday purposes makes up 50% of the Northern Ireland market, visiting friends and relatives 38% and business trips 9%. However, there is significant local variation. Over the period 2016-2018, over three out of four estimated overnight trips taken in Causeway Coast & Glens LGD (76%) were for holiday purposes.

3.73. In 2018, visitors spent £968 million in Northern Ireland, with 57 percent generated from external visitors – making tourism worth £552 million as an export business. **See Table 3.12** below showing LGD overnight trips by origin of visitors (average between 2016 and 2018).

Table 3.12: Overnight trips by origin of visitors (average 2016 – 2018).

	Northern Ireland	% of all local trips	Great Britain	% of all local trips	Other Europe	% of all local trips	North America	% of all local trips	ROI and others	% of all local trips	Total
Causeway Coast and Glens LGD	603,031	63	138,015	14	35,679	4	27,269	3	157,632	16	961,626

[25] https://tourismni.com/globalassets/facts-and-figures/research-reports/tourism-performance-statistics/local-government-district-tourism-statistics/lgd-summary-tourism-estimates-2018.pdf

Northern Ireland	2,121,779	43	1,482,987	30	380,714	8	290,301	6	672,671	14	4,948,452

3.74. The Northern Ireland Annual Visitor Attraction Survey 2018[26], published on June 6th 2019 by NISRA reported 21.1 million visits to visitor attractions in 2018 by respondents to the survey. Country Parks / Parks / Forests accounted for 42% of all visitors reported[27].

3.75. The Limavady Borough has a varied landscape that stretches from the Sperrins Mountains in the south to the Benone beach to the north along the Atlantic Coast. The region offers a range of scenic, historic, family and leisure attractions; some of the attractions in the area include Roe Valley Country Park, Sperrin mountains and Dungiven Castle.

3.76. The wind farm is situated at the edge of the Gortnamoyagh Forest that surrounds the eastern and southern edge of the site boundary. Gortnamoyagh Forest is used for outdoor activities including walking and mountain biking. The Forest is important at the scale of Causeway Coast and Glens and is therefore assessed as being of low sensitivity (See Table 3-3).

3.77. There are a few local built heritage and cultural features that are situated within the 2km radius of the site such as Gortnamoyagh Inaugration stone, Tannyranny Church Ruins and Gavin Old Church[28]. Other local features that form a part of the North Sperrins Scenic Route are Legavannon Pot & Legananam Pot that were formed due to glaciations activities.

3.78. The Development is located approximately 1.5km north of The Sperrins, the second highest mountain range in Northern Ireland and an Area of Outstanding Natural Beauty (AONB). The highest point within the mountain range is the Benbradagh peak and it is a favourite spot for activities such as paragliding and hand gliding. The Sperrins is an important regional attraction which has several popular walking and cycle routes and other archaeological and cultural features of local and regional importance.

3.79. Other wider attractions and features of tourist interest in wider Limavady region include the:

- Garvagh Forest located 5.7km east of the site boundary at its nearest point;
- Roe Valley Country Park that lies approximately 9km northwest of the site;
- Binevenagh AONB, situated approximately 10km to the north;
- Dungiven Castle, situated approximately 10km to the southwest;

[26] https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/Annual-NI-Visitor-Attraction-Survey-2018.pdf

[27] https://tourismni.com/facts-and-figures/tourism-performance-statistics/visitor-attractions/

[28] https://niarchive.org/wp-content/uploads/2019/04/NorthSperrinsHeritageTrail.pdf

- Banagher Old Church, 11km to the southwest; and
- Banagher Glen Natural Reserve, 14km to the southwest.

3.80. Given the distance to the above attractions from the Proposed Development site, they will not be effected and have been scoped out from further assessment.

Cycling and Scenic Driving Routes

3.81. The Inishowen 100 route is a scenic driving route around the Inishowen Peninsula. Part of the route runs along the north western edge of the study area between Quigley's Point and Stroove. The North Sperrins Scenic Route is a 50-mile circular route taking in parts of the Sperrin Mountains, plantation towns such as Dungiven, Maghera and Garvagh and 14 highlighted natural, cultural and historic features within the landscape. The North Sperrins Heritage Trail is a driving trail which closely follows a section of the North Sperrins Scenic Route and it provides visitors with easy access to a collection of archaeological sites. This trail has been developed to showcase the range of field monuments found across the dramatic North Sperrins landscape. There are several points of interest located within 2 – 15km of the Proposed Development.

3.82. Eagle Glens Cycle Route (or Route 11), a part of the National Cycle Network, is a circular route that runs from Garvargh Forest to Gortnamoyagh forest with a total distance of 22km. The closest part of the Network is approximately 1.5km east of the Development on the B64 before heading back towards Garvargh forest.

3.83. Other cycle routes such as the Limavady to Claudy section of Route 93 of the National Cycle Network runs via minor roads approximately 8.3km (at its closest point) to the west of the Proposed Development Site.

Walking Routes

3.84. The Site is located within a relatively remote setting with recreation opportunity based around the natural environment such as hills, lakes, rivers and forests. Under *The Access to the Countryside (Northern Ireland) Order 1983*[29], public access is restricted to:

- Areas of land which are in public ownership and to which the public are invited to use;
- Public rights of way; or
- Where the public have the landowner's permission to visit

[29] https://www.legislation.gov.uk/nisi/1983/1895

3.85. Many walking routes in the Causeway Coast and Glens are not formally designated public rights of way and access depends on the goodwill and tolerance of local landowners.

3.86. The Ulster Way long distance trail, which stretches 625 miles, runs from north-south across the centre of the study area between the Sperrins and the north coast. It then follows the coast north eastwards. The Ulster Way and North Sperrins Waymarked Way both pass the western and northern boundaries of the Proposed Development following the existing road network and into Gortnamoyagh Forest.

3.87. As a long-distance footpath, it is of regional importance (at the Northern Ireland level), and therefore is classified as being of medium sensitivity (See Table 3-3).

3.88. There are no bridleways on or within the immediate vicinity of the site.

Other Tourist Attractions.

3.89. Excluding Country Parks, Parks and Forests, the Giant's Causeway World Heritage Site attracted the highest number of visits (1,039,000) in Northern Ireland. This was a 3% increase on 2017[30]. The Giants Causeway is located approximately 34km northeast of the Proposed Development Site. As a result of being outside the Study Area, and therefore too distant to receive significant effects, this receptor is not considered further in the assessment.

3.90. The Councils Discussion Paper 7: Open Space, Sport and Outdoor Recreation focuses on children's play areas and sports pitches, which would not be affected by the Development and do not have the potential to lead to any potential significant effects from the Development, and are therefore not considered further in this assessment.

Public attitudes towards Wind Farms

3.91. The potential impact of the Development on tourism is closely related to the perception of wind farms by those visiting the area. This section provides a summary of studies carried out to establish an overview of public perception of wind farm development across the UK.

3.92. In the United Kingdom there have been numerous surveys to assess the public's attitudes to wind farms. This section examines a number of these studies in chronological order, as a means of predicting the public's response to the Development.

[30] https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/Annual-NI-Visitor-Attraction-Survey-2018.pdf

Tourism and Wind Farms

3.93. One of the latest studies on tourism and wind farms was conducted by BiGGAR Economics in 2016[31]. They examined data to test if there was a correlation between the presence of wind farms in a particular area and tourism employment in that area. The report concluded, "*although this study does not suggest that there is any direct relationship between tourism sector growth and wind farm development, it does show that wind farms do not cause a decrease in tourism employment either at a local or a national level.*"

3.94. The potential for impact on tourism is closely linked to the perception of those visiting the area. A Northern Irish Tourism Board (NITB) survey undertaken in August 2011, concluded that tourists, on the whole, seem generally positive or neutral to the prospect of wind farm development, and less than 5% of domestic (Northern Irish) tourists said they would be discouraged from returning to an area that had wind farms.

3.95. The NITB concluded that the impact of wind farm development on tourism may not be as severe as previously thought and tourists, on the whole, seem generally positive or neutral to the prospect of wind farm development. To date, there is no published evidence to indicate wind farms have a negative effect on tourism

3.96. Research by VisitScotland in April 2012[32] observed that 80% of respondents said their decision on where to visit or stay in Scotland would not be affected by the presence of a wind farm. In addition, 52% of all respondents disagreed that wind farms spoil the look of the UK/Scottish countryside, with a further 29% neither agreeing nor disagreeing.

3.97. This survey backs up a previous study commissioned by the Scottish Government in 2008 to investigate the economic effects of wind farms on Scottish tourism[33]. This study found that three quarters of all respondents felt that wind farms had a positive or neutral effect on the landscape, and that 68% of tourists reacted positively to the statement "*A well sited wind farm does not ruin landscape*". Furthermore, 93% of all visitors that had seen a wind farm during their visit to Scotland stated that this would not impact their intentions to return to Scotland for future holidays.

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[31] https://biggareconomics.co.uk/wp-content/uploads/2020/01/Research-Report-on-Wind-Farms-and-Tourism-in-Scotland-July-16.pdf

[32] VisitScotland (2012) Wind Farm Consumer Research. Available online at: http://www.visitscotland.org/pdf/Wind farm%20Consumer%20Research%20final_docUpdatedx.pdf

[33] https://www2.gov.scot/resource/doc/214910/0057316.pdf

3.98. Likewise, research of visitor attitudes to wind farms in the Republic of Ireland observed that 47% of tourists consider that wind farms actually have a positive effect, and only 10% think they have very negative effects[34].

3.99. In 2002, Sustainable Energy Ireland (SEI) commissioned a survey aimed at identifying public attitudes to renewable energy and to wind energy in Ireland[35]. The survey was undertaken by Lansdowne Market Research and involved face-to-face interviews with 1,300 tourists, both domestic (25%) and overseas (75%) (1,000 in the Republic, 300 in Northern Ireland).

3.100. The survey results indicate that most visitors are broadly positive towards the idea of building more wind farms on the island of Ireland. The largest proportion of respondents - 45% - claimed that the presence of the wind farm had a positive impact on their enjoyment of sightseeing, with only 15% claiming that they had a negative impact. Almost three quarters of respondents claimed that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland.

3.101. A conclusion can be drawn from the survey that there is no evidence that the wind farms are likely to deter tourists from visiting the area in the future.

3.102. Wind farms can be tourist attractions in themselves, providing additional interest in an area and a different experience that can complement other tourist experiences. The Best Practice Guidance PPS18 acknowledges that wind energy developments can co-exist and potentially enhance tourism and leisure interests

Living near Wind Farms

3.103. In May 2020, the Department for Business, Energy and Industrial Strategy released the official statistics from the BEIS Public Attitudes Tracker (March 2020, Wave 33, UK[36]). Data for Wave 33 was collected using face-to-face in-home interviews with a representative sample of 1,851 adults (aged 16 and over) in the UK. Interviews were carried out using the Kantar UK Omnibus, which uses a random location quota sampling approach.

3.104. The adults were asked a series of questions, one being whether they agreed or disagreed with the statement "*I would be happy to have a large-scale renewable energy development in my area*". In March 2020, the proportion of the public that agreed with the statement remained

[34] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Wind farm-VAS-(FINAL)-(2).pdf?ext=.pdf

[35] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf

[36] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/884028/BEIS_PAT_W33_-_Key_findings_Final_.pdf

stable compared to March 2019, with just over six in ten (63%) agreeing that they would be happy to have a large-scale renewable energy development in their area. Levels of agreement for this statement has gradually increased over the course of the tracker since the question was first asked in March 2012.

3.105. In 2003, a study by Sustainable Energy Ireland (SEI) – "Attitudes towards The Development of Wind Farms in Ireland[37]" was published. The national study of general public attitudes and opinions used an Omnibus survey, with 60 nation-wide sampling points. The sample size used was 1,200 people and was designed to be nationally representative in terms of age, sex and class.

3.106. The study asked whether respondents would be favourably or unfavourably disposed to a wind farm being built in their local area. 31% were very favourable disposed and 36% favourably disposed (67% total). This percentage rises to 79% in total when only those respondents who have seen a wind farm are included in the analysis.

3.107. The fact that the percentage increases among those who have actually seen a wind farm suggests that the structures themselves do not significantly contribute to any negative views of wind energy.

3.108. The study states "*Of those who are positively disposed to a local wind farm, the overwhelmingly cited reason was that it produces clean energy. 25% were of the view that it would provide employment, and 10% felt that it would add to the landscape in some way.*"

3.109. A MORI survey commissioned in 2003 by the Scottish Executive, which examined the views of locals living within 20 km of Scotland's ten operational wind farms that have 9 or more turbines[38], revealed that:

- 20% of the residents felt that their local wind farm has a broadly positive effect on the area, compared to just 7% who said it was negative, while 73% felt it had neither a positive or negative effect or expressed no opinion and
- When asked what the shortcomings of the area in which they lived most commonly mentioned lack of amenities (20%) and poor public transport (18%), whilst only 0.3% of people specifically mentioned wind farms as a negative aspect of their area

[37] https://mosart.ie/wp-content/uploads/2016/02/Attitudes-Towards-Wind-Farm-Development-Ireland.pdf

[38] Scottish Executive, MORI, "Public Attitudes to Wind Farms: A Survey of Local Residents in Scotland", 2003. Sample: 1,800 residents (https://www.webarchive.org.uk/wayback/archive/20171001131204/http://www.gov.scot/Publications/2003/08/18049/25601)

- 44% of the people living 5 km close to wind farms tend to be more positive about the wind farm as compared to the 16% of those living 10-20 km away. Also, 65% of the people within the 5 km zone were more supportive of an expansion as compared to the 53% of those in the 10-20 km zone

3.110. The same study also found that before construction 27% of people surveyed were of the opinion that an adverse landscape impact might occur as a result of wind farm development. Whereas, following construction only 12% indicated that the landscape had been spoilt.

3.111. In a more recent study by the Lawrence Berkeley National Laboratory in the United States[39], surveyors found that the majority of people in the US living within five miles of a wind farm view the projects positively, although attitudes are more polarised among residents within half a mile of the turbines.

3.112. Of the 1,700 people living within 5 miles of a wind farm, 25% percent of respondents held a very positive attitude to the scheme, 32% had a positive attitude towards the facility and 34% were neutral. Only 4% of respondents help negative opinions about the project, with another 4% were "very negative".

Public Attitudes towards Renewables in the UK

3.113. Existing studies into the attitudes of visitors, tourists and tourism organisations towards wind farms in the UK suggests that renewable energy schemes have their own tourism pull. Independent UK studies have shown that the adverse effects of wind farms on tourism are negligible, and there is a growing body of evidence to suggest that wind farms can become tourist attractions in their own right.

3.114. In the studies conducted by the Department for Business, Energy and Industrial Strategy - the BEIS Public Attitudes Tracker (March 2020, Wave 33, UK) - levels of support for renewable energy have remained between 74% and 85% since the first survey in March 2012 and support was at 82% in March 2020. Opposition to renewable energy remained at its lowest point across the tracker at 2%, having previously fluctuated between 3% and 5% between March 2012 and June 2019.

3.115. Support for onshore wind has remained stable at 77% since September 2019, having slightly decreased from the peak of 79% observed in March 2019. Over the longer term, support has increased from 65% in March 2015 to its present levels[40].

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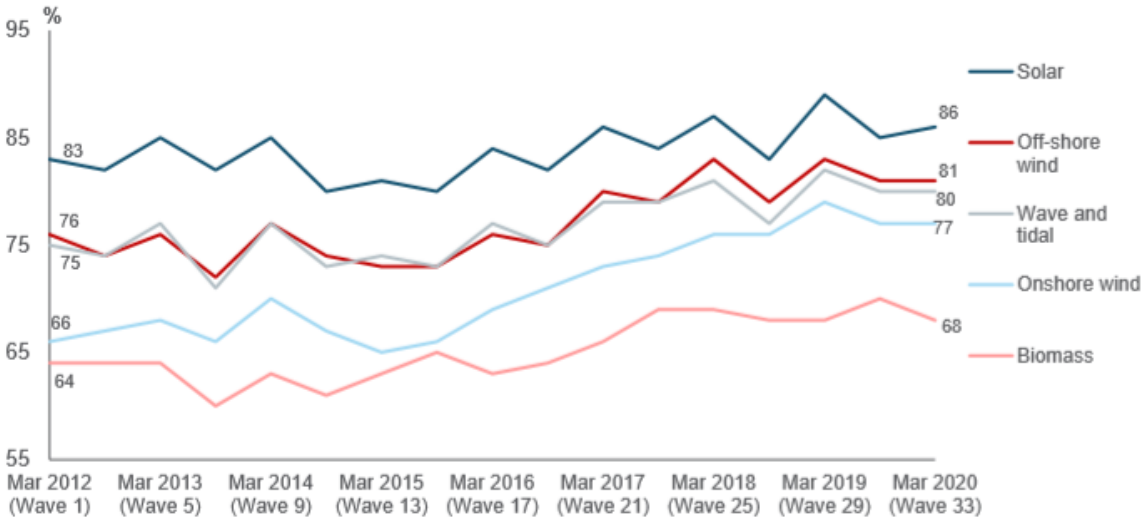
[39] https://www.euci.com/people-living-around-winds-farms-view-them-positively-and-see-few-negative-impacts-survey-finds/

[40] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/884028/BEIS_PAT_W33_-_Key_findings_Final_.pdf

Figure 3-1: Support for different forms of renewable energy (based on call people), March 2012 – March 2020.



3.116. Omnibus research was conducted for The Irish Wind Energy Association (IWEA) in 2017 as well as online research in November 2018 to measure and track perception and attitudes around wind power amongst Irish adults[41]. In November 2018, 83% of those surveyed were in favour of the use of wind power, with 15% neither favouring or opposing, and only 2% strongly opposing the use of wind power. The specific benefit 'reduction in CO2 emissions' was also recognised by over 4 in 5 Irish adults in 2018, versus 3 in 4 in 2017. That was closely followed by 'good for the environment' and 'cheaper electricity'.

3.117. These studies highlight the varying opinions with regard to wind energy development; however they suggest in all cases, that the majority of those surveyed do not have a negative attitude towards wind farms.

Land-use

Land-use Baseline Methodology

3.118. Baseline conditions have been established through desktop studies, including mapping and aerial imagery, and a series of site visits.

Baseline Description

3.119. The Proposed Development of seven turbines is located on Smulgedon Hill, approximately 1.5 km to the north of the Sperrin AONB. There are no other statutory designations relating to landscape on or immediately adjacent to the Proposed Development. Smulgedon Hill is part of the Binevenagh range which forms a long series of prominent ridges, uplands and valleys

[41] https://www.iwea.com/images/files/iwea-report-2018.pdf

that stretch in a broad arc for approximately 35km between Magilligan in the north to the Sperrin Mountains in the south. It is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau at approximately 380m high. There is an existing wind farm on Rigged Hill and a television relay antenna on Donald's Hill to the immediate south the distinctive sweeping profile of Benbradagh forms a prominent outcrop in the range at approximately 450m high.

3.120. The Original Consented Development (REF: B/2009/0070/F) of c. 92.4 hectares in size is currently rough upland grazing land. This Environmental Statement (ES) only focuses on the area which will be amended from the original, c. 6.12 hectares. Some minor construction works have commenced for the Original Consented Development.

3.121. There are three disused quarries below the Proposed Development site in the side of Smulgedon Hill, and several other quarries in hillsides in the surrounding area. Gortnamoyagh forest is a large plantation on the south western and north eastern sides of Smulgedon Hill. The land surrounding by the site rises relatively steeply from the surrounding public roads (c. 170m AOD) to the highest point located on the western side of the Proposed Development Site (290m AOD).

3.122. The Proposed Development is circumnavigated on its northern and eastern boundaries by the B64 Dungiven - Garvagh road and the B190 (Belraugh Road). There is also a narrow rural lane around the south and west sides of the Hill.

3.123. Site visits confirms that the land is predominantly used for rough grazing. The scoping response from the Agri-Environmental Scheme from DARD confirms that the land is of moderate agricultural quality i.e. Agricultural Land Classification (ALC) Grade 4 and does not come under the "*Best and Most Versatile*" Agricultural Land.

3.124. The land is owned and occupied by three local landowners.

ASSESSMENT OF POTENTIAL EFFECTS

3.125. The assessment of socio-economic, tourism and recreation and land-use effects aims to predict the likely impacts (both beneficial and adverse) arising from the Development.

Construction Phase Effects

Land-use Effects

3.126. It is estimated that the construction of the already Consented Development would result in the long-term loss of 3.97 ha of agricultural land (ALC Grade 4). However, some of this loss is only temporary (1.11 ha), including the storage and assembly areas will be re-instated following construction, whilst turbine foundations and crane pads would be permanent (2.86 ha).

3.127. Agricultural activities will be temporarily affected by the Development and will require to be halted during the main construction phase for Health and Safety Reasons. Any temporary loss of revenue as a result of halted agricultural activities is likely to be offset by the rents paid to the landowners for allowing the Development to be located here. The phasing of the construction programme, both in terms of time and location, will be discussed and agreed with landowners and any tenants to minimise disruption.

3.128. Changes to land-use within the Site during the construction phase would be of medium magnitude (see Table 3-4), albeit temporary. Combined with a low sensitivity receptor (lands at the proposed development fall within the Binevenagh Landscape Character Area (LCA)), the land-use effects would be considered short-term minor adverse (see Table 3-5) and Not Significant in terms of the EIA Regulations.

Mitigation Measures and Residual Effects

3.129. There are no significant effects predicted during the construction phase of the Development. Therefore, no further mitigation is required and therefore residual effects are minor (temporary adverse).

Socio-Economic Effects

3.130. There are no established guidelines to inform the assessment of social and economic impacts of proposed wind farms. Therefore, professional judgement has been used throughout the assessment, informed by desk-based research and consultation where applicable.

Risk to Public Safety

3.131. Construction sites are inherently hazardous operations, and therefore are required to be managed such that risks are identified and appropriately addressed. Construction will be subject to the Construction (Design and Management) Regulations 2015[42]. These regulations oblige the developer to notify the Health and Safety Executive (HSE) of the project, and to establish a safety management system encompassing risk assessment, design measures and management instructions to ensure the safety of construction and operation staff and the public.

3.132. A detailed Construction Method Statement would be agreed with the Local Planning Authority prior to construction, including the following measures:

- the refuelling of vehicles occurs in designated areas such as the temporary compound area, away from nearby watercourses and farm land;
- construction and operation of the wind farm use no chemicals, other than lubricants contained with the turbine plant itself;
- reinstatement of areas such as turbine bases are re-seeded naturally without the use of chemical fertilisers;
- concrete is low in sulphates and is only used in demarcated areas away from sensitive locations; and
- there is no on-site batching of concrete.

3.133. With the appropriate systems in place, the risks to public safety during construction are considered to be **not significant.**

Direct Employment

3.134. It is estimated that the Development will result in significant construction contracts that would make up approximately 25% of the total construction cost for services and materials during construction.

3.135. Smulgedon Wind Farm Ltd will ensure that wherever possible, local contractors and employees are used in all aspects of wind farm development. The major opportunity lies during the construction phase when suitably qualified local firms are identified and invited to bid for a significant portion of the construction work, on tracks, foundations and buildings.

[42] https://www.legislation.gov.uk/uksi/2015/51/contents

Construction materials are normally sourced locally and local transport and plant hire companies used wherever possible.

3.136. Manufacture of the turbines will be by an established turbine manufacturer. Local sourcing of equipment and the turbines themselves is preferred whenever possible but it is constrained to some extent by the specialist nature of the equipment and the availability of appropriate resources locally.

3.137. There are a number of existing operational wind farms in Northern Ireland, which has resulted in local businesses having previous experience of wind farm construction, which in turn, will be advantageous to the process of tendering for contractors. Examples of direct opportunities for local contractors will include:

- Haulage
- Turbine base and access track construction
- The supply of building materials (e.g. fencing, concrete, cement, stone, etc.) and • Mechanical, electrical and supervisory services.

3.138. In 2009 the Irish Wind Energy Association (IWEA) produced a report entitled "*Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy*''. The document focuses on wind energy and its ability to produce jobs and investment. The report states that each MW of wind power comprises an investment of £1.5 million in the economy, generally. Approximately 30% of this is likely to be spent in Ireland on things such as construction, materials, solicitors, consultants etc. IWEA's analysis further determined that for every MW produced, 1.5 jobs in Ireland are created.

3.139. Taking this into account, the already consented development of 16.45MW will invest c. £24.7 million into Irelands economy and 25 jobs will be created. It is in fact estimated that the Development will generate up to 30 short-term construction jobs during the circa 8 month construction period. Given the levels of unemployment at the LGD level and in Northern Ireland, this represents a **temporary, beneficial effect of minor significance.**

Indirect Employment

3.140. It is likely that those who benefit from direct employment during the development and initial decommissioning/construction phases will have an indirect benefit on the wider economy when they spend their salaries. It is considered that this represents a temporary, beneficial effect of minor significance to the Local and Regional areas.

3.141. It is also anticipated that there will be local employment generated as an indirect result of the construction of the proposed wind farm. Indirect employment could include supply chain

benefits for local businesses, sub-contracted work relating to the transportation of labour and materials, and expenditure by construction employees in the local economy.

3.142. The local impact of supply chain spin-offs and sub-contractor work will depend upon local capacity. In terms of local skills, it is considered feasible that during the construction process there will be opportunities for those employed to develop skills that will be of benefit to the local economy in the longer term, such as in project management and/or construction skills, and that are transferable to other potential wind farm developments.

3.143. Overall, construction of the wind farm will bring about a **short term, minor beneficial effects** through an increase in direct and indirect employment and business opportunities, but this will not result in any fundamental or long term changes in population, structure of the local community, local services or employment.

Mitigation Methods and Residual Effects

3.144. Smulgedon Wind Farm Ltd will seek to ensure positive benefits for the local area during construction of Smulgedon wind farm by using local labour, manufacturers and suppliers where possible.

3.145. Construction of the wind farm will be conducted according to The Construction (Design and Management) Regulations 2007. In line with these regulations, contractors tendering for work will be asked to demonstrate appropriate health and safety records and environmental good practice.

3.146. No significant effects are anticipated on social or economic receptors during the construction phase and therefore no mitigation is required. Consequently, there will be no residual effects.

3.147. Some minor construction works have already commenced for the Original Consented Development. It should be considered that the changes are very minor and will not materially affect the original conclusions for the consented wind farm development. The development will proceed in any event whether on the basis of the Original Consented Development or this Amendment Application (if approved).

Tourism and Recreation Effects

Public Access and Recreation

3.148. The proposed wind farm site itself is not currently used for public recreation given its current use as agricultural land and will not be used for public recreation during the construction phase.

3.149. No sections of the B64 road will be required to be closed or diverted during the construction phase of the Development. The Ulster Way long distance trail runs from north to south across the centre of the study area between the Sperrins and the north coast. It then follows the

coast north eastwards. The Ulster Way and North Sperrins Waymarked Way both pass the western and northern boundaries of the Proposed Development following the existing road network and into Gortnamoyagh Forest. They will not require diversion or closure. When construction is due to commence, notices will be put up together with details of any areas with restricted access for Health and Safety reasons.

3.150. A detailed assessment of the visual impacts of the wind farm on surrounding scenic areas including the Sperrin AONB and the North Sperrins Scenic Route has been carried out in **Chapter 4: Landscape and Visual Impact Assessment** of this Environmental Statement.

3.151. Indirect and intermittent effects on noise levels and air quality along with increased traffic may be experienced at some of these receptors, however these will be minimised through the implementation of an Outline Construction Environmental Management Plan (OCEMP) and the application of good practice guidance as described in Chapter 9: Noise, Chapter 11: Traffic and Transport and Chapter 12: Miscellaneous Issues of this ES, respectively. Effects are anticipated to be of **negligible significance** and temporary (c. 8 months of the construction phase of the Development).The original consented wind farm (**B/2009/0070/F**) did not identify any significant adverse effects on any recreational routes from the construction of the Proposed Development. Due to the minor amendments that are being made to the application (i.e height to the tip of the turbines is being reduced from 120.5m to 114.9m and rotor diameters are being increased from 70m to 82-90m), it is anticipated that there will be still be **no significant effects on recreational routes.**

Tourism

3.152. As noted above, the site is currently used for agriculture and grazing sheep and as such is not important for tourism in the local area. Based on this and considering the length of the construction programme (c. 8 months), the construction of the wind farm is predicted to have a **negligible effect** on tourism in the local area and is therefore considered **Not Significant.**

Mitigation measures and Residual effects

3.153. There are **no significant effects** upon tourism and recreation as a result of the Development. predicted during the lifetime of the Development. As a consequence of there being no requirement for mitigation, in addition to that embedded in the wind farm design, the significance of residual effects is as described above.

3.154. A coherent design and the implementation of an Outline Construction Environmental Management Plan (OCEMP) has sought to minimise such effects, as also set out in **Chapter 4: Landscape and Visual Impact Assessment**.

Operational Phase Effects

Land-use Effects

3.155. During the operational phase, the land-use at the Site would undergo change relative to the baseline, which is currently used for rough upland grazing. This will involve a change to a dual use site supporting its current agricultural regime and renewable energy generation (7 wind turbines). Rough upland grazing will continue essentially as per the baseline scenario. The value of the land would increase substantially relative to the baseline, resulting in a beneficial change of **medium magnitude.**

3.156. It is estimated that the construction of the already Consented Development would result in the long-term loss of 3.97 ha of agricultural land (ALC Grade 4). However, some of this loss is only temporary (1.11 ha), including the storage and assembly areas will be re-instated following construction, whilst turbine foundations and crane pads would be permanent (2.86 ha). Grade 1 land is of an excellent quality, whilst Grade 5 land has very severe limitations for agricultural use. Grade 4 land therefore is not considered *'Best and Most Versatile'* and so is appropriate for a development of this nature.

3.157. Grade 4 land is considered to be of **low sensitivity** and given the large expanses of land with similar ALC grades locally and nationally, the loss of this agricultural land is considered to be of **low magnitude**. Therefore, the loss of this land will result in an **adverse and negligible effect and hence, is not significant in terms of EIA regulations.**

3.158. Smulgedon wind farm will provide a form of rural diversification in the area through rental income from the turbines. Generally, the new income stream derived from wind farms helps sustain the economic viability of the farm business on which they are situated. These new finances allow investment in other aspects of the farm business, which in turn can have a spin off in terms of wider local economic benefit. On this basis, the positive impact of the wind farm on land-use is considered to be of **minor beneficial significance.**

Mitigation measures and Residual effects

3.159. No significant effects are anticipated on land-use during the operational phase and therefore no mitigation is required. Consequently, there will be no residual effects.

Socio-Economic Effects

Risk to Public Safety

3.160. Wind turbines are designed to operate at a high standard of safety. However, malfunctions or design faults can occur. The few cases of injury reported have been confined to operational staff and have been caused by a failure to observe manufacturer and operator instructions. Indeed, it has been reported that no member of the public has been injured by a wind turbine.

3.161. Smulgedon Wind Farm Ltd (part of the Randolph Renewables Group) is an experienced wind farm operator and will adhere to the highest standards of operational safety. It is considered that there will be a low risk to public safety and therefore the impact is of **negligible significance and therefore Not Significant in terms of EIA regulations.**

3.162. Whilst access to the site will be restricted, given the current use of the land for private forestry, access will not be actively promoted.

Direct Community Benefit

3.163. There is an agreement in place with 'The Community Foundation for NI' to make annual payments into a community fund that will be open to local applications once the wind farm is energised. Through the public consultation process a number of direct agreements have been agreed with various local community organisations to whom additional contributions will be made. This represents a **long-term and positive effect of Minor significance at a local scale**.

Direct Employment

3.164. The operational periodic maintenance will be required to be undertaken by a specialist maintenance team. Employees are likely to include a part time maintenance engineer (local site operator) and a small number of staff to occasionally service the turbines. Overall, it is estimated that the operational phase of the Development will generate two Full Time Equivalent posts that will safeguard the existing jobs at the site for the 30-year operational lifetime. It is considered that this represents a permanent, but reversible effect of minor beneficial significance.

3.165. The wind farm will financially benefit the local authority and the local landowners who will receive payments for leasing their land. In addition to land owner rents, the Development would be liable for non-domestic rates, the payment of which would contribute to public sector finances. This represents **long-term, beneficial effect of minor significance.**

Indirect Employment

3.166. Based on the low level of employment likely to be generated from operation of the wind farm, the potential for indirect employment opportunities is limited. The impact is therefore beneficial but considered to be of a **minor significant effect.**

Renewable Energy

3.167. The operational phase of the scheme will provide 16.45MW of electricity generation, providing Northern Ireland with renewable electricity from a local source that will address issues of the security of imported fuel supply. The impact is to the regional economy over an extended period of time (30 years). This generation of renewable energy is expected to result

in a moderate magnitude of impact to a receptor of medium sensitivity (the regional economy). The resulting **significance of impact is moderate beneficial.**

Mitigation measures and Residual effects

3.168. Although there will be limited employment opportunities during the lifetime of the wind farm, Smulgedon Wind Farm Ltd will seek to secure positive benefits for the local area by using local labour, manufacturers and suppliers where possible and if required.

3.169. No significant adverse impacts are predicted from operational activities on social and economic conditions; therefore the residual impacts are as detailed above.

Tourism and Recreation

3.170. The operation of the wind farm will not have any adverse direct effect on recreational and tourist facilities in the surrounding area. Surveys of public attitudes to wind farms provide no clear evidence that the presence of wind farms in an area impacts negatively upon tourism (**Please see Public Attitudes towards Wind Farms above**), therefore effects upon tourism and recreation are anticipated to be **negligible and not significant.**

3.171. Nearby recreational PRoWs, including the Ulster Way will be subject to indirect effects during the operational phase. An operational noise assessment has been undertaken in **Chapter 9: Noise**, which concluded that the change will be negligible from the baseline. Visual effects of the consented turbines on the nearest PRoW, the Ulster Way, are fully assessed in **Chapter 4: Landscape and Visual Impact Assessment** (Viewpoints 2 and 12 are located on the Ulster Way), which concludes that the effects are of imperceptible to moderate significance. The recreational amenity of users of these receptor locations is influenced by many factors in addition to visual amenity, including fresh air, a feeling of space, exercise, company, etc., and none of these factors would be affected in any way by the Development. The overall change in recreational amenity is assessed as being **minor and not significant in terms of EIA Regulations.**

3.172. Wind farms can provide useful destinations for educational visits. As such the Development has the potential to provide **long-term, minor beneficial effects to local tourism and recreational facilities.**

Mitigation measures and Residual effects

3.173. No significant adverse effects are predicted from operational activities on social and economic conditions including tourism and recreation activities. Therefore, the residual impacts are as detailed above.

Decommissioning Phase Effects

3.174. It is assumed that the decommissioning phase would largely be a reversal of the installation process and will be subject to the same constraints. The residual impact on the site is limited to the continued presence of the foundations and access tracks. All other structures can be removed from the site.

3.175. At the end of the wind farm's operational life, Smulgedon Wind Farm Ltd proposes to decommission the scheme. If the proposed changes to the wind farm obtains planning approval it is expected that a similar planning condition to that already attached, the Original Consented Development will be included for the decommissioning of the site in accordance with a scheme agreed in writing with CCGBC

3.176. Effects from the decommissioning phase are likely to be similar in nature to the construction phases and therefore, there will be **no significant adverse effects** upon socioeconomic, tourism or recreation as a result of the already consented Development. No significant effects were identified in the original consent and as this amendment application makes only minor changes to the turbines, including reducing the height to tip and increasing the rotor diameter, these results are considered still relevant.

Land-use Effects

3.177. During the decommissioning phase, the principal land-use at the Application Site would change to a construction site. Actual decommissioning work would be localised to the existing and proposed infrastructure, with the majority of the Site remaining as agriculture. It is expected that sheep would cease to be grazed within the more immediate confines surrounds of the Site, for health and safety reasons.

3.178. Changes to land-use within the Site during the decommissioning phase would be of medium magnitude, albeit temporary. Combined with a low sensitivity receptor, the land-use effects would be **minor and not significant** in terms of the EIA Regulations

Mitigation Measures and Residual Effects

3.179. **No significant effects** are anticipated on land-use during the decommissioning phase and therefore no mitigation is required. Consequently, residual effects will not change from those assessed above.

3.180. The Development is a temporary feature which, after its 30-year operational life will be removed or the life of the project will be extended subject to the granting of further planning permission and related consents. It is assumed that the decommissioning phase would largely be a reversal of the installation process and will be subject to the same constraints. The residual impact on the site is limited to the continued presence of the foundations and access tracks. All other structures can be removed from the site.

Socio-Economic Effects

Direct Employment

3.181. It is anticipated that the impacts on the local economy will be similar to that during the construction phase of the scheme. Direct employment will be created for local contractors increasing the economic return to the area. The effect of the decommissioning phase on direct employment is not expected to be as great as is anticipated for the construction phase. This is because the work required is less and therefore the amount of employees needed will also be less. Overall a **minor beneficial effect** is expected to be created for local jobs and the local economy during decommissioning

3.182. Given the levels of unemployment at the LGD level and in Northern Ireland, this represents a **temporary, beneficial effect of minor significance.**

Indirect Employment

3.183. It is likely that those who benefit from direct employment during the development and initial decommissioning/construction phases will have an indirect benefit on the wider economy when they spend their salaries. It is considered that this represents a temporary, beneficial effect of minor significance to the Local and Regional areas.

3.184. It is also anticipated that there will be local employment generated as an indirect result of the construction of the proposed wind farm. Indirect employment could include supply chain benefits for local businesses, sub-contracted work relating to the transportation of labour and materials, and expenditure by construction employees in the local economy.

3.185. The local impact of supply chain spin-offs and sub-contractor work will depend upon local capacity. In terms of local skills, it is considered feasible that during the construction process there will be opportunities for those employed to develop skills that will be of benefit to the local economy in the longer term, such as in project management and/or construction skills, and that are transferable to other potential wind farm developments.

3.186. Overall, decommissioning of the already consented wind farm will bring about a **short term, minor beneficial effect** through an increase in direct and indirect employment and business opportunities, but this will not result in any fundamental or long term changes in population, structure of the local community, local services or employment.

Mitigation measures and Residual effects

3.187. There are **no significant adverse effects** predicted during the decommissioning of the Development, therefore, no further mitigation is required and residual effects are as stated above.

3.188. Smulgedon Wind Farm Ltd will seek to ensure benefits for the local area during decommissioning by using local labour, manufacturers and suppliers where possible. Therefore, some **minor beneficial effects** are anticipated.

3.189. Decommissioning of the wind farm will be conducted according to The Construction (Design and Management) Regulations 2007 or those prevalent at the time. In line with these regulations, contractors tendering for work will be asked to demonstrate appropriate health and safety records and environmental good practice.

Tourism and Recreation

Public Access and Recreation

3.190. The proposed wind farm site itself is not currently used for public recreation given its current use as agricultural land and will not be used for public recreation during the construction phase.

Tourism

3.191. As noted above, the site is currently used for agriculture and grazing sheep and as such is not important for tourism in the local area. Based on this and considering the length of the construction programme (6-8 months), the construction of the wind farm is predicted to have a negligible effect on tourism in the local area and is therefore considered **Not Significant.**

Mitigation measures and Residual effects

3.192. No significant effects are anticipated for tourism and recreation during the operational phase and therefore no mitigation is required. Consequently, there will be no residual effects.

Predicted Cumulative Effects

3.193. This assessment considers the potential for significant effects to occur on relevant receptors when considering adding the Development to a cumulative baseline comprising the current baseline, plus other consented, but not built, wind farm development, and wind farm developments for which a valid planning application has been submitted. The other developments considered in the cumulative assessment include a mix of operational, consented but not constructed and pending wind farm applications out to 35km and smaller farm scale turbines out to 10km of the Proposed Development (**See Figure 4.10 of Chapter 4: Landscape and Visual Impact Assessment of this ES**).

3.194. It should also be noted that the other wind farms took account of the Original Consent for Smulgedon Wind Farm in their cumulative appraisals. As these wind farms were consented

and the changes to the Proposed Development are so minor, it can be concluded that effects should be acceptable Nonetheless, an assessment is outlined below.

Tourism and Recreation

3.195. **Table 3-13** details the wind farms included in the cumulative assessment for tourism and recreational receptors. A 20km radius was identified as an appropriate cumulative search area for this and single turbines were excluded as they are unlikely to have a cumulative effect on tourism and recreational receptors.

Table 3-13: Wind farms considered in the Cumulative Assessment

Wind Farm	Approximate distance and direction from the boundary of the Site	Status
Craiggore	c. 1.3- 2.2km north	Consented
Upper Ballyrogan	c. 3.5km northeast	Consented
Evishagran	c. 5km south	Consented
Rigged Hill	c. 5.5km north	In Planning
Brockaghboy	c. 6km south - southeast	Operational
Brockaghboy Extension	c. 7km southeast	Operational
Terrydoo Road 1	c. 7km north	In Planning
Terrydoo Road 2	c. 7km north	In Planning
Corlacky Hill	c. 9km south	In Planning
Cam Burn	c. 10km northeast	Consented
Dunbeg South	c. 10km north - northwest	In Planning
Dunbeg	c. 12km north	Operational
Dunbeg Extension	c. 12km north - northwest	Consented
Dunbeg Extension	c. 12km north - northwest	Consented
Altahullion I	c. 13km east	Operational
Altahullion II	c. 13km east	Operational
Dunmore	c. 13km north	Operational
Dunmore Extension	c. 13.5km north	Consented

Glenconway	c. 14km east	Operational
Ballyhanedin	c. 16km southwest	Consented

3.196. All effects on tourism and recreational receptors were assessed as minor or negligible, because of the low level of change that would occur to them from the Development, relative to the baseline scenario. The addition of any other wind farm sites to the baseline is not expected to alter this position. Craiggore, Dunmore Extension and Evishagaran are all proposed to be located close to the route of the Ulster Way. The effects of adding the Proposed Development to the cumulative baseline would be similar to the effects of the Development in isolation, and hence additional cumulative effects are assessed as **negligible, and not significant in terms of the EIA Regulations.**

Land-use Effects

3.197. It is estimated that the construction of the already Consented Development would result in the long-term loss of 3.97 ha of Grade 4 agricultural land, however, some of this loss is only temporary (1.11 ha), including the storage and assembly areas which will be re-instated following construction, whilst turbine foundations and crane pads would be permanent (2.86 ha).

3.198. The additional effect of the Development to the cumulative baseline on land-use is assessed as being **negligible and not significant** given the comparative size of the wider 35km study area, and the common occurrence of such land (Grade 4 agricultural land) within this study area compared to the actual land take of the Development

Socioeconomic Effects

3.199. This section considers the cumulative effects on direct employment opportunities and economic benefits, which would arise from the construction, operational and decommissioning phases of the Development, in conjunction with wind farms within 35km of the Site Boundary. The status of these schemes at the time of the assessment is shown in **Table 3-14 below.**

Table 3-14: Wind farms considered in socio-economic Cumulative Assessment

Wind Farm	Approximate distance and direction from the boundary of the Site	Status
Craiggore	c. 1.3- 2.2km north	Consented
Upper Ballyrogan	c. 3.5km northeast	Consented
Evishagran	c. 5km south	Consented
Rigged Hill	c. 5.5km north	In Planning

Brockaghboy	c. 6km south - southeast	Operational
Brockaghboy Extension	c. 7km southeast	Operational
Terrydoo Road 1	c. 7km north	In Planning
Terrydoo Road 2	c. 7km north	In Planning
Corlacky Hill	c. 9km south	In Planning
Cam Burn	c. 10km northeast	Consented
Dunbeg South	c. 10km north - northwest	In Planning
Dunbeg	c. 12km north	Operational
Dunbeg Extension	c. 12km north - northwest	Consented
Dunbeg Extension	c. 12km north - northwest	Consented
Altahullion I	c. 13km east	Operational
Altahullion II	c. 13km east	Operational
Altahullion III	c. 13km east	Operational
Dunmore	c. 13km north	Operational
Dunmore Extension	c. 13.5km north	Consented
Glenconway	c. 14km east	Operational
Ballyhanedin	c. 16km southwest	Consented
Barr Cregg	c. 21km west - southwest	In Planning
Garves	c. 23km east	Operational
Long Mountain	c. 23.5km east	Operational
Draperstown (Brackhaugh)	c. 24km south	Operational
Glenbuck II	c. 24km east	Operational
Glenbuck	c. 25km east	Operational
Eiglish Mountain	c. 27km southwest	Operational
Slieve Kirk	c. 28km west - southwest	Operational
Cloonty	c. 29km northeast	Operational

3.200. Wind farms that are operational or under construction are considered as 'baseline' wind farms. There is less certainty that consented and application stage wind farms will be constructed. 14 wind farms within 35km of the Development are consented and are application stage wind farms, and as such, the economic benefits arising from these schemes are yet to be realised.

Direct Employment

3.201. Should all of the schemes identified above be constructed and operated, it is considered that the cumulative effect on direct employment will be positive for the local study area. The contribution of the Development to this positive effect is assessed as being a **beneficial effect of minor magnitude.**

Indirect Employment

3.202. If all the schemes identified within 30km of the wind farm were to be constructed and operated, it is considered that there will be a **positive cumulative effect** on indirect economic benefits for those living and working within the local study area. The contribution of the Development will give rise to a **beneficial effect of minor magnitude**.

SUMMARY OF EFFECTS

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effects	Cumulative Effect
Construction / Decommissioning Phase					
Land-use					
Land-use	Direct, temporarily increased footprint and cessation of agriculture.	Minor	None	Minor (temporary adverse)	Negligible
Socio-Economic					
Risk to Public Safety	Direct, construction sizes are hazardous	Minor	Best practice health and safety guidelines will be adhered to.	Negligible (temporary adverse)	Negligible
Economic	Direct – job creation (beneficial) Indirect – Expenditure (beneficial)	Minor	None	Minor (temporary beneficial)	Minor (beneficial)
Tourism and Recreation					
Public Access and Recreation	Indirect – intermittent visual and acoustic changes (adverse)	Negligible	Good practice guidance and OCEMP will seek to minimise effects	Negligible (temporary adverse)	Negligible (adverse)
Tourism	Indirect – intermittent visual changes (adverse)	Negligible	None	Negligible (temporary adverse)	Negligible (adverse)

Operational Phase					
Land-use					
Land-use	Direct – increased site value and improved biodiversity	Minor	None	Minor (beneficial)	Negligible
Socioeconomic					
Risk to Public Safety	Direct – malfunctions / design faults	Negligible	Developer will adhere to the highest standards of operational safety	Negligible (adverse)	Negligible
Economic	Direct – job creation (beneficial) Indirect – Expenditure (beneficial)	Minor	None	Minor (beneficial)	Minor (beneficial)
Community Benefit	Direct – community fund	Minor	None	Minor (long-term beneficial)	Minor (long-term beneficial)
Tourism and Recreation					
Tourism and Recreation	Indirect - visual and acoustic changes	Minor	None	Negligible (long-term adverse)	Negligible (long-term adverse)

CONCLUSION

3.203. Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of 'major' or 'moderate' significance.

3.204. **No significant effects** are predicted for land-use as a result of the construction / decommissioning or operational phases of the Development. Furthermore, **no significant cumulative effects** are predicted for land-use. The land-use change is barely perceptible from the Original Consented Development, due to the very minor changes. These effects were deemed acceptable hence the original wind farm was approved.

3.205. **Minor Beneficial effects** on local employment in the Local (Causeway Coast and Glens) and Regional (Northern Ireland) areas are predicted during the initial construction / decommissioning phases of the Development. Once operational, the wind farm will generate 2 Full Time Equivalent posts at the site for the 30-year operational lifetime. The wind farm will also financially benefit the local authority and the local landowners who will receive payments for leasing their land. These effects are minor and not significant. Minor beneficial cumulative effects are also predicted.

3.206. **No significant effects on tourism or recreational receptors** have been identified during any phase of the Development and no significant cumulative effects are predicted on these receptors either. The tourism and recreational change are barely perceptible from the Original Consented Development, due to the very minor changes. These effects were deemed acceptable hence the original wind farm was approved. Therefore, it is expected that the effects form the minor changes from the Proposed Development will also be deemed acceptable.

Chapter 4: Landscape and Visual

4. LANDSCAPE AND VISUAL

INTRODUCTION

Background

4.1. Neo Environmental Ltd has been appointed by Smulgedon Wind Farm Ltd (the "Applicant") to undertake the Landscape and Visual Impact Assessment chapter of an Environmental Statement for a proposed amendment (the "Proposed Development") to a consented wind farm (**Planning Reference B/2009/0070/F**) on lands at Smulgedon Hill, BT49 OPY (the "Application Site"). The original consented development ("Original Consent") consists of seven wind turbines of 120.5m to tip. Please see **Figure 4.1: Appendix 4A, (Volume 3)** for the layout of the Proposed Development.

4.2. For the purposes of this Environmental Statement (ES) the larger consented development area that constitutes the original wind farm and all associated infrastructure will be referred to as "the Original Application Area".

Development Description

4.3. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all seven turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

4.4. For a full description of the Proposed Development and the various elements, please see **Chapter 1: Introduction** of this Environmental Statement.

4.5. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Site Description & Receiving Environment

4.6. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Magilligan in the north to the Sperrin Mountains in the south.

4.7. The area that encompasses the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N414740 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

4.8. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current land use within the land holdings is grazing, with heath, unmanaged grasslands, and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

Scope of Assessment

4.9. This LVIA chapter will provide an assessment of the potential effects of the Proposed Development on the existing landscape and visual amenity of the Application Site and surrounding area. The scope of the study zone for this assessment is extended to 35km from the Application Site, in line with current best practice guidance based on the proposed turbine height. The approach taken will follow the guidelines set out in the "Guidelines for Landscape and Visual Impact Assessment, 3rd Edition" (GLVIA3), produced by the Landscape Institute and the Institute of Environmental Management and Assessment. In accordance with the GLVIA3 guidance, the level of assessment is proportional to the Proposed Development's scale, type and likely effects. A previous LVIA assessment was produced for the consented wind farm in 2009[1] and was consulted as a basis to produce this updated assessment, including the aforementioned amendments. The supporting figures within the original assessment have been updated to account for the amendments and changes to best practice.

[1] Soltys Brewster Consulting (SBC) (2009) Technical Appendix A6: Landscape and Visual, and Volume 2: Figures, in *Smulgedon Wind Farm Environmental Statement.*

4.10. While landscape and visual effects are closely related, they are separately assessed in this statement.

- Landscape effects as a result of the Proposed Development, may be defined as changes in the physical landscape which may give rise to changes in its character and quality, landscape patterns, designations, features and elements.
- Visual effects as a result of the Proposed Development, comprise changes to the composition of existing views and visual amenity experienced by people such as residents, and recreational or vehicular users.
- Cumulative landscape and visual effects with other similar existing, consented (not constructed) and in-planning projects, will also be considered where appropriate.
- These effects may be direct or indirect, adverse (negative), beneficial (positive), or neutral. They may vary in duration from short to long term and have irreversible or reversible effects.

4.11. The statement is supported by the following Figures and Technical Appendices:

- Appendix 4A: Figures (Volume 3)
    - Figure 4.1a – Smulgedon Wind Farm Aerial Photography to 15km
    - Figure 4.2b – Smulgedon Wind Farm Aerial Photography
    - Figure 4.2 – Landform Map to 15km
    - Figure 4.3a - Regional Landscape Character Areas (35km)
    - Figure 4.3b – Local Landscape Character Areas (35km)
    - Figure 4.3c – Northern Ireland Seascape Character Areas (35km)
    - Figure 4.4a – Landscape Designations with ZTV (35km)
    - Figure 4.4b – Landscape Designations with ZTV (15km)
    - Figure 4.5 – Roads & Waymarked Routes with ZTV
    - Figure 4.6 – Viewpoint Selection
    - Figure 4.7a - Hub Height ZTV with Viewpoints (A3)
    - Figure 4.7b - Hub Height ZTV with Viewpoints (A1)
    - Figure 4.8a – Blade Tip ZTV with Viewpoints (A3)

- Figure 4.8b – Blade Tip ZTV with Viewpoints (A3)
- Figure 4.9 - Comparative ZTV with Consented Development
- Figure 4.10 - Cumulative Map
- Figure 4.11 - Comparative ZTV with Existing/Consented Wind Farms (35km)
- Figure 4.12 - Comparative ZTV with Existing/Consented Wind Farms (10km)
- Figure 4.13 - 4.20 - Comparative ZTV with Existing/Consented Wind Farms individually (x 8 no.)
- Figure 4.21 - Comparative ZTV with All Proposed Windfarms
- Figure 4.22 - 4.26 Comparative ZTV with All Proposed Windfarms individually (x 5 no.)
- Figure 4.27 to 4.46 Viewpoints, Photomontages and Wireframes (x 20 no. of each)

- Appendix 4B: LVIA Methodology (Volume 4)
- Appendix 4C: Character Areas (Volume 4)

Statement of Authority

4.12. This LVIA was prepared by Ronan Finnegan BSc PGDip LA CMLI, who is a Chartered Landscape Architect with over 12 years of consultancy experience. Whilst working at Neo Environmental Ronan has gained particular experience in undertaking LVIAs for a range of development types including energy, housing and infrastructure. Ronan has previously worked on over 1GW of solar photovoltaic (PV) energy development projects located throughout the UK and Ireland and a range of windfarm and single turbine developments.

Consultation

4.13. A pre-application meeting was undertaken by Neo Environmental with Cathy McKeary, planner at Causeway Coast & Glens Borough Council on the 28th of June 2019. A number of matters in relation to the LVIA were discussed which are outlined below. Previous consultations were undertaken in 2008 for the Consented Development with Limavady Borough Council, the Department of Agriculture and Rural Development (DARD): Countryside Management Branch, the Forest Service, the Northern Ireland Environment Agency (NIEA): Coast and Countryside Department (NIEA) and the Landscape Architects Branch of Planning Service (LAB).

Table 4.1: Consultation Responses

Consultee	Type/Date of Consultation	Issues Raised	Response/action taken to issues raised
Causeway Coast & Glens Borough Council	Pre-Application Meeting (28th June 2019)	Consideration of the previous viewpoints	Addressed within this chapter of the ES

LEGISLATION AND PLANNING POLICY CONTEXT

4.14. This LVIA has been considered with regard to all relevant national, regional and local planning policy and guidance:

- Planning Policy Statement 18: Renewable Energy (2009)[2]
- Planning Policy Statement 18 SPG: Wind Energy Development in Northern Ireland's Landscapes (August 2009)[3]
- Strategic Planning Policy Statement for Northern Ireland (SPPS)[4]
- Planning Act (Northern Ireland) 2011[5]
- The Regional Development Strategy for Northern Ireland (2010)[6]
- Northern Area Plan 2016[7]

4.15. The most relevant policy documents to this impact assessment are discussed in more detail below.

Planning Policy Statement 18: Renewable Energy (2009)

4.16. Planning Policy Statement 18 (PPS 18) sets out the planning policy for development in relation to wind energy and other forms of renewable energy. This PPS is supported by PPS 18: Best Practice Guidance and the Supplementary Planning Guidance (SPG) "Wind Energy Development in Northern Ireland's Landscapes" (August 2010).

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[2] Department of the Environment (DoE) (2009) *Planning Policy Statement 18: Planning, Archaeology and the Built Heritage* DoE: Belfast.

[3] Department of the Environment (DoE) (2009) *Planning Policy Statement 18 SPG: Wind Energy Development in Northern Ireland's Landscapes*. DoE: Belfast.

[4] NI Government (2015) Strategic Planning Policy Statement for Northern Ireland: Planning for Sustainable Development. NI Government: Belfast.

[5] NI Government (2011) Planning Act (Northern Ireland). NI Government: Belfast.

[6] Department for Regional Development (2010) *Regional Development Strategy (RDS 2035): Building a Better Future.* NI Government: Belfast.

[7] Department of the Environment (DoE) (2016) *Northern Area Plan 2016: Plan Strategy and Framework*. DoE: Belfast.

Policy RE 1 Renewable Energy Development

"Development that generates energy from renewable resources will be permitted provided the proposal, and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on:

(a) public safety, human health, or residential amenity;

(b) visual amenity and landscape character;

(c) biodiversity, nature conservation or built heritage interests;

(d) local natural resources, such as air quality or water quality; and

(e) public access to the countryside.

Proposals will be expected to be located at, or as close as possible to, the source of the resource needed for that particular technology, unless, in the case of a Combined Heat and Power scheme or a biomass heating scheme, it can be demonstrated that the benefits of the scheme outweigh the need for transportation and an end user is identified. Where any project is likely to result in unavoidable damage during its installation, operation or decommissioning, the application will need to indicate how this will be minimised and mitigated, including details of any proposed compensatory measures, such as a habitat management plan or the creation of a new habitat. This matter will need to be agreed before planning permission is granted. The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given significant weight in determining whether planning permission should be granted. The publication Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy' will be taken into account in assessing proposals.

Wind Energy Development

Applications for wind energy development will also be required to demonstrate all of the following:

(i) that the development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size and siting of turbines;

(ii) that the development has taken into consideration the cumulative impact of existing wind turbines, those which have permissions and those that are currently the subject of valid but undetermined applications;

(iii) that the development will not create a significant risk of landslide or bog burst;

(iv) that no part of the development will give rise to unacceptable electromagnetic interference to communications installations; radar or air traffic control systems; emergency services communications; or other telecommunication systems;

(v) that no part of the development will have an unacceptable impact on roads, rail or aviation safety;

(vi) that the development will not cause significant harm to the safety or amenity of any sensitive receptors1 (including future occupants of committed developments) arising from noise; shadow flicker; ice throw; and reflected light; and

(vii) that above-ground redundant plant (including turbines), buildings and associated infrastructure shall be removed and the site restored to an agreed standard appropriate to its location.

Any development on active peatland will not be permitted unless there are imperative reasons of overriding public interest.

For wind farm development a separation distance of 10 times rotor diameter to occupied property, with a minimum distance not less than 500m, will generally apply. The supplementary planning guidance 'Wind Energy Development in Northern Ireland's Landscapes' will be taken into account in assessing all wind turbine proposals."

PPS 18 SPG: Wind Energy Development in Northern Ireland's Landscapes (August 2009)

4.17. The SPG guidance[8] should be read in conjunction with the above Planning Policy Statement (PPS 18): Renewable Energy. The guidance seeks to provide "broad, strategic guidance in relation to the visual and landscape impacts of wind energy development". It is based on the sensitivity of the Local Landscape Character Areas to wind energy. The aims of the guidance include:

- *"Sets out the background to the Landscape Character Areas and special landscapes of Northern Ireland, and to wind energy development in these landscapes;*
- *Explains the approach and methodology that was used in this guidance to assess wind energy development in relation to the landscape of each Landscape Character Area;*
- *Contains general principles and guidance relating to wind energy development in the landscape and associated sensitivities, opportunities and challenges. This includes principles and guidance relating to site selection, siting, layout and design and the assessment of landscape, visual and cumulative impacts;*

[8] NIEA (August 2010) *Wind Energy Development in Northern Ireland's Landscapes*. Available at: https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/spg_other/supplementary_guidance_wind_energy_development_in_ni_landscapes-2.htm

- *Considers cumulative wind energy development in Northern Ireland's distinctive landscapes in October 2007 and highlights landscape issues that need to be carefully considered in the future;*
- *Provides practical guidance relating to the use of this guidance and the preparation and submission of wind energy proposals."*

4.18. Other key PPS which need consideration with regards to the Proposed Development and its interaction with both the natural and built heritage include:

- *PPS 2: Natural Heritage*
- *PPS 6: Planning, Archaeology and the Built Heritage*
- *PPS 6 (Addendum) Areas of Townscape Character*
- *PPS16: Tourism*

Strategic Planning Policy Statement for Northern Ireland (SPPS)

4.19. The final SPPS document was published in 2015 in order to facilitate sustainable development across Northern Ireland. The document states that the policy provisions of PPS are retained, and as such the information and objectives within the SPPS are supplementary to PPS. Of particular note is Section 6.221-227 within the document, which relates to Renewable Energy and the need to consider its potential impacts on the landscape. The SPPS recommends that the supplementary planning guidance 'Wind Energy Development in Northern Ireland's Landscapes' and other relevant practice notes should be taken into account when assessing all wind energy proposals

"6.221 Council should set out policies and proposals in their Local Development Plans (LDPs) that support a diverse range of renewable energy development, including the integration of micro-generation and passive solar design. LDPs must take into account the above-mentioned aim and regional strategic objectives, local circumstances, and the wider environmental, economic and social benefits of renewable energy development. Moratoria on applications for renewable energy development whilst LDPs are being prepared or updated are not appropriate.

6.222 Particular care should be taken when considering the potential impact of all renewable proposals on the landscape. For example, some landscapes may be able to accommodate wind farms51or solar farms more easily than others, on account of their topography, landform and ability to limit visibility.

6.223 A cautious approach for renewable energy development proposals will apply within designated landscapes which are of significant value, such as Areas of Outstanding Natural Beauty, and the Giant's Causeway and Causeway Coast World Heritage Site, and their wider settings. In such sensitive landscapes, it may be difficult to accommodate renewable energy

proposals, including wind turbines, without detriment to the region's cultural and natural heritage assets.

6.224 `Development that generates energy from renewable resources will be permitted where the proposal and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on the following planning considerations:

- public safety, human health, or residential amenity;
- visual amenity and landscape character;
- biodiversity, nature conservation or built heritage interests;
- local natural resources, such as air quality, water quality or quantity; and,
- public access to the countryside.

6.225 The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given appropriate weight in determining whether planning permission should be

The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given appropriate weight in determining whether planning permission should be granted.

6.226 Active peatland is of particular importance to Northern Ireland for its biodiversity, water and carbon storage qualities. Any renewable energy development on active peatland will not be permitted unless there are imperative reasons of overriding public interest as defined under The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended.

6.227 For wind farm development a separation distance of 10 times rotor diameter to occupied property, with a minimum distance not less than 500m, will generally apply."

The Regional Development Strategy for Northern Ireland (2010)

4.20. The Regional Development Strategy for Northern Ireland deals with the policy strategies for Northern Ireland up to 2035. There are no specific policies regarding landscape within the document but the section relevant to landscape is *"RG11: Conserve, protect and, where possible, enhance our built heritage and our natural heritage"*, which states that their aim for the protection, conservation and enhancement of the landscape is to:

- "*Recognise and promote the conservation of local identity and distinctive landscape character. Landscape character is what makes an area unique. It is defined as "a distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another, rather than better or worse". We can only make*

informed and responsible decisions on the management and planning of sustainable future landscapes if we pay proper regard to their existing character. By understanding how places differ we can also ensure that future development is well situated, sensitive to its location, and contributes to environmental, social and economic objectives. The Northern Ireland Landscape Character Assessment 2000 provides valuable guidance on local landscape character and scenic quality.

- *Conserve, protect and where possible enhance areas recognised for their landscape quality. Protected landscapes should continue to be managed through a partnership approach involving central and local government and the local communities.*
- *Protect designated areas of countryside from inappropriate development (either directly or indirectly) and continue to assess areas for designation. Designating special areas for protection is an effective way of ensuring our wildlife and natural landscapes retain their individual characteristics. Some areas are deemed of such importance that they are formally designated under various pieces of national and international legislation.*
- *Consider the establishment of one or more National Parks. This would conserve and enhance the natural, built and cultural heritage of areas of outstanding landscape value while promoting the social and economic development of the communities they support."*

Northern Area Plan 2016

4.21. The Northern Area Plan 2016 was adopted on the 22nd of September 2015 to cover Causeway Coast and Glens Borough Council, Coleraine Borough Council, Limavady Borough Council and Moyle District Council. Within the plan the policies which relate to protection, conservation and enhancement of the natural and built environments include:

ENV 1 Local Landscape Policy Areas Policy

- *"Planning permission will not be granted for development proposals that would be liable to affect adversely those features, or combination of features, that contribute to the environmental quality, integrity or character of a designated LLPA. Where development is permitted, it will be required to comply with any requirements set out for individual LLPAs in the District Proposals. Where riverbanks are included within the LLPAs, access may be required to the river corridor as part of the development proposals. Any access should not have an unacceptable adverse impact on the flora and fauna of the river corridor. Where proposals are within and/or adjoining a designated LLPA, a landscape buffer may be required to protect the environmental quality of the LLPA."*

ENV 2 Sites of Local Nature Conservation Importance Policy

- *"Planning permission will not be granted for development that would be liable to have a significant adverse effect on the intrinsic nature conservation interest of a designated Site of Local Nature Conservation Importance."*

ENV 3 Trees Policy

- *"Development that would result in the loss of trees, hedges or other features that contribute to the character of the landscape, or are of nature conservation value, will not be permitted unless provision is made for appropriate replacement planting and the creation of new features."*

ENV 5 Area of Significant Archaeological Interest

- *"Within the designated Area of Significant Archaeological Interest, planning permission will not be granted for proposals for large scale development, unless it can be demonstrated that there will be no significant impact on the character and appearance of this distinctive historic landscape. Particular attention will be given to the impact of proposals when viewed from the monuments and other critical viewpoints within the ASAI and on the character of the area experienced while moving in and around its various monuments."*

Policy OSR 1: Public Rights of Way and Permissive Paths

- *"Permission will not be granted for development proposals that would have an adverse impact on the route, character, function or recreational value of the Ulster Way, the National Cycle Network, public rights of way or permissive paths. Proposals that improve these routes will be permitted, provided the proposal is compatible with, and sensitive to, the local environment."*

ASSESSMENT METHODOLOGY

4.22. The methodology followed for this LVIA chapter is contained within **Appendix 4B, (Volume 4)**, in addition to the supporting figures which are referenced throughout this statement. The assessment is based on the final layout of the Proposed Development Layout (**Figure 4.1 of Appendix 4A, (Volume 3)** and various detailed structure drawings which accompany this planning application.

4.23. The LVIA has taken the following approach:

- Firstly, identify and evaluate the existing landscape and visual baseline within a 35km study zone;
- Determine the landscape and visual receptors that have potential to be affected considerably by the Proposed Development and assess their sensitivity to the proposed changes resulting from the Proposed Development; and
- Assess the interaction of the Proposed Development with the landscape and visual receptors, taking account of any mitigation measures in order to establish a judgement of the 'degree of effects' the Proposed Development will have upon each receptor.

4.24. The assessed 'degrees of effects' grades used within in this LVIA are provided in **Table 4-2** below. These effects are attained by combining the level of sensitivity with the level of magnitude of change to provide the effects upon each receptor. These effects are graded as **Very Significant, Significant, Moderate, Slight, Imperceptible or No Change**, either direct or indirect effects and can be characterised as adverse or beneficial. For the purpose of this statement those effects of **Significant and Very Significant** are considered 'significant' due to the type of development and the environment in which the proposal will be sited.

4.25. Although the table does not necessary provide a clear correlated value which is where professional judgment will be used in the LVIA on asserting a value.

Table 4.2: Significance of landscape and visual effects

Sensitivity (Susceptibility & Value)	Magnitude of Change				
	High	Medium	Low	Negligible	None
High	Very Significant	Significant	Moderate	Imperceptible	No Change
Medium	Significant	Moderate	Slight	Imperceptible	No Change

Low	Moderate	Slight	Slight	Imperceptible	No Change
Negligible	Slight	Not Significant	Imperceptible	Imperceptible	No Change
None	No Change	No Change	No Change	No Change	No Change

4.26. For the purpose of this assessment the potential duration of any predicted landscape and visual effects is grouped into five bands, based on the maximum proposed operational timeframe of the Proposed Development. The duration bands include: Temporary effects (less than one 1 Year); Short-Term effects (one to seven years); Medium-Term effects (seven to fifteen years); Long-Term effects (fifteen to thirty years); and Permanent effects (lasting over thirty years).

LANDSCAPE ASSESSMENT

Landscape Baseline

4.27. The purpose of collecting and describing the landscape baseline data for the study zone is to help establish the context of the landscape into which the Proposed Development is seeking to be located, later using this to assess the potential effects of the Proposed Development.

Designations

4.28. Landscape designations are landscapes which are noted as being highly valued and attributed special protection at national (statutory) to local level (non-statutory), to protect against inappropriate development. The various designation across the study zone are indicated on **Figure 4.4 of Appendix 4A, (Volume 3).**

4.29. Historic and ecological designations also contribute to the overall landscape character and quality; these are briefly outlined below and considered in detail within the respective Technical Appendices.

Statutory Designations

Areas of Outstanding Natural Beauty.

4.30. The Area of Outstanding Natural Beauty (AONB) designations have been legislated by the DoE under the Nature Conservation and Amenity Lands (N.I.) Order, 1985. These areas of landscape are noted for their distinctive character and quality, with the need to protect, conserve and enhance the landscape. Any development likely to be detrimental to the quality of the AONB will not be permitted.

4.31. Three AONB's falling within the study area including:

- Sperrin AONB - approximately 1km to the south of the Proposed Development.
- Binevenagh AONB - approximately 10km to the north of the Proposed Development.
- Causeway Coast AONB – approximately 27km northeast of the Proposed Development zone.

Sperrin AONB

4.32. The Sperrins AONB covers an expansive area of mountainous landscape of great geological complexity to the south of the Proposed Development. The AONBs nearest boundary runs along Gelvin Road located approximately 2.2km southwest of the Proposed Development.

4.33. The AONB was designated in 2008 under the Nature Conservation and Amenity Lands (NI) Order 1985 and lying in the heart of Northern Ireland. It stretches from the Strule Valley in the west to the perimeter of the Lough Neagh lowlands in the east this area presents vast expanses of moorland penetrated by narrow glens and deep valleys. In its south, the Burren area is noted for its lakes, sandy eskers and other glacial features. The area is rich in historic and archaeological heritage and folklore.

Binevenagh AONB

4.34. The Binevenagh AONB is noted for its distinctive plateau of Binevenagh Mountain and its contrast with the coastal lowlands around Magilligan Strand. The AONB nearest boundary is where it runs along the B66 Craigmore road near Ringsend, approximately 8.10km to the northwest of the Proposed Development.

4.35. The AONB was designated in 2006 and extends between the Roe Estuary and Magilligan, the cliffs of Binevenagh, the Bann Estuary and Portstewart sand dunes. The series of Sperrins Mountains ends at this point. The AONB is rich in natural and cultural heritage, with a number of National Trust properties including Portstewart Strand and Downhill Demesne.

4.36. Representative views have been selected from within both AONB designations looking towards the Proposed Development. The Viewpoints include nos. 8,9 and 13 from within the Sperrins AONB and nos. 18 and 19 from within Binevenagh AONB.

Causeway Coast AONB

4.37. The Causeway Coast AONB is noted for its rich coastal landscape along the North Antrim coastline, which include the Giants Causeway. The western edge of the AONB is located within the study zone to the east of Portrush and approximately 27km northeast of the Proposed Development.

4.38. The AONB was designated 1989 and includes a mix of rich natural, cultural and built heritage, including beaches, dramatic coastal cliffs and small fishing villages. The Giant's Causeway is outside of the study zone.

Countryside Policy Areas & Green Belt

4.39. The Countryside Policy Areas (CPAs) aims is to protect the countryside from under pressure of development, to protect the visual amenity and landscape quality and maintain the rural character. The CPAs within the study zone cover parts of the Sperrins and Binevenagh AONB, areas of coast around Derry and Portrush and part of the River Bann corridor between Ballymoney and Kilrea.

4.40. Green belts are located around the edges of the larger settlements within the study zone. Their purpose is to prevent unnecessary sprawl of urban area whilst protecting the surrounding countryside.

Local Landscape Policy Areas

4.41. Local Landscape Policy Areas (LLPAs) are small areas of lands within or adjoining settlements which have a high amenity value, landscape quality or local significance. They may include open spaces, woodlands, importance views, archaeological sites, historic buildings etc. There are several LLPA within and around the settlements across the study zone.

Areas of Especially High Scenic Amenity

4.42. Areas of Especially High Scenic Amenity (AEHSA) are designated by Donegal County Council and are noted for having the highest landscape quality across the county due to their wildness. The nearest AEHSA is to the west of Inishowen along the mountain range between the hills of Grinlieve and Crocknasmug, approximately 30-35km to the northwest of the Proposed Development.

Historic Parks, Gardens and Demesnes

4.43. Historic Parks, Gardens and Demesnes include a range of country houses and parkland which contribute to the local landscape character and are of historic importance. None of these designated lands are found near to the Proposed Development, those found across the study zone are listed below. The potential effects of the Proposed Development upon the setting of these Historic Parks, Gardens and Demesnes are further considered within Chapter 8 Archaeological and Cultural Heritage.

- County Antrim
  - Beardiville, Ballyhibstock House, Benvarden House, Leslie Hill, Moore Fort and Moore Lodge, O'Harabrooke,
- County Derry
  - Ampertaine House, Anderson Park, Ardmore, Ardnargle, Ashbrook, Ballyscullion House, Beech Hill, Bellarena, Cromore, Daffodil Garden, Dog Leap, Downhill, Drenagh, Dungiven Priory and Bawn, Enagh House, Guy Wilson, Knockan/ Ash Park, Lizard Manor, Moyola Park, Pellipar, Roe Valley Park, The Oaks and Templemoyle and Walworth.

Non-Statutory Designations

Recreational & Tourist Routes:

Waymarked Trails

4.44. The Ulster Way long distance trail runs from north-south across the centre of the study zone between the Sperrins and the north coast. The route then travels in an easterly direction along the coast. Both the Ulster Way and North Sperrins Waymarked Way pass along the surrounding lands near to the western and northern boundaries of the Proposed Development. The nearest section of these routes is approximately 897m to the northwest along a laneway and 1.57km to the west along Peter's Road,

4.45. Viewpoints 1 and 12 are representative views from these routes looking towards the Proposed Development.

Cycle Routes

4.46. The No. 93 National Cycle Network route runs from the coast to the Sperrins and then towards Derry. The nearest section of the route is approximately 9.0km to the northeast as it passes through the Roe Valley.

4.47. There are a number of Sperrins Cycle routes with the study zone which include long and shorter circular routes. The nearest route is the Eagle Glens route, a 22km route which starts and finishes within the village of Garvagh. The western section of the route directly passes along the B64 Legavallon road next to the Application Site.

4.48. Viewpoints 11 and 16 are representative of medium – long range views experience along the National Cycle Network looking towards the Proposed Development.

Scenic Driving Routes

4.49. The Sperrin Scenic Route is divided into four section, of which the North section falls within part of the study zone. This route is a 50 mile route which takes in a number of small towns and 13 points of interest which include a mix of natural landscape features and historic sites.

4.50. The North Sperrins Heritage Trail is a trail which largely follows the North Sperrins Scenic Route allowing easy access to several field monument within the Northern Sperrins landscape.

4.51. The Inishowen 100 route is located within County Donegal and follows the Inishowen Peninsula. The nearest section of the route is on the far northwestern end of the study zone between Quigley's Point and Stroove on the western side of Lough Foyle. This route follows part of the Wild Atlantic Way which starts off at Derry and continues along the same coastal road on the western side of Lough Foyle around the Inishowen Peninsula.

4.52. Viewpoints 1, 2, 3, 8, 15, 16 and 20 are representative of views looking towards the Proposed Development from along or near to sections of these scenic routes within the study zone.

Built Cultural Heritage

4.53. There are various historic buildings, grounds and archaeological site which are also an importance tourist attraction. Most of these are located along the coast, within the AONBs and the city of Derry.

4.54. There are several National Trust properties within the study zone which are noted for their rich cultural value and landscape features. The properties are key tourist attractions along the north coast. They include the Downhill Demesne and Hezlett which includes the Mussenden Temple and Portstewart Strand. None of these sites fall within the ZTV coverage of the Proposed Development.

4.55. Further details on the heritage assets can be found within **Chapter 8: Archaeological and Cultural Heritage**

4.56. Viewpoints 3, 6, 7, 16, 17, 19 and 20 are representative of views from or near tourist assets looking in the direction of the Proposed Development.,

Landscape Character Studies

4.57. The Northern Ireland landscape) has been defined into 26 broad Regional Landscape Character Areas (RLCAs) and more defined 130 Local Landscape Character Areas (LCAs)[9]. The neighbouring County Donegal Council has undertaken a landscape character assessment for the county, defining the county's landscape into 44 LCAs. The coastal and marine areas have been assessed as part of a Seascape Character Assessment (SCAs) for both Northern Ireland and County Donegal.

4.58. These LCAs and SCAs were reviewed as part of the baseline study through desk and when undertaking the site surveys. The existing landscapes are broadly similar to the key characterises and description of each of the LCAs and SCAs. There are 12 Regional LCAs, 29 LCAs and five SCAs within the study zone, the boundaries of which are shown in **Figure 4.3, (Volume 3)**. The key characteristics of the RLCA, LCAs and SCAs are described in **Appendix 4C, (Volume 4).**

4.59. The following describes the characteristics of the RCLA 10 Binevenagh Ridge and LCA 36 in greater detail here because the Proposed Development is located within it.

Regional Landscape Character Areas

[9] Department of Agriculture, Environment and Rural Affairs, (2000 &2016) Landscape Character of Northern Ireland. Available at: https://www.daera-ni.gov.uk/articles/landscape-character-northern-ireland

RLCA 10 Binevenagh Ridge:

4.60. The Binevenagh Ridge is described as:

"a ridge of basalt running north-south from the coast to the Sperrin mountains. The ridge is marked by the pronounced west-facing scarp slopes which drop steeply down to the Roe valley to the west, and more gently to the Bann Valley in the east. The western scarp is formed of a series of distinct peaks separated by lower saddles. The most prominent, from north to south, are Binevenagh (385m), Keady Mountain (337m) and Donald's Hill (399m). Further south this form is mirrored by Benbradagh (465m), which represents the northern extent of the higher Sperrin range.

The distinct ridgeline marks the transition from upland to lowland displays a change from moorlands and bogs towards pastures of an open nature with stone walls appearing infrequently. Extensive swathes of the upland are covered in coniferous forestry which has been planted in angular forms. Deciduous woodland is restricted to the glens and steeper slopes, particularly the lower slopes of Binevenagh mountain. The exposed cliffs of Binevenagh support important alpine plant communities. The upland area is sparsely populated, though there are scattered dwellings in the glens along the Roe Valley. Further east the area becomes increasingly settled, with the main settlements of Macosquin and Ringsend on more sheltered ground. There are a number of hard rock quarries in this RLCA. Rigged Hill and Dunbeg wind farms are sited on the ridge, where they are visible from both east and west, and there is a series of small communication masts.

To the north of RLCA 10 the mountain of Binevenagh dominates the surrounding landscape. It falls away dramatically with a cliff-like escarpment which is particularly prominent when viewed from the north and west at the flat low lying alluvial plain which extends around Lough Foyle taking in Magilligan. The mountain, and its relationship to the strand below, forms the centrepiece of the Binevenagh Area of Outstanding Natural Beauty".

4.61. Key Characteristics

- A ridge of basalt hills running north-south, with a very distinct western scarp and gentler east-facing slopes.
- A distinct series of west-facing hills march south from Binevenagh, defining the edge of the Roes valley and joining with the Sperrin range at Benbradagh.
- Moorland hilltops give way to upland pasture across the more gentle eastern slopes, sloping down to merge with the Bann Valley farmland.
- The dramatic cliff-like escarpment of Binevenagh dominates the flat lowland landscape to the north and west. The relationship between Magilligan and Binevenagh is essential to the perception of both areas.

- Extensive plantations of coniferous forest are found along the ridge from north to south.
- Sparsely populated upland with more settled slopes, and strong east-west links across the lower saddles of the hills.
- Broad views eastward over the Bann Valley, and westward across Lough Foyle and Magilligan to Inishowen in County Donegal.
- Frequent visitor facilities including car parks and trails in the north within the AONB, though the southern part of the RLCA is less accessible.

4.62. Past, present and future forces for change

- Renewable energy:

"Northern Ireland's first wind farm was commissioned at Rigged Hill in 1994. Since then, the Binevenagh ridge has seen several wind farm developments, and there are more consented proposals awaiting construction. Landscape sensitivity studies may be required to determine the potential for the landscape to absorb further development of wind farms or single turbines, without adverse impacts on the character of the ridge and the adjacent low landscapes, including cumulative effects."

- Management plans:

The presence of the AONB designation places Binevenagh among Northern Ireland's most valued landscapes. The Binevenagh AONB Management Plan and Action Plan set out issues and opportunities for the enhancement of landscape and promotion of access across the AONB area and represent a driver for positive change in the area.

4.63. The Proposed Development is located in the southern end of the Binevenagh Ridge RLCA, set outside of the AONB and back from the open ridge tops of Rigged Hill and larger hills within the RLCA.

Local Landscape Character Areas

LCA 36: Binevenagh

4.64. The key characteristics of this LCA include:

- sloping upland basalt plateau ending at a dramatic, cliff-like escarpment
- escarpment summits have a distinctive profile and form a sequence of local landmarks
- large-scale mosaic of upland moor and extensive conifer plantations

- open, exposed upland moors, with few native trees or field boundaries
- rocky outcrops and scree slopes reveal grey basalt rock
- patchy, textured pattern of moorland grass, heather, rushes and stunted scrubby bushes

4.65. Landscape Condition and Sensitivity to Change

"The most significant pressure on this upland moorland is from conifer plantations, most of which have hard edges and shapes which seem unsympathetic in relation to views and landform. The distinctive slope profiles of the escarpment summits are landmarks for miles around and any development or conifer planting in these areas would detract from their scenic quality. The historic field pattern of the marginal upland pastures on the western fringes of the ridge are also particularly sensitive to change and mass planting, new built development or poor quality conversions could all have a detrimental impact on these highly visible slopes.

The open upland plateau is also an extremely sensitive landscape where any built development would represent an intrusion. The conifer plantations are a temporary landscape element and could therefore not act as an effective screen. Wind farms and transmission masts may have a detrimental influence, particularly if they are sited close to escarpment summits."

4.66. The Proposed Development is located in the centre of the Binevenagh LCA, with the smaller Smulgedon Hill set back from the more prominent hills and ridgelines found within this LCA.

The Site and Surrounding Environment

The Site

4.67. The Proposed Development is located upon Smulgedon Hill, which is part of the Binevenagh range which forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Magilligan in the north to the Sperrin Mountains in the south, covering parts of two AONBs. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau at approximately 380m high.

4.68. The Application Site itself is contained within 6.12 hectares of open lands across Smulgedon Hill, with an elevation of approximately 210m – 290m AOD. The land consists of large areas of rough grassland and some smaller areas of improved grassland. The Application Site is divided by the B64 Legavallon Road with the site's roadside boundaries enclosed by a mix of low hedgerow and post and wire fencing.

The surroundings

4.69. Across the wider extent of Smulgedon Hill are a disused quarry on its western side and the, large Gortnamoyagh forest plantation on the south western and north eastern sides of the hill.

The forestry and steep topography of the hill help to shield the visibility of the Proposed Development from many of the nearest receptors. There are no residential properties directly adjacent to the Proposed Development. There are several properties to the southwest further along the B64 Legavallon Road and to the west along Temple and Peters Roads. The nearest settlement is the small village of Drumsurn 4km to the northwest of the Proposed Development. The nearest larger settlement are the towns of Limavady 10.5km to the north west, Dungiven 10km to the south west and Garvagh 8.5km to the east of the Proposed Development.

4.70. Across the surrounding landscape the arc of hills is very prominent with their distinct ridges and plateaus. Upon these hills are the vertical television mast on Donald's Hill approximately 3.5km to the north and the existing Rigged Hill windfarm approximately 4.77km to the north.

Wind Energy across the Study Zone

4.71. Wind energy in the form of single farm scale turbine to large clusters of windfarms has become a much more prevalent feature in the landscape since the time of the Original Consent.

4.72. The nearest operational windfarms include Rigged Hill (10 turbines), located 4.77km to the north and Brockaghboy and its extension (13 turbines) 5.84km to the southeast. The consented Craiggore windfarm located 1.9km to the northeast is currently in the very early stages of its construction with no turbines are currently installed. Other operational clusters of windfarms across the wider study zone include the Altahullion and Glenconway windfarms (41 turbines) 12.5km approximately to the west and the Dunbeg and Dunmore windfarms (21 turbines) 13km north. The Slieve Kirk (12 turbines) and Eglish Mountains (6 turbines) cluster of windfarms are located further away approximately 27km to the southwest.

4.73. Throughout the study zone there is a sporadic distribution of operational single or small groups of wind turbines of various scale located across the lowlands and hills and often associated with nearby farms. The nearest of these is a single turbine located 2km to the northeast, which is prominent above the quarry on the slope of Craiggore Hill.

4.74. The cumulative assessment section of this LVIA provides further details of these developments, which are mapped in **Figure 4.10** and listed in **Table 4.7 and Table 4.8**.

Landscape Value

4.75. The relative landscape value attached to the various landscape receptors identified through the baseline study needs to be established. These receptors include a mix of designated and non-designated landscapes, features, aesthetic and perceptual qualities. The value is later combined with the susceptibility to change of the landscape receptor to determine the landscape sensitivity. The approach taken in the determination of the value is outlined in the methodology contained in **Appendix 4B, Volume 4**.

4.76. The distinctive landscape of the Binevenagh LCA 36 with its iconic uplands has a **Very High** value. The more central area of this LCA in which the Application Site is located is away from the more iconic steep escarpments and plateau. The surrounding lands contain large areas of forestry, quarrying and degraded farmland which detract from the landscape. The Application Site is not within any designations like the Binevenagh AONB nor is there any tourist amenities nearby. The landscape around the Application Site and immediate area is considered **Medium to High Value**.

4.77. The nationally designated areas and assets found throughout the study area which contribute to the landscape setting, including the Binevenagh and Sperrins AONBs, will have **high to very high value** due to their regional to nationally recognised importance.

Landscape Sensitivity

4.78. The landscape sensitivity of the landscape receptors identified through the baseline study, is determined by considering their susceptibility to change from the Proposed Development and their value based on professional judgement. Further details can be found in the methodology section within **Appendix 4B, Volume 4**.

Landscape Character Areas

4.79. The potential sensitivity of the landscape sensitivity of the Northern Ireland Local Landscape Character Areas to wind energy development has been considered within the Wind Energy Development in Northern Ireland's Landscapes SPG.

Wind Energy Development in Northern Ireland's Landscapes (2009) Supplementary Planning Guidance to Accompany PPS 18

4.80. Landscape sensitivity is defined in the SPG as the extent to which the inherent character and visual amenity of an area is inherently vulnerable to wind energy development.t.

4.81. A high sensitivity LCA is defined as a landscape that “is very vulnerable to change and would be adversely affected by wind energy development, which would result in a significant change in landscape and visual characteristics and values”. At the other end of the scale a low sensitivity landscape is one where the landscape is “is not vulnerable to change and would not be adversely affected by wind energy development, which would not result in significant change in landscape and visual characteristics and values.”

4.82. The SPG notes that because LCAs are broad in extent there will inevitably be areas within them with different levels of sensitivity. Hence, even LCAs with overall high sensitivity does not necessarily mean there is no capacity to accommodate wind energy if it is correctly sited, with the overall level of sensitivity being that which prevails across most of the LCA

4.83. The SPG provides general principles for wind energy developments proposed to be sited within the LCAs including consideration of the spacing between wind farms, the layout, turbine grouping, turbine heights, siting and design.

LCA 36 Binevenagh

4.84. The SPG provides a summary of the key landscape and visual characteristics and values of the LCA, the overall sensitivity to wind energy and recommendations on the location and siting of any development.

4.85. The SPG describes the scale west facing escarpments extending to the Sperrin Mountains with expansive open moorland landscape. A number of prominent manmade features are noted including Rigged Hill windfarm, quarrying on Donald's Hill and large blocks of coniferous plantations. The SPG describes the landscape as being highly visible from the settlements, main roads and Binevenagh Hill. The prominent western facing skyline at Binevenagh, Keady Mountain, Donald's Hill while eastern skylines are less prominent. The scenic quality is highest within the Binevenagh and Sperrins AONBs sections of the LCA. Wildness is found upon the expansive open moorlands in parts of the LCA, but the present of coniferous plantation detracts from the sense of wildness. The Ulster Way runs through the LCA, with other mountain walks, forest parks and picnic spots providing recreational use and opportunities for viewpoints looking across the LCA.

4.86. The LCA is assessed as having **High to Medium** sensitivity to wind energy developments. This is due to the "*landscape is of extreme sensitivity due to its iconic, landmark character and very wide visibility*." The SPG notes that some areas within the LCA that are "*lower and less prominent sections of the escarpment, and areas where there is extensive forestry, might be somewhat less sensitive to wind energy development.*"

4.87. The SPG recommends any siting of wind energy should avoid the northern and southern escarpment, with particular care to "*to avoid adverse impacts on the distinctive skylines of Binevenagh, Keady Mountain, Donald's Hill and Benbradagh and on the settings of natural and cultural heritage features and recreational resources*." It notes that there may be some ability to accommodating wind energy on the central lower sections of the LCA, particularly where it can be associated with nearby forestry. The Proposed Development is located on the less prominent hill away from the more sensitive distinct hillside profiles that are characteristic of this LCA.

Application Site

4.88. When considering the overall value and susceptibility of the Application Site being developed out, it will have a **Medium sensitivity** to this Proposed Development type. i.e. a landscape of moderately valued characteristics with a moderate level of susceptibility to change from the Proposed Development.

Review of landscape Baseline of the Original Consent and Proposed Development

4.89. The LVIA has reviewed changes to the baseline across the study zone since the Original Consent's LVIA was undertaken in 2008. The Planning legislation and policies has been updated including the Planning Act (Northern Ireland) 2011, Strategic Planning Policy Statement for Northern Ireland (SPPS) 2015 and the Northern Area Plan 2016 as well as the emergent of the new council areas. At the time of the original assessment the PPS 18 SPG: Wind Energy Development in Northern Ireland's Landscapes was still in draft form. It was later adopted in August 2009. There has non changes to the statutory or non-statutory designations.

4.90. The Application Site has barely changed in character since the original assessment. There has been little change to the immediate surrounding area. On review of aerial photography there has only been 2 new dwellings added within 2km of the Proposed Development, located off Peter's Road approximately 1.24km and 1.81km to the southwest. Views of the Proposed Development being contained by the steep hill and Gortnamoyagh Forest. The nearest residential receptor 0.968km to the southwest of the Proposed Development has extended their property. The area of forest at Craiggore on the north side of the B64 Legavallon road near to the Application Site has been recently cleared for the approved Craiggore windfarm. Wind energy has been more prevalent across the landscape of the study zone since the original assessment. Several windfarm developments which were also in the planning system at the time of the Original Consent which are now operational within the landscape. The nearest wind energy development is a single turbine prominently sited above the quarry on Donald's Hill approximately 2km north of the Proposed Development. The wind energy developments are considered later in the cumulative assessment of this LVIA.

LANDSCAPE IMPACTS

4.91. Having established the landscape baseline into which the Proposed Development will be sited, it is necessary to consider those landscape components known as 'receptors' which have the potential to be effected by changes brought about by the Proposed Development. The effects resulting from the interaction of the Proposed Development and landscape receptors will be identified for each phase of the Proposed Development including construction, operation and decommissioning.

Landscape Effects

4.92. The following section assesses the magnitude of effects the Proposed Development may have on the landscape character and resources of the landscape receptors. These magnitude of effects will then be combined with the landscape receptor's level of sensitivity to determine the significance of the effects.

Do Nothing Scenario

4.93. Assuming that the Proposed Development not to progress, the surrounding landscape would still evolve and is likely to be subject to pressure such as greater farm diversity/intensification, forestry, other renewable energy developments or new rural housing. These could potentially result in changes to the existing landscape characteristics through further variations to the field systems, land uses or built forms.

Construction Phase

Landscape Character

4.94. The site works required to build out the Proposed Development will be confined to within the limits of the Application Site which occupies a small portion of the Binevenagh LCA. The fluctuation across the site's landform will further help contain most of the groundworks. There will be some visibility of the cranes installing the turbines from across the wider extent of the Binevenagh LCA and surrounding LCAs. Any views being temporary in nature and will not affect the character of these LCA. Some indirect effects will occur with the site traffic as it travels through part of the study zone, which will be most notable during the movement of the key components of the Proposed Development. Again, the movement of traffic will be temporary and managed to minimise disturbance.

4.95. Overall, the medium sensitivity and medium-low magnitude of change will result in temporary Moderate to **Moderate/Minor adverse** lasting for the duration of the construction phase.

Application Site

4.96. The site works will result in a noticeable change from the current land use to one of a construction site lasting for a temporary period of 8 months. The works will require earthworks to install the access tracks, cabling, turbines, substations and the temporary site compound. This will result in a loss of rough grassland and pasture over the extent of the Proposed Development. The slight increase in the turbine foundation size of the Proposed Development compared to the Original Consent will be negligible upon the overall effects of the siteworks. Any areas of disturbed ground outside of the main layout will be carefully graded and reinstated to similar vegetation cover to help assimilate the lands back into their surroundings.

4.97. Overall, the medium sensitivity and medium-low magnitude of change will result in temporary **Moderate to Moderate/Minor adverse** lasting for the duration of the construction phase.

Operational Phase

Landscape Character

4.98. The Proposed Development will further add a new wind energy development into the Binevenagh LCA, which already contains several windfarms including Dunmore and Dunbeg cluster, Rigged Hill and the nearby approved Craiggore Windfarm and Evishagaran Windfarm.

4.99. The Proposed Development will consist of the same number and location of turbines as the Original Consent. Sited on Smulgedon Hill which is a less sensitive landform than those hills highlighted within the SPG for the Binevenagh LCA

4.100. The proposed differences in the turbine height and crane pad dimensions to that of the Original Consent will not affect the overall principle of the Proposed Development or its potential effects on the characteristics of the Binevenagh LCA and other LCAs across the study zone. As with exception to the immediate area of the LCA these changes to the consented development will not be noticeable across the wider extents of the Binevenagh LCA or other LCA through the study zone.

4.101. As such, the potential effects of the Proposed Development will be the same as those assessed with the original LVIA produced by SBC, which stated:

> *"The Development will have a direct physical effect on a small part of the Binevenagh LCA, but it is unlikely to dramatically alter its character because it occupies a small area away from the primary uplands and ridges. It is located in the centre of this long thin area and is visually contained immediately to the north and south by Donald's Hill and Benbradagh. The extent of its visibility from the rest of Binevenagh LCA is limited and the overall magnitude of effect on this LCA will also be limited. Rigged Hill wind farm is located to the north of the Development, also within this LCA and there are several existing, consented and proposed wind farms to the east and west of the study area that will be visible from many parts of Binevenagh*

LCA. The overall magnitude of effect of the Development on Binevenagh LCA is judged to be slight.

It is in the centre of the LCA and will have no direct or significant indirect effects on the character of either the Sperrin or Binevenagh AONBs at the northern or southern ends of the Binevenagh LCA. It will be visible from some, but not all parts of the northern edge of the Sperrin AONB but there are very few residences or publicly frequented viewpoints in this location."

4.102. As with the Binevenagh LCA most of the surrounding LCAs have experienced an increase in wind energy within their landscape or neighbouring LCAs since the Original Consent, in particular that of smaller farm scale turbines and some clustering of windfarms.

4.103. On review there will be no notable difference to the potential indirect effects of the Proposed Development or Original Consent upon the other LCAs throughout the study zone. As with distant it will be hard to decipher the difference in the turbine model types while the massing of the seven turbines on Smulgedon Hill will remain the same, with any effects reducing as other closer windfarms and wind turbine developments become more prevalent within these neighbouring and more distant LCAs.

4.104. Overall, the medium sensitivity and medium magnitude of change will result in **Moderate adverse** within the immediate LCA while reducing to **Minor adverse** across the wider extents of the LCA. This will last for the operational phase's duration of 30 years.

4.105. The effects of the Proposed Development on the LCA across the study zone is summarised within **Table 4.3** below, which has been sourced and adapted from the original LVIA by SBC.

Table 4.3: Summary of Effects on Landscape Character Areas

Landscape Character Area	Sensitivity	Magnitude of Effect	Significance of Effect
Binevenagh	Medium	Slight	Moderate adverse (localised) and Minor adverse (across the wider LCA)
Magherafelt Farmland	High	Negligible	Imperceptible
Beaghmore Moors and Marsh	High	Negligible	Imperceptible
Sperrin Mountains	Low to Medium	Slight	Minor to Moderate adverse
Sperrin Foothills	Medium	Negligible	Imperceptible
Burngibbagh and Drumahoe	Medium	Negligible	Imperceptible

Derry Slopes	High	Negligible	Imperceptible
Lough Foyle Alluvial Plain	Medium	Slight	Minor adverse
Loughermore Hills	Medium	Negligible	Imperceptible
Magilligan Lowlands	Medium	Negligible	Imperceptible
Roe Basin	Medium to Low	Slight	Imperceptible to Minor adverse
Eastern Binevenagh Slopes	Low to Medium	Negligible	Minor adverse to Imperceptible
Glenshane Slopes	Low	Negligible	Minor adverse
Upper Moyola Valley	High	Negligible	Minor adverse
Moyola Floodplain	High	Negligible	Imperceptible
Garvagh Farmland	High to Medium	Slight	Imperceptible
Lower Bann Valley	Medium to Low	Negligible	Imperceptible
Lower Bann Floodplain	Medium	Negligible	Imperceptible
Coleraine Farmland	Medium	Negligible	Imperceptible
Garry Bog	High	Negligible	Imperceptible
Dervock Farmlands	High to Medium	Negligible	Imperceptible
Causeway Coast and Rathlin Island	Low	Negligible	Minor adverse
Long Mountain Ridge	Medium to High	Negligible	Imperceptible
Cullybackey and Clough Mills Drumlins	Medium to High	Negligible	Imperceptible
Glenelly Valley	Low	Negligible	Minor adverse
South Sperrin	Low	Negligible	Minor adverse
Slieve Gallion	Medium	Negligible	Imperceptible
Inishowen Coastal Area	Low	Negligible	Minor adverse
Inishowen Lowlands	Low	Negligible	Minor adverse

Application Site

4.106. Once the Proposed Development is operational the proposed turbines and their associated infrastructure will remain intact for the duration of thirty years. During this period, the lands can continue to be grazed if desired. This will allow the site to retain an agricultural use in cohesion with the windfarm during its operation phase. The existing roadside hedgerow will be improved which along with ecological enhancement measures will help improve the condition of the land.

4.107. During its operational phase, the Proposed Development site will remain unmanned. Occasional movement of traffic will be required through the Application Site several times a year to service the windfarm and ancillary electrical equipment and manage the land. However, the level of traffic will be minimal, with just one to two vehicles requiring access at any given time. Therefore, there will be little disturbance to the land.

4.108. Overall, the medium sensitivity magnitude of change will result in **Moderate adverse** over the duration of the operational phase.

Decommissioning Phase

4.109. At this stage in the Proposed Development's lifespan after the period of planning consent of 30 years has ceased the turbines and associated infrastructure will be removed off site and the site restored, in accordance with an approved decommissioning plan. It is expected that all structures above ground will be removed and the lands reinstated to a suitable agricultural use. The access tracks may be retained if beneficial for the landowner.

Landscape Character

4.110. The initial decommissioning works will have a similar temporary level of localised disturbance on the LCA as that of the initial construction phase. Once the lands are fully restored there would be a notable reduction of wind energy within this part of the Binevenagh LCA, which may collectively reduce were other nearby wind energy developments and others across wider extent of the LCA being decommissioned around the same time if not being repowered.

4.111. Overall, the medium sensitivity and low-medium magnitude of change will result in **Moderate to Moderate/Minor adverse** during the decommission works but reverse to **Minor to Moderate beneficial effects** once the lands are fully reinstated.

Application Site

4.112. As with the construction phase site works, the decommissioning phase works have a similar temporary level of disturbance contained within the extent of the Application Site lands. Once fully restored the lands can be used for a similar land use predevelopment.

4.113. Overall, the medium sensitivity and low-medium magnitude of change will result in **Moderate to Moderate/Minor adverse** during the decommission works but reverse to **Minor to Moderate beneficial effects** once the land is fully reinstated

VISUAL ASSESSMENT

Visual Baseline

4.114. In order to be able to assess how the Proposed Development will potentially affect the existing views experienced by people and their visual amenity within the study area, it is necessary to first determine the extent of the potential visibility of the Proposed Development and those receptors likely to be affected. This was established by determining the following criteria:

- the area in which the Proposed Development may be visible is based on the bare earth Zone of Theoretical Visibility (ZTV);
- the different groups of people (known as visual receptors) who may experience views of the Proposed Development; and
- the viewpoints where they will be affected and the nature of views at those points.

Views of the Site & Receptors

4.115. The Application Site is located upon c. 6.12 hectares of the open northern end of Smulgedon Hill, at approximately 210m – 290m AOD. Smulgedon Hill is part of an arc of hills running north to south which also includes Binevenagh Mountain, Keady Mountain, Boyd's Mountain, Rigged Hill, Donald's Hill, Smulgedon Hill and Benbradagh Mountain. Smulgedon Hill has a more rounded profile than many of these other hills and lacks their characteristics such as, prominent escarpments, ridges and plateaus. It is lower in height, set back further east from the hills and framed either side by Donald Hills (399m AOD) and Benbradagh Mountain (465m AOD).

4.116. Views are greatest from the lowlands west of the Application Site looking to the east with Smulgedon Hill nestled between Donald Hill and Benbradagh. Both of these mountains have more elevated profiles, therefore will remain as more prominent features in the landscape. Medium to long distant views of Smulgedon Hill further west are recessive in comparison to the more dominant series of aforementioned hills. This easterly view of Smulgedon Hill is also screened by local topography fluctuations and vegetation cover.

4.117. Potential views from the north, east and south are more contained by undulations in the local topography and the expansive block of Gortnamoyagh Forest plantations.

4.118. The main views from the B64 Legavallon road, which circumnavigates the boundary of the Application Site, are directed away from the site and look out to the west towards Donald's Hill and beyond to the Inishowen peninsula. These views are enhanced by a nearby viewpoint and picnic area on the adjoining Belraugh Road.

4.119. The Proposed Development will be potentially visible from a range of receptors found across the study zone including residents, road users, farm workers, recreational users and tourists. The LVIA assessment will later assess the potential effects of the Proposed Development upon these visual receptor types from representative viewpoints.

ZTV coverage

4.120. The Original Consent LVIA produced Zones of Theoretical Visibility (ZTVs) for the hub height to 85m and blade tip to 120.5m of the approved development. These show the potential visibility of the approved windfarm over a bare earth model scenario not accounting for screening by vegetation or built elements. The original LVIA stated that the Original Consent's visibility across the study zone, based on the ZTV, would be greatest within:

- *"In the immediate vicinity of the Development (within 5km)*
- *To the west within approximately 15km*
- *Between the north east and south east at a distance of approximately 20km*
- *In the Foyle Estuary between Culmore and Redcastle"*

4.121. These ZTVs have been updated to account for the Proposed Development's reduced hub height of 68.9m and blade tip of 114.90m, see **Figures 4.7a and 4.7b of Appendix 4A, Volume 3.** A comparative ZTV, see **Figure 4.21 of Appendix 4A., Volume 3**, has also been produced to help illustrate the difference in the potential visibility between the Original Consent and Proposed Development. The comparative ZTV indicates that despite the reduced heights the coverage will generally be the same for both developments across the extent of the study zone as stated above. The exception to this is some very minor patches of the Proposed Development on the outer fringes of the combined ZTV coverage to the far southeast, northwest and north of the study area as indicated on the figure.

Visual Receptor Sensitivity

4.122. The visual sensitivity of the following visual receptors (people) identified through the baseline study is determined by considering their susceptibility to change from the Proposed Development and their value based on professional judgement. Further details can be found in the methodology section.

- **Residents**: The views of receptors within the surrounding landscape including rural and urban areas will have a high sensitivity.
- **Road Users**: Those along the various local and regional graded roads will have a medium sensitivity. Those on designated driving routes where the views are a key part of the travelling experience will have medium-high sensitivity.

- **Recreational Users**: Walkers and cyclists travelling along dedicated routes or the roadway, will have a medium/high sensitivity; higher when a prominent rural setting is within their views.
- **Farm Workers**: The views of farm workers across the rural landscape where views are secondary to their work, will have a medium sensitivity.

Viewpoint Selection

4.123. The Original Consent LVIA by SBC carried out an initial desktop and site survey selection of 89 viewpoints which were refined to 20 viewpoints in the final assessment. The 20 viewpoints representative views provide worst case scenario for a range of receptor and from sensitive areas e.g. AONBs, walking or scenic driving routes. The views are taken from a range of close, medium, long and distant views at different directions across the study zone.

4.124. The suitability of the final twenty viewpoints for use in this LVIA assessment was reviewed during the site visit. It was found that all twenty were able to be reused as there was no change to the proposed turbine layout and the views were largely unaltered since the original LVIA assessment. The reuse of the viewpoints was also agreed with Causeway Coast & Glens Borough Council during the projects consultation period.

4.125. The final locations of the twenty viewpoints used in this assessment are listed in **Table 4.4** below and mapped in **Figure 4.6 of Appendix 4A, Volume 3.**

4.126. The existing view, wireframes and photomontage of the Proposed Development from each of these twenty viewpoints is illustrated in **Figures 4.27 to 4.46 of Appendix 4A, Volume 3.** The layout of these figures slightly differs from those of the Original Consent figures as they have been updated in accordance with the latest visualisation guidance as produced by Scottish Natural Heritage (NatureScot)[10].

[10] Scottish Natural Heritage (February 2017) *Visual Representation of Wind Farms Version 2.2*. Available at: https://www.nature.scot/visual-representation-wind-farms-guidance

Table 4.4: Viewpoint Selection

Viewpoint Number and Location Name	Range of View & Distance (approx. distance from nearest turbine (km))	Direction of View	Reason for choosing
1: Kilhoyle Road	Close (1.5km)	South west	Near N. Sperrins Scenic Route (no view from route itself), potential cumulative views. On the Ulster Way.
2: Smulgedon Hill	Close (1km)	East	Closest range within proposed Development, on secondary road network, near N. Sperrins Scenic Route
3: B190 Dungiven - Coleraine	Medium (2.5km)	East	Sperrins Scenic Route.
4: Drumsurn Village	Medium (4.5km)	South east	Primary road network within Countryside Protection Area and on N. Sperrins Heritage Trail & Scenic Route.
5: B66, Glencurb	Long (8km)	South west	Primary road network, potential cumulative views.
6: Craigahulliar Road	Distant (27km)	South west	Proximity to Very Significant tourist towns on north coast, potential cumulative views, elevated views including north coast and Inishowen.
7: Seacon Townland, A26 nr Ballymoney	Distant (21km)	South west	Primary road network near large town (Ballymoney), potential cumulative views.
8: Curraghmore Road, North Sperrins Scenic Route	Medium – long (6km)	North west	N. Sperrins Scenic Route, potential cumulative views, within Sperrin AONB and Countryside Protection Area.
9: A29 south of Garvagh	Long (8km)	West	Primary road network, edge of town location, potential cumulative views.
10: Glenbuck Road nr Boghill	Distant (25km)	West	Potential cumulative views, distant view from eastern part of study area

11: Portglenone Play Area near Marina	Distant (24km)	North west	View from centre of town in this part of study area, on National Cycle Network.
12: Benbradagh Mountain north east	Medium (5km)	North – north east	Within Sperrin AONB, elevated location with panoramic and cumulative views, Ulster Way.
13: Slieve Gallion	Distant (27km)	North	Within Sperrin AONB, elevated location with cumulative views, distant view from southern part of the study area.
14: Lisdillon Road, Slieve Kirk Hill	Distant (29km)	East	Potential cumulative views, distant view from western part of study area.
15: Legavallon Road, B190 nr Gortgarn	Long (7.5km)	East	Scenic drive, location near small settlement on primary road network, potential cumulative views.
16: Polly's Brae Road junction with B192, Drumrane Rd	Long (9km)	South east	Secondary road network, near entrance to school, potential cumulative views, located on scenic drive and cycle route.
17: Radisson Roe Hotel driveway	Long (12.5km)	South east	Popular resort hotel and golf course, potential cumulative views, near large town and scenic driving route.
18: B66 opposite Ashlawn (private house)	Long (10km)	South – south east	Edge of Binevenagh AONB, secondary road network.
19: Scotchtown Road, Magilligan	Distant (19km)	South east	Car park at southern end of strand, within Binevenagh AONB with view of Binevenagh escarpment, potential cumulative views.
20. Greenbank Church, Quigley's Point	Distant (30km)	South east	Inishowen 100 scenic and Wild Atlantic Way driving route, secondary road network, distant view in north western edge of study area, potential cumulative views, gathering point for receptors near community facility.

Visual Impact

4.127. The following section considers the potential effect of the Proposed Development during the construction, operation, and post decommissioning stages upon the existing views and visual amenity on the visual receptor(s) at the selected.

Do Nothing Scenario

4.128. It is expected that were the Proposed Development not to progress the views of receptors considered from the viewpoints above would still be subject to potential future visual changes within the immediate and wider surrounding landscape. Potential future visual changes could occur from the likes of changes to farmland practices, new farm buildings, forestry expansion, new rural housing or other renewable energy developments.

Viewpoint 1: Kilhoyle Road

- Landscape Character Area and Designations: Roe Basin near boundary with Binevenagh LCA. There are no landscape designations.
- Type and Sensitivity of Receptor: Low to medium. Primarily local road users of low sensitivity but also occasional forestry and farm workers of medium sensitivity.

Existing View:

4.129. This viewpoint is located on a quiet rural road within the narrow steep-sided valley between Donald's Hill and Smulgedon Hill. Looking south, southwest from this location, the site of the Proposed Development will be evident on elevated landform in front of the high points of Carn Hill (448m AOD) and Benbradagh (465m AOD) which form the skyline.

4.130. The foreground of the view comprises coniferous forest, beyond in the middle-distance elevated moorland rises to the south, southwest. The skyline is formed by elevated moorland, conifer forest and the more distant summits of Carn Hill and Benbradagh in the background of the view. A number of operational wind farms and individual wind turbines are evident in successive views across the Roe Basin lowlands and Loughermore Hills beyond to the west. Operational Altahullion Wind Farm is barely perceptible against the skyline in slightly successive views to the southwest. A number of individual wind farms are also evident in the middle distance and background, back clothed by landform within a similar direction of view. Views looking southwest towards these areas are channelled and framed by Smulgedon Hill and Donald's Hill.

4.131. Successive views to the northwest, north and east are largely screened by landform and vegetation. Similar views can be obtained from the B190 in this vicinity and from a small

number of residential properties on lower parts of the Kilhoyle Road, whose residents will be of higher sensitivity.

Predicted View:

4.132. The hubs and blades of all seven turbines will be seen against the skyline in relatively close proximity in views looking south, southwest in this location. The lower towers of four turbines will be partly screened by landform, and the tower of one turbine in the western part of the layout will be largely screened by landform. There will be some overlapping of turbine blades in the centre of the southwestern part of the layout. The Proposed Development will read as one distinct wind farm from this location. Benbradagh Hill will remain clearly visible behind the turbines. The Proposed Development is illustrated in the wireframe and photomontage of **Figures 4.27b and 4.27c of Appendix 4A, Volume 3.**

Magnitude of Change: **High to medium.**

4.133. Given the close proximity to the Proposed Development the magnitude of visual effect is considered to be high and taking account of the low to medium sensitivity, this will result in a moderate and significant visual effect.

Significance of Visual Effect: **Moderate to minor adverse**.

4.134. The B190, where this viewpoint is located, is relatively quiet and within a sparsely populated area. There will be few road users (medium sensitivity) and residents (high sensitivity) viewing the Proposed Development from this viewpoint. There may be farm workers within the vicinity who are judged to have medium sensitivity. Taking into account the susceptibility and value, the overall sensitivity is judged to be **low-medium**.

Magnitude of Cumulative Effect: **Moderate to Very Significant**.

4.135. The Proposed Development will be viewed as a distinct wind farm from this viewpoint with no operational windfarms within view. Successive views to the southwest will afford distant views to Altahullion Wind Farm although it is barely perceptible against the skyline, hence this view towards the Loughermore Hills and Roe Basin lowlands remains the prominent focus. More westerly successive views are of the more distance wind farms of Slieve Kirk, Eglish Mountain and consented Ballyhanedin. The total cumulative effect results in an extensive spread of turbines to the east and west of Altahullion.

Significance of Cumulative Visual Effect: **Minor to moderate.**

Viewpoint 2 Smulgedon Hill

- Landscape Character Area and Designations: Within Binevenagh LCA near the boundary with the Roe Basin LCA. It is on the Ulster Way and adjacent to the northern edge of the Sperrin AONB.
- Type and Sensitivity of Receptor: **High to low**. Walkers on the Ulster Way of **high** sensitivity, farm workers of **medium** sensitivity and local road users of **low** sensitivity.

Existing View:

4.136. This is the closest viewpoint to the Proposed Development, taken from the Temple Road which is a narrow road providing access around the southern side of Smulgedon Hill. Temple Road commences from and terminates at the B64 Legavallon Road. Together, the roads form a loop, circumnavigating Smulgedon Hill. Temple Road is a secondary route to that of the Legavallon Road. The viewpoint is situated on the Ulster Way and provides an expansive and far reaching vantage point surveying the Binevenagh Hills and the Roe Valley lowlands in the middle and far distance. These open views are only available from the western third of the Temple Road.

4.137. This is in great contrast to the framed view as shown in **Figure 4.28a of Appendix 4A, Volume 3,** looking eastwards towards the Proposed Development. Over 75% of the view is composed of the rising hillside of Smulgedon Hill with a post and wire fence dividing its rough upland moorland grasslands from the roadside. A small boundary section of the coniferous forest from the far side skylines the smooth hilltop to the north.

4.138. The unremarkable grassy moors immediately to both sides of the road are dotted with boulders and gorse with indistinct field boundaries and there's evidence of sheep grazing. This contrasts with the more dramatic mountain profiles that are characteristic of this Binevenagh LCA which remains the prime focus of the view from the viewpoint.

4.139. The central third of the Temple Road transects the Gortnamoyagh Forest which contains views to both sides. The forestry is due to be felled sometime between 2040 and 2050, which exceeds the anticipated operational lifespan of the Proposed Development.

Predicted View:

4.140. All but the blade tips of turbine four will be screened by the grassy hillside of Smulgedon Hill from this viewpoint on Temple Road.

Magnitude of Effect: **Negligible.**

4.141. Owing to the small size and small scale of effect to the eastern view from this location the magnitude of effect is negligible. A photomontage was not produced due to the lack of visibility of the Proposed Development, as demonstrated in **Figure 4.28b of Appendix 4A, Volume 3.**

Significance of Visual Effect: **Negligible**

4.142. The sensitivity of the road users (medium sensitivity), walkers (medium – high sensitivity), workers (medium sensitivity) were considered with respects to their susceptibility and value but due to the limited change to the view to the east the sensitivity will be **negligible**. The predominant view to the west along this short length of the Ulster Way is unaffected.

Magnitude of Cumulative Effect: Negligible.

4.143. No wind farms are visible within the frame of the viewpoint. Successive views westwards will afford distant views (over 10km away) toward the existing wind farm of Altahullion with the majority of the turbines sky lined making them difficult to perceive clearly from such a distance. Successive views to the southwest provide distant views (over 20km away) of Slieve Kirk and Eglish Mountain, which are entirely sky lined, but barely perceptible. Smaller, single turbines are visible in the middle to back distance; these are entirely back clothed by the landscape. Consented windfarms of Evishagaran (5km distant) and Ballyhanedin (10km distant) will be within the south-southwestern view.

4.144. Due to the limited view of the blade tip from turbine four of the Proposed Development, it will not contribute significantly to the sequential view of wind farms from this viewpoint.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 3 B190 Dungiven - Coleraine

- Landscape Character Area and Designations: Roe Basin near boundary with Binevenagh LCA. On the North Sperrins Scenic Driving Route and Heritage Trail, in close proximity to the northern boundary of the Sperrin AONB.
- Type and Sensitivity of Receptor: **High to medium**. Residents of individual dwellings along the B190 and travellers on the scenic driving route are of **high** sensitivity. Farm workers of **medium** sensitivity.

Existing View:

4.145. The viewpoint is located on the B64 Legavallon Road 4.5 miles northeast of Dungiven en route to Coleraine, which is 15 miles further to the northeast. The route is well used by local residents going between both towns and it is also part of the North Sperrins Scenic Route and North Sperrins Heritage Trail, which are both scenic driving routes attracting tourists. To either side of the road there are expansive views over open farmland, divided mainly by hawthorn hedgerows and well-spaced hedgerow trees, post and wire fences have replaced the native

hedgerows along some boundaries. The presence of grazing farm animals and farm steadings indicate that farm workers will also be visual receptors from this viewpoint.

4.146. To the northeast this easterly view is contained to the north and left of the road by Donald's Hill (399m) and to the northeast east by Smulgedon Hill, to the right-hand side of the road. The westerly view features the distinctive profile of Benbradagh (465m AOD) to the southwest, left of the B64 and a range of Sperrin mountains from the smaller Straid Hill (303m) to the larger Mullaghclogha (635m), which is visible in the distance. The extensive open view to the northwest from the Legavallon Road whilst travelling northeast, is the dominant view across the Roe Valley Basin with the hills of Loughermore (396m AOD) and the Inishowen ranges in Donegal, respectively, then culminating in a distant view of Binevenagh in the north-northwest.

4.147. Within the confines of the framed viewpoint much of the view either side of the road presents the grazed farmlands divided by hedgerows and post and wire fences with the land rising to the left hand side of the road to Donald's Hill with the disused Craiggore Hill quarry from where a single wind turbine is in clear view, partially back clothed by the moorland and the hub and blades sky lined. To the centre of the view are a detached dwelling and steading with Smulgedon Hill rising behind it where boundary edges of the Gortnamoyagh Forest visually detract from the smooth, undulating hill, as does the disused quarry in the hillside above the dwelling. The upland areas are primarily characterised by open moorland but there are also some disused quarries on the sides of Smulgedon and Donald's Hill and the large expanse of Gortnamoyagh Forest in the eastern side of this viewpoint, that are visually detractive. The single turbine upon the open slope above the Craiggore Hill quarry is clearly visible within the view. The existing view is illustrated in **Figure 4.29a of Appendix 4A, Volume 3.**

Predicted View:

4.148. One of the seven proposed turbines will be mostly visible skylined from behind the Smulgedon Hill. The blades and hub of a second turbine and the blade tips of a third turbine will be visible against the skyline, and are therefore mostly screened by the hill, with all three almost equidistant; therefore they will be perceived as a single development. See **Figure 4-31b of Appendix 4A, Volume 3**.

Magnitude of Effect: **Slight to moderate**.

4.149. The vertical elements of the Proposed Development that are visible, are viewed in conjunction with the multiple electrical pole scattered across this view. Combined with the multiple hedgerows traversing the view the addition of the turbines will not alter the view greatly. It will not affect the primary focus of the view, which is the westward facing panorama. However, as the receptors are highly sensitive the, magnitude of effect increases to moderate in many instances.

Significance of Visual Effect: **Moderate adverse**.

4.150. This is a popular tourist driving route with the dominant view being to the northwest over the expanse of farmland framed by the distant mountain ranges. The type and sensitivity of visual receptors is judged to be high to medium, but due to the minor addition to the non-dominant view along this road, the overall sensitivity of these visual receptors is considered as **moderate**.

Magnitude of Cumulative Effect: **Slight**

4.151. Three of the ten turbines from the consented Craiggore Wind Farm will be visible to the west of Donald's Hill, almost in their entirety, with the blade tips of a fourth turbine being visible from this viewpoint. Up to nine wind turbines from the Craiggore Windfarm will be visible, in successive views to the west, with the majority of 6 turbines being visible and blade tips of three of the turbines visible from behind Donald's Hill. There will also be views of small, single farm turbines to the west of the B190. Sequential views may be experienced along the road, although the majority of the operational wind farms are in the far distance. Owing to the limited view of the Proposed Development from behind Smulgedon Hill, the size and scale of the change is limited.

Significance of Cumulative Visual Effect: **Moderate**

Viewpoint 4 Drumsurn Village

- Landscape Character Area and Designations: Roe Basin LCA, no landscape designations.
- Type and Sensitivity of Receptor: Residents at edge of small rural village with **high sensitivity**.

Existing View:

4.152. This viewpoint is on the south eastern extent of Drumsurn village next to a new housing estate; Drumsurn court. The village is surrounded by open grassy farmland with native hedgerow field boundaries and some with a mix of mature native broadleaved trees and conifers. Some of the hedgerow boundaries have become penetrable and some have been replaced with post and wire fences. The viewpoint along the Drumsurn Road faces in a southeasterly direction with a dedicated pedestrian path and grassy verge to the left of the road. A post and wire fence divides the path from the pastoral fields to the left. The view straight ahead is contained by Donald's Hill to the east, Benbradagh to the south and the lower lying Smulgedon Hill just off-centre of the road. Along the northern route from the village, Binevenagh contains the northerly view.

4.153. Aside from the farmland setting in the foreground and middle distance, there are many vertical elements such as telegraph poles, signposts and streetlamps that visually detract from the fields, hedgerows and the rising hillside of Smulgedon Hill in the distance.

4.154. Drumsurn village is a well-kept village with a few local amenities and some views are afforded towards the Roe Basin and Lough Foyle. The recently built housing developments at the southwestern end of the village do not relate with the surrounding landscape and the smaller scale homes within the centre of the village in terms of their style and materials.

4.155. Rigged Hill wind farm is visible to the north from Drumsurn Road, between Keady Mountain and Donald's Hill, outside the viewpoint view. Within the view shown in **Figure 4.30a of Appendix 4A, Volume 3**, the single turbine by Craiggore Quarry is visible left of centre of the view and another single turbine located in the lowland, is screened by the hedgerow in the foreground to the right of the view.

Predicted View:

4.156. All seven turbines of the Proposed Development are skylines to varying degrees from behind the hilltop and northern slope of Smulgedon Hill at the centre of the view. The majority of the four of the turbines are visible with the lower towers screened by the hill. The other three have blade tips showing to varying degrees, two of which have hubs visible. See **Figure 4.30b of Appendix 4, Volume 3**. Further partial screening of the development is afforded by mature broadleaf and coniferous trees in the middle distance and the houses, telegraph poles and signposts visually detract from the Proposed Development in the centre of the view. Donald's Hill (399m AOD) and Benbradagh (465m AOD) remain the more dominant elements to either side of the view.

Magnitude of Effect: **Moderate**.

4.157. The scale and size of effect of the Proposed Development located on the low lying Smulgedon Hill in the centre of the viewpoint from 4.5km distance from the nearest turbine, will not distract from the more dominant view from the larger hills of Donald's Hill and Benbradagh. The vertical elements in the foreground and middle ground visually detracts from the addition of the Proposed Development.

Significance of Visual Effect: **Very Significant adverse**.

4.158. Residential visual receptors have a high sensitivity, although the residents within the village currently have views to the north toward Rigged Hill wind farm so they are less susceptible to this type of change. The Proposed Development is situated to the southeast, so it does not interfere with the predominant view from the village is toward the Roe Basin in the southwest.

Magnitude of Cumulative Effect: **Slight.**

4.159. Within the extent of the view from this viewpoint, as shown in **Figure 4.30b, Volume 3**, the smaller, single turbine by Craiggore Quarry is sited to the left, whilst the Proposed Development is in the centre of the view, so they are visibly distinct from one another.

4.160. Successive views to the northeast, next to Donald's Hill, will provide partially screened views toward Rigged Hill Wind Farm, although the Proposed Development has the potential to appear smaller in scale than Rigged Hill Wind Farm as there are larger proposed repowering turbines within this development.

4.161. Successive views of the consented Evishagaran Wind Farm to the east past Benbradagh may be afforded, but due to the many hedgerows and mature deciduous and coniferous trees forming field boundaries in the low lying fields within the near and middle distance, views to the windfarm may be partially screened. Sequential views are likely to the west towards the cluster of wind farms on the Loughermore hills.

Significance of Cumulative Visual Effect: **Moderate adverse**

Viewpoint 5 B66, Glencurb

- Landscape Character Area and Designations: Eastern Binevenagh Slopes LCA, no landscape designations.
- Type and Sensitivity of Receptor: **Low to medium.** Vehicular travellers on secondary road of **low sensitivity** and farm workers of **medium sensitivity**. Sensitivity of the limited number of residents of individual dwellings is reduced to medium by the existing presence of Rigged Hill Wind Farm.

Existing View:

4.162. The view is mainly comprised of rolling farmland with a mix of field boundaries ranging from post and wire fences, maintained native hedgerow and less managed hedgerow with mature native deciduous trees interspersed within them. Unmanaged fields to the foreground have evidence of rank grasses and rushes. Telegraph poles form a vertical element from left to right through the foreground with farm steading featuring in the middle ground. A church skylines the rolling hilltops to the left of the view and a large swathe of forestry planting from Gortnamoyagh Forest to the right of the view in the distance visually detracts from the smooth hilltops overall. The predicted felling of the forest is not expected until 2024 to 2052.

4.163. River Ridge Commercial Recycling Centre is located a short distance from this viewpoint and operates on weekdays from 9am – 5pm with a regular flow of trucks accessing the centre along this route. The B66 road connects Limavady in the west with Ballymoney in the east and the viewpoint is located approximately halfway between the two towns. On the western approach

along this route toward Limavady, distant views are afforded toward the Binevenagh mountain range.

4.164. The operational Rigged Hill Wind Farm to the northwest and Brockaghboy Wind Farm to the southeast are within view, although clear views to both developments will be dependent on clement weather conditions. A single turbine in clearly visible almost in its entirety in the middle distance. See **Figure 4.31a of Appendix 4A, Volume 3.**

Predicted View:

4.165. The blade tips of the Proposed Development will be visible from the viewpoint with the remaining body of the turbines being screened by the coniferous planting of Gortnamoyagh Forest which will remain in place throughout the operational duration of the Proposed Development. This is illustrated in the wireframe in **Figure 4.31b of Appendix 4A, Volume 3**. No photomontage has been produced from this viewpoint because of the Proposed Development's lack of visibility.

Magnitude of Effect: **Negligible.**

4.166. The blade tips are unlikely to be discernible.

Significance of Visual Effect: **Imperceptible.**

4.167. The visual receptors from this viewpoint are judged to be of low to medium sensitivity and the Proposed Development is unlikely to be a noticeable addition. The operational Rigged Hill Wind Farm will be prominent from this view.

Magnitude of Cumulative Effect: **Negligible.**

4.168. The operational Brockaghboy windfarm, located next to the Proposed Development to the south east, is visible as shown in the wireframe, on the upland plateau, although it is a distance away, so clear visibility is diminished. The consented Craiggore and Upper Ballyrogan wind farms are visible in the centre of the view in the distance along the hilltop. The consented Evishagaran Wind Farm will be barely perceptible in the centre of the view and proposed Corlacky wind farm will be perceptible in the distance along with Brockaghboy. Due to the large proportion of the Proposed Development being screened by forestry the size and scale is negligible which in turn results in an imperceptible cumulative visual effect.

Rigged Hill is clearly visible to the northwest of the Proposed Development above the Gortnamoyagh Forest and on an upland plateau.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 6 Craigahulliar Road

- Landscape Character Area and designations: Causeway Coast LCA near boundary with Colerain Farmland LCA, within Green Belt between Portrush and Portstewart.
- Type and Sensitivity of Receptor: Road users with **low** sensitivity, farm workers with **medium** sensitivity and residents with **high** sensitivity.

Existing View:

4.169. The viewpoint is taken near a cluster of detached houses from the Gateside Road, south of Portrush, a popular tourist seaside town along the North Coast. The south westerly to westerly view from the road provides an elevated, panoramic view across well-managed farmland between Portrush and Coleraine.

4.170. Far reaching views along the north Antrim coastline westwards towards Derry's Foyle Estuary and Donegal's Inishowen Peninsula.

Predicted View:

4.171. From this viewpoint the nearest turbine of the Proposed Development is 27km to the southwest and only the upper parts of the turbine will be perceptible, but from this distance the clarity will be somewhat diminished and in more inclement weather, the Proposed Development may not be distinguishable.

4.172. As is illustrated in **Figure: 4.32b**, the Proposed Development is to the centre of the framed view. Multiple wind farms are within view from this viewpoint, although they are located between the middle ground and far distance, such as Dunbeg and Dunmore Wind Farms.

Magnitude of Effect: Negligible

4.173. Due to distance from the Proposed Development, the relative size and scale combined with the proportion of the turbines visible, the magnitude of effect is imperceptible.

Significance of Visual Effect: **Minor adverse– Imperceptible.**

Magnitude of Cumulative Effect: **Negligible.**

4.174. The existing wind farms of Dunbeg and Rigged Hill will be the most prominent from this viewpoint as they are closer and within the centre of the view. There are small single turbines, Greenhall Highway (60)/1, (60)/2 and Churchland Lane (20), in the middle distance and in front of these wind farms. The consented Craiggore Wind Farm will be to the left of the view, in a southwesterly direction and will be viewed to the right of the Proposed Development; it will

be more prominent on the skyline as it is closer to this viewpoint. The Proposed Development will not contribute significantly to the total cumulative impact from this viewpoint.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 7 Seacon Townland, A26 nr Ballymoney

- Landscape Character Area and Designations: Coleraine Farmland LCA, within Green Belt near Ballymoney.
- Type and Sensitivity of Receptor: Primarily travellers on A26 of **low** sensitivity and farm workers of **medium** sensitivity. There are few residents of high sensitivity. Overall sensitivity is **low to medium**.

Existing View:

4.175. The viewpoint is located on a lane off from a busy dual carriageway (A26 Newbridge Road), 3.3 miles northwest from Ballymoney, along the section connecting to Coleraine. Countryside views in a south-westerly direction from the road are intermittent due to screening from mature native hedgerows and trees. Due to the speed at which road users will be travelling, the opportunity for sustained views will be limited. When views through the vegetation are possible, they are mainly to the foreground and middle distance with limited views west toward the Binevenagh range.

4.176. The predominant view is of rolling farmland with a mixture of distinct, managed, native hedgerows and post and wire fenced boundaries. Farm steadings are dispersed throughout the landscape albeit they are set back from the road. The existing view is as illustrated in the viewpoint image in **Figure 4.33 of Appendix 4A, Volume 3.**

Predicted View:

4.177. Five of the seven turbines will largely be backclothed by Donald's Hill whilst the remaining two will be skylined above Smulgedon Hill. See **Figure 4.33a** and photomontage **4.33c of Appendix 4A, Volume 3**.

Magnitude of Effect: **Slight.**

Significance of Visual Effect: **Minor adverse**

Magnitude of Cumulative Effect: **Moderate to Slight**.

4.178. Multiple wind farms will be within view from this viewpoint alongside the Proposed Development. Rigged Hill Wind Farm is visible, in a southwesterly direction, in the far distance,

during clear weather conditions, with vegetation in the fore and middle ground partially screening the development. See **4.33a and 4.33b of Appendix 4A, Volume 3.** There are proposals to repower Rigged Hill with larger turbines which will potentially increase its overall visibility.

4.179. Upper Ballyrogan Wind Farm and Craiggore Wind Farm will be the most visible within the view in the far distance. Craiggore Wind Farm will be sky lined east of Donald's Hill. The trees atop the rising hills in the middle distance provide screening in this view, hence the upper blades of the consented Cam Burn wind farm will be the only visible parts of this development. Further screening in the foreground, along the roadside will prevent views to the existing and consented Dunbeg and Dunmore wind farm developments.

Significance of Cumulative Visual Effect: **Minor adverse**

Viewpoint 8 Curraghmore Road, North Sperrins Scenic Route

- Landscape Character Area and designations: Glenshane Slopes LCA near boundary with Eastern Binevenagh Slopes LCA, on northern edge of Sperrin AONB, in CPA and on North Sperrins Scenic driving route.
- Type and Sensitivity of Receptor: Travellers on scenic driving route within AONB of **high sensitivity**.

Existing View:

4.180. This viewpoint is looking in a northwesterly direction from an elevated position. The foreground view is of rough grassland with unmaintained mature native hedgerow field boundaries and with a post and wire fence between the roadside and the rural landscape beyond. The farmland in the middle-distance consists of maintained lowland pastures with multiple dwellings scattered throughout. The rising hills of Donald's Hill to the right and Benbradagh Hills to the left are largely clothed in coniferous forest and the frame the view in the near distance. Smulgedon Hill to the centre of the view is not distinct in profile from this view.

4.181. A single turbine is clearly visible in the middle distance and the existing Rigged Hill Wind Farm is also clearly visible to the right of the view above Cam Forest. Some blade tips of the existing Dunmore and Dunbeg wind farms are skylined in successive views further north towards the Binevenagh AONB. Immediate south easterly, views are restricted by roadside vegetation but further views toward the rising hills in the Sperrin AONB afford views of the Brockaghboy Wind Farm where the turbines are sky lined.

Predicted View:

4.182. All seven turbines of the Propose Development would be clearly visible in the centre of the view, which is 6km from the closest turbine. It would be slightly larger in scale than the existing Rigged Hill development to the right of the view. Although the turbines would be visible in their entirety and mostly skylined, the upper tips are in line with the summit of Donald's Hill to the right. The Proposed Development will not predominate the upland area in which they would be sited.

Magnitude of Effect: **Moderate – Very Significant adverse.**

4.183. The Proposed Development will be viewed at a similar scale and will occupy a similar extent of land to existing turbines and will be viewed within the context of a diverse landscape of working farmland and forestry plantations.

Significance of Visual Effect: **Very Significant.**

The Proposed Development will be a prominent visual element from this viewpoint.

Magnitude of Cumulative Effect: **Moderate adverse**.

4.184. The Proposed Development will comprise the most dominant turbines within the view as the existing Rigged Hill Wind Farm is visible in the far distance. The single turbine in the middle distance will be viewed in conjunction with the Proposed Development, albeit the Proposed Development will be distinctive from it. The consented Craiggore Wind Farm will be a similar scale and will be visible to the right of the Proposed Development as a distinct group of turbines. The least visible wind farm developments will be the existing and consented Dunmore and Dunbeg in successive views to the north.

4.185. The close-range view to the southeast of the viewpoint of the larger Brockaghboy Wind Farm is more dominant to that of the Proposed Development.

4.186. Successive views along the southwest route toward the Sperrin AONB will afford views of the existing wind farms of Glenconway, Slieve Kirk and Eglish Mountain.

Significance of Cumulative Visual Effect: **Very Significant adverse**

Viewpoint 9 A29 south of Garvagh

- Landscape Character Area and designations: Garvagh Farmland LCA, no landscape designations.

- Type and Sensitivity of Receptor: Workers in commercial premises and travellers on main road of **low** sensitivity. A few residents at the edge of the town facing main road of **medium** sensitivity.

Existing View:

4.187. This viewpoint is located along the A29 Carhill Road between the villages of Garvagh and Swatragh. It is a well-used road and the viewpoint is located near to a car sales business with other light industrial businesses located nearby. There are many detached dwellings and farm steadings leading off the road as well as a local primary school.

4.188. This westerly view is dominated by foreground views of farmland with glimpses of detached dwellings from behind bands of mature native deciduous and coniferous planting. A small proportion of the view to the right affords distant views toward the Binevenagh range with some turbines from the Rigged Hill Wind Farm visible against the sky above the conifer plantation.

Predicted View:

4.189. Most of the blades and hubs of six of the seven turbines of the Proposed Development will be visible in the centre of the view in the far distance from behind a conifer plantation, with only the blade tips of the seventh turbine visible. The forestry is due to be felled between 2030 and 2047, after which the Proposed Development will still be in operation; although the partial screening of the Proposed Development afforded by the dense band of mature deciduous planting in the middle ground of the view should still be in situ.

4.190. Visual receptors within the surrounding light industrial units will have limited visual experience of the Proposed Development as most of their working day will be spent indoors. Road users' views will be directed along a north and south trajectory away from the Proposed Development in the west. Residential visual receptors will have the opportunity for prolonged views of the Proposed Development, but owing to their location between the villages and the surrounding light industrial land-uses, alongside the existing views of Rigged Hill Wind Farm, their sensitivity is diminished.

Magnitude of Effect: **Slight**

Significance of Visual Effect: **Minor adverse to none.**

4.191. Views of the Proposed Development in the distance will only be partially visible owing to the screening afforded by the coniferous plantation and localised tree planting within the vicinity of the viewpoint, therefore the magnitude of change would be slight.

Magnitude of Cumulative Effect: **Slight**

4.192. The Proposed Development will be equally as visible alongside the existing Rigged Hill Wind Farm located in the distance to the right of the viewpoint, although the repowering of Rigged Hill Wind Farm will include larger turbines which will be more dominant within the view than the Proposed Development. The total cumulative effects will be negligible.

Significance of Cumulative Visual Effect: **Minor adverse**

Viewpoint 10 Glenbuck Road nr Boghill

- Landscape Character Area and designations: Long Mountain Ridge LCA, no landscape designations.
- Type and Sensitivity of Receptor: Primarily vehicular travellers on minor road adjacent to three consented wind farms. These receptors are judged to be of **low** sensitivity. There will be agricultural workers and residential receptors from the few isolated houses near the viewpoint. The views of these receptors will also be heavily influenced by their proximity to the consented wind farms and overall, they are judged to be of **medium** sensitivity.

Existing View:

4.193. This elevated viewpoint is taken from a ridge on Long Mountain on a country road near the village of Rasharkin. The majority of the view is composed of the foreground owing to a drop in level from the ridge, so middle distant views do not feature, but long distant views contain the Binevenagh hills to the west and the Antrim hills to the east. The foreground view is somewhat diminished in scale by the nearby wind turbine tower, there are three operational wind farms on this mountain. It comprises of rough upper moorland with post and wire fencing and a road associated with the turbine. The irregularly spaced clumps of mature vegetation are unmanaged and negatively detract from the distant views beyond the ridge.

4.194. Owing to the fair-weather conditions during the site visit, long distant views are possible of the Brockaghboy Wind Farm to the left of the view. The Rigged Hill turbines to the right of the view are skylined and less easily perceptible due to their distance away from the viewpoint. Single turbines are visible scattered throughout the Bann Valley below, they are the most discernible element within this distant part of the view, albeit a general impression of rolling farmland and settlements are perceivable.

Predicted View:

4.195. All seven turbines will be visible to the centre of the view, 25km to the nearest turbine. Half of the turbine structures will be back clothed whilst the other half will be sky lined. They will be perceptible as a standalone wind farm development along the softly undulating horizon.

Magnitude of Effect: **Slight.**

4.196. Owing to diminished clarity of view from this distance toward the Proposed Development, the change to the view is scarcely noticeable.

Significance of Visual Effect: Imperceptible.

Magnitude of Cumulative Effect: **Slight.**

4.197. Brockaghboy is currently the most visible wind farm within this view and is to the left. Rigged Hill Wind Farm to the right is just about perceptible in fair weather conditions. The scattering of single turbines within the distant lowlands between the two existing wind farm developments do not visually link the two. The addition of the Proposed Development to the centre of the view will be viewed as a standalone development partially back clothed along the horizon and will be less noticeable than the Brockaghboy Wind Farm.

4.198. Three consented wind farms will be located in the distance to the right of the Proposed Development but closer to the viewpoint, therefore they will be more perceivable from this view.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 11 Portglenone Play Area near Marina

- Landscape Character Area and designations: Lower Bann Valley LCA, no landscape designations.
- Type and Sensitivity of Receptor: All receptors are judged to be of **medium** sensitivity. They will primarily be children and accompanying adults using the play equipment, but residents of a few adjacent houses may experience similar views. Their sensitivity is lowered by their location within an urban area. Similar views may also be obtained from the marina car park and sports pitches which are beyond the play area.

Existing View:

4.199. The viewpoint is looking north west toward the River Bann and onwards to the Binevenagh hills which form a small part of the distant view from this location. The majority of the view is composed of the Portglenone Marina and its associated infrastructure; visitor complex, car park with some tree planting and ornamental planting, slipway, trailer park and camping area and incorporates the cul-de-sac of nearby residential street, Bannview Terrace. Residents here and in nearby streets are likely to have countryside views toward the northwest, especially from first floor windows. Middle views over the rolling countryside hills west of the River Bann are well vegetated mainly with mature deciduous trees with some conifers interspersed.

4.200. Brockaghboy Wind Farm is barely visible in the distance and is mostly sky lined. A small single turbine is visible to the right of the view from behind a band of mature trees. Rigged Hill is supposedly visible according to desktop studies but at 35 km away, it is not discernible from this distance away.

Predicted View:

4.201. The majority of the development is screened by Binevenagh range with only the blade tips visible against the skyline.

Magnitude of Effect: **Negligible.**

4.202. Such a small proportion of the Proposed Development will be visible in the far distance due to screening from topography. Combined with the majority of the view being formed of the built and natural elements within the near and middle distance, the change to the view from the Proposed Development will be imperceptible.

Significance of Visual Effect: **Imperceptible**

Magnitude of Cumulative Effect: **Negligible.**

4.203. The closest wind farm, Brockaghboy, is approximately 15km away and is only perceivable in fair weather conditions, in inclement weather the view is likely to be occluded. As has already been discerned, views of Rigged Hill Wind Farm were not achieved, albeit the repowering and larger turbines will potentially provide views of the development from this distant viewpoint. Dunmore and Dunbeg Wind Farms are theoretically visible, but they are screened by dense bands of tree planting in the middle distance. With only the upper blade tips of the Proposed Development being visible, it will not have an increased effect on the cumulative view.

4.204. Successive views to the north reveal views of the existing wind farms on Long Mountain; Long Mountain, Garves and Glenbuck from above the rooflines of new housing within the town of Portglenone.

Significance of Cumulative Visual Effect: **No significance**

Viewpoint 12 Benbradagh Mountain

- Landscape Character Area and designations: Binevenagh LCA, within Sperrin AONB, CPA and on Ulster Way.
- Type and Sensitivity of Receptor: Primarily walkers on the Ulster Way of **high** sensitivity. There may also be farmers tending extensively grazed stock who will be of **medium** sensitivity. Neither group of receptors are likely to occur in any great numbers.

Existing View:

4.205. The viewpoint is from an elevated position on Benbradagh Mountain 5km east of Dungiven town. It is accessed via the Curragh Road which exits Dungiven town in an easterly direction to the foot of Benbradagh Mountain, from here the viewpoint is reached via a steep mountain track past a farm gate. The gate prevents public vehicular access but is accessible on foot and it forms part of the Ulster Way. The foreground view on Benbradagh is of rocky, upland moors with evidence of extensive grazing. There are large areas of rushes indicating wet, marshy areas. There are a few geometric patches of coniferous plantations on some lower flanks of the hillside.

4.206. The dominant visual appeal from this viewpoint are the panoramic views gained in almost all directions; from the Sperrin mountain range in the south to Binevenagh in the north. Many existing wind farms and one single turbine are visible over the panorama. From this high viewpoint the profile of Smulgedon Hill is just about discernible in front of Donald's Hill which appears flat and almost level with Rigged Hill to the left. In the far distance to the right of centre, Knocklayd and Lannimore Hill along the Causeway Coast are visible. The existing view towards the Proposed Development is illustrated **4.38a of Appendix 4A, Volume 3.**

Predicted View:

4.207. All seven turbines are visible from this point which is 5km to the nearest turbine. The turbines will be mainly back clothed by moorland and conifer plantation from this elevation. This close-range view was chosen to represent the 'worst case scenario' albeit the viewpoint is in a remote location that would not be regularly accessed by the majority of visual receptors. See the wireframe and photomontage Figure **4.38b and 4.38c of Appendix 4A, Volume 3**.

Magnitude of Effect: **Moderate.**

4.208. Although the Proposed Development will be clearly visible from this viewpoint, it forms such a small proportion of this view and it is considered that the frequency at which the Proposed Development will be viewed from this point will be quite minimal within the Sperrin AONB.

Also, there are not similarly unscreened views of the Proposed Development available from the AONB. The Proposed Development will be viewed alongside other wind developments, so it will not be an unfamiliar addition to the view.

Significance of Visual Effect: **Very Significant adverse**

Magnitude of Cumulative Effect: **Moderate.**

4.209. The Proposed Development will bring wind turbines into closer proximity to this viewpoint in this direction. However, there are already clear views of established wind farms within and beyond the study area, so the addition of the Proposed Development will not introduce a new or dominant landscape element. The various wind farms are illustrated in the wireframes **Figures 4.38a and 4.38b of Appendix 4A, Volume 3.**

4.210. The existing views of wind farms within medium distance include partial views of the large Brockaghboy Wind Farm (visible when turning to the east) while all turbines of the Rigged Hill and Altahullion Wind Farm cluster on Long Mountain are also visible. More distant views of wind farms include partial views of the turbines of Dunbeg and clear views of the likes of Slieve Kirk and Eglish Mountain and small cluster on Long Mountain and others.

4.211. The views of the Proposed Development will be backdropped by the consented Craiggore Wind Farm, which would increase the mass of turbines on the ridge, but which are setback from Donald Hill's. Alterations would occur to the existing views of Rigged Hill Wind Farm with the proposed repowering scheme. The consented Cam Burn and Upper Ballyrogan Wind Farms will be heavily screened by the coniferous plantation of Gortnamoyagh Forest. The proposed Dunbeg South would further extend turbines already visible on the ridge by the existing Dunbeg Wind Farm.

4.212. The receptors views will be most affected by the nearby consented Evishagaran Wind Farm which is within the northern end of the Sperrins AONB and located on the moorland southeast of the Ulster Way and associated access track.

Significance of Cumulative Visual Effect: **Moderate**

Viewpoint 13 Slieve Gallion

- Landscape Character Area and designations: Slieve Gallion LCA, within Sperrin AONB.
- Type and Sensitivity of Receptor: Primarily passengers in vehicles travelling to appreciate this elevated view of **high** sensitivity and occasional workers travelling to the transmission mast and compound on the summit of Slieve Gallion of **medium** sensitivity.

Existing View:

4.213. This elevated hilltop viewpoint is accessed via Tullynagee Road from the foothills of Slieve Gallion to the transmission mast at the summit of the mountain. Along the road to the summit there is a picnic area from which panoramic views over County Tyrone are gained. From the summit, views are possible to the northeast and east far across into County Antrim and Belfast and to the Blue Stack Mountains in Donegal to the northwest.

4.214. The upland moorlands dominate the foreground and middle ground with evidence of extensive grazing. Settlements are visible in the lowlands below and as the hills rise above them the ground cover transitions to upper moorland and a large swathe of coniferous planting blankets the hillside of Mullaghmore Hill to the centre of the distant view. The existing view is illustrated in **Figure 4.39a of Appendix A, Volume 3.**

Predicted View:

4.215. The blade tips of the Proposed Development will be visible from behind the summit of White Mountain just left of Slieve Gallion. Most of the turbines are screened so the hillwalkers who are of high sensitivity will barely perceive the addition to the view, which is located at the end of the publicly accessible route. The Proposed Development's lack of visibility is illustrated in the wireframes of **Figure 4.39a and 4.39b of Appendix A, Volume 3.**

Magnitude of Effect: **Negligible.** The Proposed Development will not be visible.

Significance of Visual Effect: **Imperceptible**

Magnitude of Cumulative Effect: **Negligible**. The Proposed Development will not be visible and there are no other wind farms visible in this viewpoint.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 14 Lisdillon Road, Slieve Kirk Hill

- Landscape Character Area and designations: Sperrin Foothills LCA, no landscape designations.
- Type and Sensitivity of Receptor: Travellers in vehicles on rural road, workers in nearby electricity substation and farmers of **medium to low** sensitivity.

Existing View:

4.216. This is a hilltop viewpoint upon Slieve Kirk Hill located south of Ardmore which provides expansive views toward the Loughermore Hills in the north-northeast to Benbradagh in the east. Two turbines from Slieve Kirk Wind Farm dominate the middle ground view to the right of the view. The foreground contains views of the surrounding upland landscape of peatbog, marshlands and grassy pastures with post and wire fencing to either side of the road. Long distant views to the northeast reveal the turbines of Altahullion. Other single turbines are visible and back clothed by the hills to either side of the central view.

4.217. Views to the southwest from this point reveal the Sperrins in Tyrone and Fearns Hill and Conwal North in County Donegal. Further north along the ridge affords views to the Inishowen Peninsula in Donegal and the Foyle Estuary.

Predicted View:

4.218. Some of the Proposed Development will be visible sky lined some 29km to the right of the Altahullion development. See the viewpoint image, wireframes and photomontages of **Figure 4.40a to 4.40c of Appendix A, Volume 3.**

Magnitude of Effect: **Slight.**

Significance of Visual Effect: **Minor adverse**

Magnitude of Cumulative Effect: **Negligible.**

4.219. The existing Slieve Kirk Wind Farm which are the dominant turbines within the foreground, while the more distant Altahullion Wind Farm cluster is the largest mass of turbines in this view.

4.220. The Proposed Development would be barely discernible beyond this contiguous group of wind farms. Other wind energy which will be introduced to the existing view will include the consented Ballyhanedin Wind Farm and potentially the proposed Barr Cregg Wind Farm, which are both closer than the Altahullion Wind Farm cluster. More distant wind farms include the consented Craiggore Wind Farm, Evishagaran Wind Farm and the proposed Rigged Hill repowering, which will be viewed either behind the Altahullion Wind Farm cluster or largely contained by the hills. This demonstrate that wind turbines are already a strong element within the wider landscape to which the Proposed Development would make no significant addition.

Significance of Cumulative Visual Effect: **No significant effect**

Viewpoint 15, Legavallon Road, B190 nr Gortgarn

- Landscape Character Area and designations: Roe Basin LCA, on scenic driving route.

- Type and Sensitivity of Receptor: A range of receptors with sensitivities ranging from high to low including local residents overlooking main road, users of riverside walk and playing field, workers and customers at local shop, farm workers and travellers along main road.

Existing View:

4.221. This viewpoint is near a small settlement with local facilities and amenities situated near to the river within the Roe Valley. The foreground view beyond the houses comprises well maintained pastoral fields and associated native hedgerow. Middle ground views feature tree belts across the Roe Valley. The distant views are framed by Binevenagh and Benbradagh.

4.222. Rigged Hill wind turbines are skylines in the left of the view. To the centre right within the lowlands, three single turbines are visible to various degrees. Smulgedon Hill is visible in the centre of the view but is diminished in scale between the more distinctive and higher summits of Binevenagh and Benbradagh.

Predicted View:

4.223. Only one of the turbines of the Proposed Development will be visible from behind Smulgedon Hill. Two other turbines will have their blades and hubs visible whilst the blade tips of a further three turbines will be perceivable above the summit of the hill. The seventh turbine will be screened by Smulgedon Hill from this viewpoint. The predominant view from this point is the well-maintained lowlands and riverside planting along the Roe Valley which features along the mid horizontal line within the view. The visible elements of the Proposed view are not as visually dominant as the mountains to either side of Smulgedon Hill.

4.224. The local facilities within the settlement and the well-used roads into it, reduces the sensitivity of visual receptors from this viewpoint.

Magnitude of Effect: Slight

Significance of Visual Effect: Minor adverse

Magnitude of Cumulative Effect: Slight.

4.225. The Proposed Development will be simultaneously visible with the existing Rigged Hill Wind Farm to the north. Rigged Hill is a long-standing element of landscape character in this area and is located on a more prominent upland plateau but at a greater distance from this viewpoint. The proposed repowering of these turbines will further enhance their prominence.

4.226. The consented Craiggore Wind Farm will be visible upon the eastern end of Donald Hill extending the presence of wind energy along the ridge between the Proposed Development and Rigged Hill. Further to the right the turbines of the consented Evishagaran Wind Farm will be visible against Benbradagh Hill.

4.227. The Proposed Development will be a similar scale to these consented turbines but will consist of a smaller group of turbines located on a lower, less prominent hill within the Binevenagh range. The view will be further altered if the proposed Rigged Hill repowering turbines are approved.

Significance of Cumulative Visual Effect: **Minor adverse**

Viewpoint 16 Polly's Brae Road junction with B192, Drumrane Rd

- Landscape Character Area and designations: Roe Basin LCA at base of Loughermore Hills LCA, on scenic driving route and National Cycle Network, at edge of Greenbelt around Limavady.
- Type and Sensitivity of Receptor: Residents of houses in the area with **high** sensitivity and farm workers of **medium** sensitivity.

Existing View:

4.228. This viewpoint is taken from Polly's Road where it meets the B192 Drumrane Road, south of Limavady. Polly's Brae Road has a small cluster of houses and a local primary school. In the viewpoints south-easterly view there are large detached houses and farmsteads off the Drumrane Road, and they form the basis of the foreground view over well maintained grassy lowlands, characteristic of the Roe Valley. The middle ground view of mature deciduous trees and farmsteads forms only a small proportion of the overall view as the landform drops in elevation beyond these features. The distant hills behind frame the view behind with Donald's Hill visible in the east, albeit its sloping profile is screened by a house featuring in the foreground. To the right of the house the low rising ridge of Smulgedon Hill is visible with the more prominent profile of Benbradagh rising to the east.

4.229. Rigged Hill wind turbines are sky lined along the hilltops left of the house. The theoretical view of Brockaghboy wind turbine tips over the conifer plantation to the southeast is barely perceptible.

Predicted View:

4.230. The Proposed Development is 9km from this viewpoint and all seven turbines are visible to various degrees. Four of the seven turbines are almost entirely visible. The remaining three turbines are predominantly screened by landform with blade tips and hubs of two turbines

visible and only blade tips of the final turbine visible. Both the foreground and background features rise above the upper extents of the Proposed Development.

4.231. Rigged Hill Wind Farm to the left to the view will be more dominant from this viewpoint and the horizontal extents of the Proposed Development is a lot less than that of Rigged Hill, therefore impacting a lot less on the upland area on which it is located.

Magnitude of Effect: Moderate – **slight**

Significance of Visual Effect: **Moderate adverse**

Magnitude of Cumulative Effect: **Moderate adverse.**

4.232. The Proposed Development will be simultaneously visible with the existing Rigged Hill Wind Farm and it will bring wind turbines into closer proximity to visual receptors at this location. However, it is in a less prominent position than Rigged Hill and will form only a small cluster of turbines. The proposed repowering of Rigged Hill will continue to be a more dominant development within this view. Views with the existing Brockaghboy Wind Farm and consented Evishagaran are limited by the ridgeline. Some greater views will be possible with the proposed Corlacky Hill Wind Farm which is visible above the ridge but further away than the Proposed Development.

4.233. There will be sequential visibility in the vicinity of this viewpoint with a large existing wind farm cluster at Altahullion, and proposed wind farms at Dunbeg and Dunmore to the north of Rigged Hill. Wind farms are not an uncommon characteristic in this landscape

Significance of Cumulative Visual Effect: **Moderate adverse**

Viewpoint 17 Radisson Roe Hotel driveway

- Landscape Character Area and designations: Roe Basin LCA, within Distinctive Landscape Setting of Limavady.
- Type and Sensitivity of Receptor: Hotel staff of **low** sensitivity, hotel visitors and players on the sports pitches in the foreground of **medium** sensitivity.

Existing View:

4.234. This viewpoint is just of the B69 Baranailt Road bypass west of Limavady. The road accesses the Roe Park Resort and has mature trees lining the road to the west, but predominantly open views toward the east are gained through recently planted avenue trees. There are elevated views over the River Roe and fields beyond onto the western edge of residential development

within Limavady in the middle distance. The townland falls away after this point to reveal north-northeasterly views of Binevenagh range, Keady Mountain in the east, Donald's Hill in the southeast and Benbradagh to the south-southeast. The foreground view beyond the River Roe are of riparian planting and flood prevention earth berms, with sports pitches beyond to the centre of the view and views of the golf course beyond mature shrubs and trees in the foreground.

4.235. The south south-easterly views toward the undulating hilltops in the distance are filtered through nearby vegetation although the coniferous plantations and open moorlands are discernible on the hilltops and sides. The hill slopes are a patchwork of coniferous forestry and open heath and moorland. Smulgedon Hill is only just apparent above the middle ground suburban vegetation. Rigged Hill Wind Farm is visible along the hilltops to the left of centre in the view; albeit foreground vegetation is partially screening the development from this viewpoint. A couple of single turbines are visible, back clothed by a conifer plantation to the left of Rigged Hill lower down on the hillside.

4.236. North-easterly views of the existing Dunmore and Dunbeg Wind Farms are clear along the hilltop above the residential suburbs of Limavady.

Predicted View:

4.237. Bare earth analysis predicts that the Proposed Development should be visible from this point, but screening from the mixed development area of Limavady in the middle ground and vegetation prevents the majority of possible views towards the Proposed Development. The blades of six of the seven turbines may be visible above the screening albeit due to the complexity of this part of the view within the fore and middle ground, the introduction of the Proposed Development is relatively small in scale. Also, the predominant view from this point is of the higher and clearer outlines of Donald's Hill and Benbradagh to either side of the Proposed Development.

Magnitude of Effect: **Slight.**

4.238. The addition of the Proposed Development encompasses a small proportion of this view due to the complexities contained within it, therefore the magnitude of change would be slight.

Significance of Visual Effect: **Minor adverse – Imperceptible**

Magnitude of Cumulative Effect: **Slight.**

4.239. Rigged Hill is a larger and more prominent existing wind farm in this view, its proposed repowering scheme will further increase these structures prominence upon the ridgeline. The proposed wind farm will occupy a small and more discreet position in a lower saddle of land partially obscured by intervening tree cover and built development. There will be sequential

visibility with existing wind farms at Dunbeg and Dunmore and proposed Dunbeg South, on approaching the hotel roadside entrance to the north.

Significance of Cumulative Visual Effect: **Imperceptible**

Viewpoint 18 B66 opposite Ashlawn (private house)

- Landscape Character Area and designations: Roe Basin LCA, at edge of Binevenagh AONB.
- Type and Sensitivity of Receptor: Residents of a few dwellings along this road and visitors to the Binevenagh AONB both of **high** sensitivity. Farm workers of **medium** sensitivity.

Existing View:

4.240. The view is located along the B66 Ringsend Road just eastwards from Limavady by the gateposts to a detached private house. The signpost indicating the Binevenagh AONB is located a short distance from the viewpoint to the east. The foreground view is of well-maintained grassland pastures with native hedgerows. The eastwards view is flanked by Keady Mountain to the left of the B66 and Donald's Hill to the right. Benbradagh and the Sperrin Mountains are visible further in the distance to the south beyond the mature deciduous trees in the fore to middle ground of the view. Rigged Hill Wind Farm to the east-southeast is the most visible wind farm in the view.

Predicted View:

4.241. Only the blades and hub of one of the seven turbines from the Proposed Development will be visible from behind the lower slope of Donald's Hill. Similarly, screened views of the Proposed Development are available from the nearby Binevenagh AONB, of which there are only a few.

Magnitude of Effect: **Negligible**

Significance of Visual Effect: **Minor adverse**

Magnitude of Cumulative Effect: **Negligible.**

4.242. The existing Rigged Hill Wind Farm is a prominent and long-standing element of this view. It will be simultaneously visible with one of the proposed turbines, but this turbine will have a negligible effect on the extent of wind turbines from this viewpoint. The consented Craiggore Wind Farm will be barely visible with one upper turbine blade tip visible. The consented Evishagaran Wind Farm along the slopes of Benbradagh further south of the Proposed Development is partially visible through trees. The proposed Repowering Rigged Hill turbines

will be of a larger scale which will further increase their prominence along this section of the route.

4.243. There may be sequential visibility with existing wind farms at Dunbeg and Dunmore and proposed Dunbeg South on travels further up Keady Mountain, but Rigged Hill is likely to remain more prominent than the Proposed Development.

Significance of Cumulative Visual Effect: **Minor**

Viewpoint 19, Scotchtown Road, Magilligan

- Landscape Character Area and designations: Magilligan Lowlands LCA near boundary with Lough Foyle Alluvial Plain LCA, on western edge of Binevenagh AONB and CPA.
- Type and Sensitivity of Receptor: Farm workers of **medium** sensitivity and visitors to the coast of **high** sensitivity.

Existing View:

4.244. This viewpoint is looking southeast from where the Scotchtown Road terminates on the coast by the Foyle Estuary, just north of the mouth of the River Roe. The foreground is dominated by the flat grasslands to either side of the road with a post and wire fence to one side and a straight, solid stone-built wall to the other. The field boundaries are predominantly post and wire fences which adds to the expansive view over the flat grassy fields. Middle ground views are of a single line of intermittent clumps of mature deciduous and coniferous planting behind which Binevenagh (in the east), Keady Mountain, Donald's Hill and Benbradagh rise to form the distant backdrop to this view.

4.245. The viewpoint is located within the western edge of the Binevenagh AONB. The dominant view from this location is the view east towards the dramatic cliff face of Binevenagh which is viewed in stark contrast to the expansive, wide expanse of floodplain at the foot of the hill stretching out to the Foyle Estuary. Smulgedon Hill is viewed as a low hill 19km in the distance toward the southeast from this viewpoint, and is in amongst the striking hill profiles of Donald's Hill to the left and Benbradagh to the right. Rigged Hill turbines appear sky lined near the centre of the view and are the most visible of the wind farms within this view.

4.246. The expansive and distant view to the east towards the Inishowen Peninsula of Donegal is a key focal point from this viewpoint.

Predicted View:

4.247. One turbine from the Proposed Development will be visible in its entirety atop Smulgedon Hill. The upper tower and blade tips of two others will be visible from behind the lower flanks of Donald's Hill with the remaining four turbines being completely screened from view.

4.248. The Proposed Development will be viewed in conjunction with the Brockaboy Wind Farm which is further behind, so the turbines will be viewed as being smaller and due to the distance between the developments, Brockaghboy may not be visible during inclement weather conditions.

4.249. The view southeast towards the Proposed Development from this viewpoint is not within the line of view to the dramatic view of Binevenagh nor the view to the Inishowen Peninsula, the predominant views from this location. Further inland along the Scotchtown Road the views to the Proposed Development are screened by vegetation and the foothills of Donald's Hill eventually completely screen the development further inland from this viewpoint.

Magnitude of Effect: **Negligible**

Significance of Visual Effect: **Minor adverse**

Magnitude of Cumulative Effect: Negligible.

4.250. The existing Rigged Hill Wind Farm is a long-standing element of this view but is still located at some distance from this viewpoint and is therefore, not prominent. The Proposed Development will be significantly less prominent than Rigged Hill. The Proposed Development will be visible in conjunction with the approved Evishagaran Wind Farm further to the south on Benbradagh Hill and the Dunbeg South Wind Farm between Rigged Hill and Binevenagh. A small portion of the consented Craiggore Wind Farm will also be visible to the right of Rigged Hill Wind Farm, which itself will potentially be altered by its proposed repowering. These other developments are located over wider areas and are on more prominent sections of the ridgeline than the Proposed Development. The Altahullion cluster is only visible when facing towards the southwest away from the Proposed Development.

Significance of Cumulative Visual Effect: **Minor adverse**

Viewpoint 20 Greenbank Church, Quigley's Point

- Landscape Character Area and designations: Inishowen Coastal Area LCA, on Inishowen 100 scenic drive.

- Type and Sensitivity of Receptor: Tourists on scenic driving route and residents of houses overlooking the coast are of **high** sensitivity. Fishermen in the estuary of **medium** sensitivity. Church goers of **low** sensitivity.

Existing View:

4.251. This viewpoint is located in front of Greenbank Church along the coastal road R238 that starts north of Muff and continues along the Foyle Estuary until Moville where it turns inland. The foreground and middle ground view are encompassed by the view of the estuary and it is contained in the distance by views of Binevenagh in the east to the gentle rise of the Loughermore Hill in the south-southeast; albeit the hills are not visible in great detail from this distance. The detached dwellings along this route take advantage of the view eastwards over the estuary and beyond, although the views are intermittent along the R238 route due to areas of roadside and field boundary vegetation. The profile of Donald's Hill is the most distinctive ridge profile from this distance. The profile of Smulgedon Hill is not clearly visible due to the larger landforms in view behind it and to either side.

4.252. The dominant view is the partnership of the Foyle Estuary with the mountains beyond, with areas of settlement along the coastline in the distance being distinguishable from the landform behind. Some of the closer wind turbines of Dunbeg and Dunmore in the east can be identified and some turbines from Altahullion and Slieve Kirk to the southeast. Some individual turbines along the far side of Londonderry coastline are also visible.

Predicted View:

4.253. All seven turbines will be visible in the far distance to the right of Donald's Hill along the lower hill profiles, circa 30km in the distance. The majority of five of the turbines will be visible with the towers of the other two turbines being screened by landform. All this considered, alongside the variable weather conditions over the estuary, clear views to the Proposed Development will be intermittent and at a significant distance.

Magnitude of Effect: **Negligible**

Significance of Visual Effect: **Minor adverse**

Magnitude of Cumulative Effect: **Negligible.**

4.254. Dunbeg and Rigged Hill Wind Farms appear skylined in distant easterly views across the estuary. Gortnamoyagh Forest screens the Brockaghboy Wind Farm development to the south east.

4.255. The Proposed Development alongside the existing wind farms, the consented Craiggore and Evishagaran Wind Farms and the proposed Dunbeg South, Repowering Rigged Hill and Corlacky Wind Farms will be viewed as a collection of wind farms visible from a distance

between Binevenagh and Benbradagh Hills. The addition of the Proposed Development from this viewpoint at this distance will not have a significant impact on the existing view.

Significance of Cumulative Visual Effect: **Minor adverse**

Visual Summary

4.256. A total of 20 final viewpoints were assessed. The Proposed Development will have potential visual effects **of Very Significant or Moderate significance** on only six of these viewpoints and effects of **minor to no significance** on fourteen viewpoints. The results of the visibility analysis are summarised in **Table 4.6 and Table 4.7** below.

4.257. The reassessment of the Proposed Development upon receptors identified at the twenty viewpoints will not have any noticeable changes to the previously predicted adverse effects of the Original Consent. As the changes to the turbine dimension will only be noticeable within close range of the Proposed Development. There will be some greater cumulative views than at the time of the Original Consent, due to a number of operational and proposed wind farm and single farm turbine applications which post-date the Original Consent's application and assessment. However, these developments will have considered the Original Consent at Smulgedon and the in-combination effects for these were deemed acceptable.

Table 4.5: Summary of Visual Effects on Viewpoints

Viewpoint no. & location name	Range of view (distance to centre of wind farm, km)	Receptor Sensitivity	Magnitude of visual effect	Significance of visual effect
1. Kilhoyle Road	Close (1.5km)	Low - med	Very Significant - mod	Mod – minor
2. Smulgedon Hill	Close (1km)	High - low	Negligible	None - minor
3. B190 Dungiven - Coleraine	Medium (2.5km)	High – med.	Slight - mod	Moderate
4. Drumsurn Village	Medium (4.5km)	High	Moderate	Very Significant
5. B66, Glencurb	Long (8km)	Low - med	Negligible	None

6. Craigahulliar Road	Distant (27km)	High - low	Negligible	Minor - none
7. Seacon Townland, A26 nr Ballymoney	Distant (22km)	Low - med	Slight	Minor
8. Curraghmore Road, North Sperrins Scenic Route	Medium – long (6km)	High	Mod - Very Significant	Very Significant
9. A29 south of Garvagh	Long (8km)	Low - med	Slight	Minor - none
10. Glenbuck Road nr Boghill	Distant (26km)	Low	Slight	None
11. Portglenone Play Area near Marina	Distant (25km)	Medium	Negligible	None
12. Benbradagh Mountain	Close – Med (5km)	High	Moderate	Very Significant
13. Slieve Gallion	Distant (28km)	High - Med	Negligible	None
14. Lisdillon Road, Slieve Kirk Hill	Distant (30km)	Medium	Slight	Minor
15. Legavallon Road, B190 nr Gortgarn	Medium (7.5km)	High - low	Slight	Minor
16. Polly's Brae Road junction with B192, Drumrane Rd	Long (10km)	High - med	Mod – slight	Moderate
17. Radisson Roe Hotel driveway	Long (12.5km)	Low - med	Slight	Minor - none
18. B66 opposite Ashlawn (private house)	Long (10km)	High - med	Negligible	Minor
19. Scotchtown Road, Magilligan	Distant (20km)	High - Medium	Negligible	Minor

20. Greenbank Church, Quigley's Point	Distant (30km)	High - low	Negligible	Minor

Table 4.6: Summary of Viewpoints with potential cumulative effects

Viewpoint no. & location name	Visible Wind Farms	Magnitude of Cumulative effect	Significance of Cumulative effect
1. Kilhoyle Road	Altahullion cluster, Glenconway, Eglish, Slieve Kirk and Ballyhanedin	Mod - Very Significant	Minor - mod
2. Smulgedon Hill	None	Negligible	Imperceptible
3. B190 Dungiven - Coleraine	Craiggore	Slight	Moderate
4. Drumsurn Village	Rigged Hill, Altahullion cluster, Craiggore, Evishagaran	Slight	Moderate
5. B66, Glencurb	Brockaghboy, Rigged Hill, Craiggore, Upper Ballyrogan, Evishagaran, Corlacky	Negligible	Imperceptible
6. Craigahulliar Road	Rigged Hill, Dunbeg, Dunmore, Dunbeg South	Negligible	Imperceptible
7. Seacon Townland, A26 nr Ballymoney	Upper Ballyrogan, Craiggore,	Mod - slight	Minor

	Cam Burn, Rigged Hill, Dunbeg South		
8. Curraghmore Road, North Sperrins Scenic Route	Rigged Hill, Brockaghboy, Dunmore and Dunbeg	Moderate	Very Significant
9. A29 south of Garvagh	Brockaghboy and Rigged Hill	Slight	Minor
10. Glenbuck Road nr Boghill	Brockaghboy and Rigged Hill	Slight	Imperceptible
11. Portglenone Play Area near Marina	Brockaghboy, Rigged Hill, Dunmore, Dunbeg, Glenbuck, Garves and Long Mountain	Negligible	Imperceptible
12. Benbradagh Mountain	Brockaghboy, Rigged Hill, Altahullion cluster, Dunbeg and Dunbeg South, Craiggore, Evishagaran	Moderate	Moderate
13. Slieve Gallion	None	Negligible	Imperceptible

14. Lisdillon Road, Slieve Kirk Hill	Slieve Kirk, Altahullion cluster, Brockaghboy, Ballyhanedin, Bar Cregg, Craiggore, Evishagaran	Negligible	Imperceptible
15. Legavallon Road, B190 nr Gortgarn	Rigged Hill, Craiggore,	Slight	Minor
16. Polly's Brae Road junction with B192, Drumrane Rd	Rigged Hill, Brockaghboy Corlacky Hill, Evishagaran	Moderate	Moderate
17. Radisson Roe Hotel driveway	Rigged Hill, Dunbeg, Dunmore, Dunbeg South, Brockaghboy	Slight	Minor – not significant
18. B66 opposite Ashlawn (private house)	Rigged Hill, Dunbeg, Dunmore, Dunbeg South, Craiggore, Evishagaran	Negligible	Minor
19. Scotchtown Road, Magilligan	Rigged Hill, Evishagaran, Dunbeg South, Craiggore, Brockaghboy, Altahullion cluster	Negligible	Minor
20. Greenbank Church, Quigley's Point	Dunbeg, Dunmore, Dunbeg	Negligible	Minor

	South, Rigged Hill, Altahullion cluster, Slieve Kirk		

Note: Rigged Hill refers to the existing and proposed repowering wind farm and the Altahullion cluster refers to the existing Altahullion phase I and II and Glenconway Wind Farms.

MITIGATION MEASURES

Mitigation during Construction Phase

- Construction works will be undertaken following good environmental practice on site to minimise its effects on the existing landscape and ecological site elements. The temporary construction areas to accommodate the construction activity will be reinstated and incorporated into the overall design.
- Site works and deliveries will be carried out at suitable times to be agreed with the council, while any necessary lighting will be directed downwards to prevent spillage. These measures will help reduce the potential visibility of works and disturbance within the surrounding area.
- Any excavated soils for the cable trenches, tracks or foundations will be separately stored as topsoil and subsoil before being backfilled or gently graded back into the existing land profile. No soil will be brought off-site or new soil into the site.
- The layout of the access track and structures will follow the existing landforms to minimise any changes to the existing site levels.
- The finish of turbines will be painted an off white and any ancillary structures will be painted as RAL 6005 Moss Green colour or other subtle colour(s) to help blend with the local surroundings. The substations finish will be reflective of the local vernacular. All finishes being agreed with the local authority.
- Any breaches in the boundary hedgerow on the roadside will be compensated with additional hedgerow planting along the roadside edges. The areas of disturbed land will be seeded with a suitable grass mix to retain an agricultural use or other appropriate seed mix in keeping with the ecological enhancement measures.

Mitigation during Operational Phase

- Once operational, due to the vertical nature of the proposed turbines it will not be possible to provide further mitigation of these structures.
- Any site works required for servicing the electrical infrastructure will be kept to a minimum so that the lands remain largely unoccupied over the duration of the operational windfarm.

Mitigation during Decommissioning Phase

- At the decommissioning stage all structures, bases, tracks, and cabling will be removed offsite. All works carried out in line with best construction practice to minimise disturbance across the Application Site and surrounding landscape.
- Once all site elements are removed the disturbed lands will be graded and reinstated to a suitable grassland coverage. Lengths of any established field hedgerow boundaries will be retained. It may be necessary to retain some access track if so, required by the landowner.
- Careful restoration of the former windfarm site will ensure the lands are returned to their pre-planning agricultural use as intended.

RESIDUAL EFFECTS

Construction Phase

4.258. Most effects during the construction phase will be temporary for up to 8 months. There will be some semi-permanent changes as a result of the earthworks required for the foundations and access tracks. The excavated material will require displacing around the edges of the Application Site and graded into the adjoining land. This can be reverted when reinstating the land during the decommission phase.

Operational Phase

4.259. The proposed turbines and associated infrastructure will remain a prominent feature upon Smulgedon Hill for the operational lifetime of the Proposed Development. The vertical nature of these elements will mean it will not be possible to reduce the predicted range of **Minor to Major adverse** effects upon the landscape or visual receptors across the study zone,

Decommissioning Phase

4.260. The removal of the wind turbines and associated infrastructure together with the sensitive restoration of the Application Site lands to a suitable agricultural use will help to reverse the operational phase's negative adverse effects of the Proposed Development on the characteristics of the Application Site, the wider Binevenagh LCA and other LCA through the study zone. At this stage, the turbines will be no longer visible within the surrounding landscape and from any affected visual receptors across the study zone thus reverse any adverse visual effects experienced during the operational phase.

CUMULATIVE EFFECTS

4.261. Cumulative effects are defined by the GLVIA3 as:

"Result from additional changes to the landscape or visual amenity caused by the Development in conjunction with other developments (associated with or separate to it), actions that occurred in the past, present or are likely to occur in the foreseeable future."

4.262. Cumulative landscape effects may occur to the landscape components e.g. loss of hedgerows or landscape characteristics by introducing new features. Cumulative visual effects may occur where one development is viewed in combination (static views of up to 90-degree arc), successively (turning around on the spot) or sequentially where the user moves along routes, e.g. roads or paths with one development or more evident.

4.263. The Original Consent LVIA by SBC considered all other windfarms out to 30km which were within the planning systems (as operational, consented and pending applications) in 2008. Many of these windfarms are now operational or in the process of being constructed.

4.264. The following reviews the status of wind energy planning applications across the 35km as of 7th September 2020. This is to determine if there are any notable changes to the original assessment which may have a bearing on the Proposed Development. The other operational, consented and pending applications include all relevant small wind turbines development out to 10km and all windfarms out to 35km from the Proposed Development. These developments are listed in **Table 4.7 and Table 4.8** below and mapped in **Figure 4.10 of Appendix 4A, Volume 3**.

Table 4.7: Relevant Single turbine developments within 10km of the Proposed Development

PLANNING REFERENCE	PLANNING STATUS	DESCRIPTION	DISTANCE
LA01/2015/1005/F	Application Withdrawn.	640m NE of 27 Peters Road, Limavady. Proposed single wind turbine on a 60m hub with 50m blade diameter, giving 85m tip height.	1.32km
LA01/2015/0670/F	Permission Granted	697m NE of 31 Drumhappy Road, Dungiven. Relocation of wind turbine previously approved	3.2km

		under planning ref: B/2011/0063/F. Turbine to have a 40m hub height and a 39m rotor diameter.	
LA01/2015/0271/F	Application Withdrawn	lands 265m North East of 15 Peters Road, Dungiven. Erection of single wind turbine – 40m hub height with 27m blade length, associated access and 2 no electricity cabinets.	1.91km
B/2014/0252/F	Application Withdrawn	697m NE of 31 Drumhappy Road, Dungiven. Change of wind turbine previously approved under planning ref: B/2011/0063/F to EWT with 50m hub height and 54m rotor diameter	3.2km
B/2013/0232/F	Permission Granted	Approx. 200m south east of 197 Legavallon Road, Dungiven. Erection of a 225kW wind turbine with a tower height of 31 metres.	2.39km
B/2012/0291/F	Application Withdrawn	240m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind turbine with hub height of 40m on site of existing quarry.	1.50km

B/2012/0290/F	Permission Granted	340m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind turbine with hub height of 40m on site of existing quarry.	1.50km
C/2013/0402/F	Permission Granted	461m South/South East of 49 Gortnamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a max output not exceeding 250kW.	2.8km
C/2012/0477/F	Application Withdrawn	517m south southeast 49 Gortnamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a maximum output not exceeding 250kW.	2.8km
C/2010/0442/F	Permission Refused	292m North East of 247 Legavallon Road, Garvagh. Proposed A29 225kW wind turbine, with 30m hub	1.67km

Table 4.8: Wind farm developments within 35km of the Proposed Development

Planning Reference	Planning Status	Description	Distance
LA01/2018/0200/F	Under Consideration	Construction of a wind farm comprising 9 no wind turbines (maximum 149.9mto blade tip) and associated infrastructure.	9.97km
LA01/2017/1654/F	Under Consideration	Construction of a wind farm comprising 6 no. wind turbines (maximum 149.9 metres to blade tip), an electrical substation / control building, energy storage area, construction compound, junction improvements.	35km
LA01/2017/1124/F	Permission Granted	Proposed amendment to the overall tip height of the consented Craiggore Wind Farm (B/2012/0268/F)	2.4km
LA01/2016/0315/F	Withdrawn	Amendments to consented Brockaghboy No 2 Wind Farm (H/2014/0241/F)	4.77km
LA01/2016/0061/F	Permission Granted	Construct a three-turbine extension to the operational Dunbeg Wind Farm (consented under PAC REF.	4.02km

		2009/A0363 to planning reference B/2007/0560/F)	

Cumulative Landscape Effects

4.265. The Proposed Development will not be adding further to the number of wind turbines within the Binevenagh LCA as it is only a variation to the model types of those already approved upon Smulgedon Hill. The Binevenagh LCA already contains a number of operational, approved, and pending windfarms which stretches along the arc of the hills between the Binevenagh AONB and northern end of the Sperrins AONB. Smaller farm scale turbines are typically found on the lower lowland, with some sited on the mid slopes of the hills within the LCA, refer to **Figure 4.10 of Appendix 4A, Volume 3**.

4.266. The Proposed Development is set back on the lower Smulgedon Hill away from the more prominent hillsides and is located a distance away from the location of the other windfarms which are sited on more sensitive areas of the LCA. Some of these wind farms which post-date the Original Consent will have considered Smulgedon Wind Farm in their cumulative assessments, including the nearby Craiggore and Evishagaran Wind Farms, as listed in **Table 4.8**. The proximity of the Proposed Development with Craiggore Wind Farm will result in some cluster of wind energy between Smulgedon Hill and Craiggore Hill. Proposed developments of relevant single wind turbines within 10km that postdate the Original Consent, as listed in **Table 4.7** have been considered and it is considered that there will be no significant additional cumulative landscape effect.

4.267. The Proposed Development's changes will have no further adverse cumulative effects upon the setting of the Binevenagh LCA or indirect effects on the other LCAs across the study zone or designations, than those already considered by the Original Consent.

Cumulative Visual Effects

4.268. The Original Consent provided Cumulative ZTV of the Smulgedon Windfarm and all other windfarms in the study zone. These figures have been updated within this LVIA, see **Figures 4.10 – 4.26 of Appendix 4A, Volume 3**, to account for the Proposed Development's reduced turbine height and a number of applications submitted after the Original Consent application. The updated viewpoint figures also show the location of these other developments within each viewpoint wireframe. The wireframes provide a sense of the high density in places of wind energy of varying scales visible from most viewpoints. These viewpoints experience a mix of combined, successive views or sequential views of the Proposed Development and other wind energy.

4.269. The Original Consent LVIA by SBC provides a summary of the landscape and visual cumulative assessment:

"There are a significant number of other proposed and constructed wind farms within the study area and also in adjacent areas, particularly Inishowen, near Derry and to the east. Altahullion and Rigged Hill wind farms are long-standing developments and wind farms have become common and recognisable landscape features in this study area. The Development is unlikely to cause the overall landscape and visual character to change or significantly increase the perception of wind farms".

4.270. The change in turbine height will be negligible on any change to the previously predicted cumulative visual effects of the Original Consent. As the Proposed Development consists of the same number of turbines and location as the Original Consent. The minor reduction in height will not be discernible when viewing these turbines along with the mix of other existing, consented and proposed wind energy from different locations across the study zone.

4.271. The recent applications which postdate the Original Consent are of a larger scale and sited on the more prevalent hillsides of the northern Sperrin Mountains between the two AONBs. These later developments will have been required to carefully consider their position with regards to the potential visibility with the Original Consent in any cumulative assessment, which it is assumed the cumulative interaction was deemed acceptable as these developments were granted planning permission. The potential cumulative visual effects of the approved developments have been considered within the visual assessment and they are included in the cumulative summary in Table 4.6.

SUMMARY & CONCLUSION

Summary

Landscape Effects

4.272. The Proposed Development effects on the landscape character of the Binevenagh LCA will be greatest within the immediate area resulting in **Moderate adverse effects**. This is reduced to **Minor adverse effects** across the wider LCA because it is set on a small lower less prominent hill within the LCA. It will have **Minor to Imperceptible adverse effects.** The Proposed Development does not fall within any designation nor will it have any significant effects on designated landscapes. There are existing larger windfarms located in the more sensitive parts of the LCA and within designated areas.

Visual Effects

4.273. The Proposed Development's visibility will largely extend across the eastern and western lands of the study zone. The greatest views occurring from the west looking towards the northern Sperrins. There is reduced visibility from the northern and southern areas of the study zone outside of 25km, as views are increasingly screened by variations in the local topography, blocks of forestry, other trees and hedgerows and buildings within the intervening landscape. The viewpoint assessment determined that only six of the viewpoints would have **Very Significant or Moderate adverse effects. The remaining 14 viewpoints will be Minor to Imperceptible.**

Cumulative Effects

4.274. Across most of the study zone the Proposed Development will be visible alongside one or more wind energy developments, which may include a windfarm or smaller farm scale turbine as these types of development are prevalent across the landscape and have become a common feature. Additional wind farms and relevant single wind turbines that postdate the original assessment were included in the cumulative assessment. A total of five viewpoints will experience of **Very Significant or Moderate adverse effects with the remaining 15 viewpoints experiencing Minor to Imperceptible adverse** effects. Views toward the Application Site are sometimes reduced by screening from trees, hedgerows, buildings or local variations in the topography within the intervening landscape. The Proposed Development will only slightly add to the presence of wind energy already present or approved within the Binevenagh LCA or other LCAs across the study zone.

Conclusion

4.275. The Proposed Development has reassessed the Original Consent LVIA after reviewing the existing baseline after a gap of some 12 years since the LVIA assessment was undertaken. The greatest change to the landscape across the study zone has been the increase in wind energy development which includes both smaller scale farm turbine, typically around 40-70m blade tip, and larger windfarms, which are now extending to around 140m in blade tip.

4.276. The proposed changes to the Original Consent include a variation to the turbine model with a reduce hub height by 16.1m to 68.9m high, a wider blade pan by 21m to 92m rotor diameter which gives an overall lower blade tip by 5.6m to 114.90m than the consented turbines. Only those receptors within close range of the Proposed Development will notice the proposed turbines greater blade sweep area and lower blade tip height. The majority of receptors will find it hard to differentiate between the two developments, given there is no change to their location within the Application Site upon Smulgedon Hill. Any potential landscape or visual effects due to the differences in the proposed and consented crane pad are negligible.

4.277. Overall, the principles of the Proposed Development are very much the same as that of the Original Consent which has already been granted and any adverse landscape, visual and cumulative effects of both.

Chapter 5: Ecology

5. ECOLOGY

INTRODUCTION

5.1. Neo Environmental Ltd has been appointed by Smulgedon Wind Farm Ltd (the "Applicant") to undertake the Ecology Chapter of an Environmental Statement (ES) for a proposed amendment (the "Proposed Development") to a consented wind farm (Planning Reference B/2009/0070/F) on lands at Smulgedon Hill, BT49 OPY (the "Application Site"). The original consented development ("Original Consent") consists of 7 wind turbines of 120.5m to tip. Please see Figure 1 for the layout of the Proposed Development.

5.2. For the purposes of this Environmental Statement (ES) the larger consented development area that constitutes the original wind farm and all associated infrastructure will be referred to as "the Original Application Area".

5.3. This chapter is supported by the following Figures (found in **Volume 3**) and Technical Appendices (found in **Volume 4**):

- Appendix 5A Figures:

  – Figure 5.1 Environmental Designations Map;

  – Figure 5.2 Extended Phase 1 Habitat Map;

- Appendix 5B Site Photographs

- Technical Appendix 5.1: Bat Activity Report

5.4. Potential effects for bird species are assessed separately and covered within **Chapter 6; Ornithology,** of this ES.

DEVELOPMENT DESCRIPTION

5.5. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines.

Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

5.6. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

SITE DESCRIPTION

5.7. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

5.8. The area that encompasses the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

5.9. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

STATEMENT OF AUTHORITY

5.10. This Chapter has been produced by ecologists registered with the Chartered Institute of Ecology and Environmental Management (CIEEM). All associated survey work has been carried out in line with the relevant professional guidance; CIEEM's Guidelines for Preliminary

Ecological Appraisal[1], Ecological Impact Assessment[2], and Report Writing[3]. The following individuals produced this Chapter:

5.11. Daniel Flenley has 14 years of ecology experience including undertaking surveys and writing associated reports. A graduate member of the Chartered Institute of Ecology and Environmental Management (CIEEM), he is currently applying for full membership. Daniel has experience in undertaking and managing a range of surveys and assessments including Ecological Impacts Assessments (EcIAs), extended phase 1 habitat surveys and ornithological and protected species surveys, for around 200 projects. These include a variety of development types such as energy, commercial, industrial and transport infrastructure. Daniel holds a Great Crested Newt class licence and has worked as an accredited agent under bat and amphibian mitigation and reptile survey licences.

5.12. Dara Dunlop is a Qualifying Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) with circa 3 years' experience in the ecology sector, including working for an ecological consultancy, undertaking a range of protected species surveys and extended phase 1 habitat surveys for industrial schemes, and land management of designated sites. Dara has co-authored a number of reports including Ecological Impact Assessments and Protected Species Reports for various developments.

5.13. Brogan Loughlin has a background in wildlife conservation, with circa 2 years' experience undertaking a range of protected species surveys, extended phase 1 habitat surveys, bat surveys and fresh water surveys for various industrial schemes, renewable energy projects, quarries and National Trust sites. Brogan has written a number of reports including Ecological Impact Assessments, bat reports and Appropriate Assessments for various developments. Adding to her background in conservation, Brogan has previously worked as a volunteer Assistant Ranger and Wildlife Conservation Officer.

[1] CIEEM (2017) *Guidelines for Preliminary Ecological Appraisal.*
[2] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.*
[3] CIEEM (2017) *Guidelines for Ecological Report Writing.*

LEGISLATION, POLICY & GUIDANCE

5.14. The Proposed Development has been assessed against existing European, national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance:

EUROPEAN LEGISLATION

5.15. European legislation relevant to the Proposed Development is outlined within **Table 3-1** below.

Table 3-1: Relevant European Legislation

Directive	Main Provisions
EU Habitats Directive 92/43/EEC	The EU Habitats Directive sets out the framework for the designation and protection of sites for nature conservation for species and habitats listed in Annex II, IV and V. The directive was adopted in 1992 as a response to the Bern Convention. *"The main aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance."* The protection of species outlined in the Habitats Directive is transposed into national legislation principally by 'EC (Natural Habitats) Regulations 1997 (amended)'[4].
EU Birds Directive EC/79/409	European Union members meet their obligations for bird species under the Bern Convention and Bonn Convention, and more generally by the means of the EU Birds Directive. The Birds Directive sets out the criteria for Special Protection Areas including; a list of species requiring protection in Annex 1 of the Directive and mechanisms for protecting wild birds naturally occurring in Europe. This Directive is transposed into national

[4] Office of the Attorney General (1997), European Communities (Natural Habitats) Regulations 1997 (amended 1998, 2005), available at www.irishstatutebook.ie

	legislation principally by the 'EC (Birds and Natural Habitats) Regulations 2011'[5]. The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State.
Environmental Liability Directive 2004/35/EC	The Environmental Liability Directive aims to make those causing damage to the environment (water, land and nature) legally and financially responsible for that damage. The directive covers environmental damage caused by or resulting from occupational activities to: Species and natural habitats protected under the 1992 Habitats Directive and the 1979 Wild Birds Directive. Damage to protected species and natural habitats is "*any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species*".
Bern Convention	The Bern Convention came into force in 1982, with the principal aims to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III.
Bonn Convention	The Bonn convention came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral Agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities.

NATIONAL LEGISLATION

5.16. The principal national legislation governing the protection of wildlife and natural resources in Northern Ireland are:

[5] Office of the Attorney General (2011), European Communities (Birds and Natural Habitats) Regulations 2011, available at www.irishstatutebook.ie

- The Wildlife (Northern Ireland) Order 1985[6] - this is the principal legislation for the protection of wildlife in Northern Ireland and outlines strict protection for species that have significant conservation value.
  - It is an offence to intentionally kill, injure, or take any wild bird or their eggs or nests, with special penalties for Schedule 1 species.
  - The Order makes it an offence to intentionally kill, injure, or take, possess, or trade in any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
  - It is also an offence to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant species listed on Schedule 8. The Order also prohibits the unauthorised intentional uprooting of such plants.
- The Wildlife (Northern Ireland) Order 1985 was amended in 2011 by The Wildlife and Natural Environment Act (Northern Ireland) 2011, giving protection to a wider range of wildlife, providing additional enforcement powers and penalties for related offences. It also introduced a statutory duty on all public bodies to further the conservation of biodiversity.
- The conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended).
- The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985.
- The Environment (Northern Ireland) Order 2002.

PLANNING POLICY

Planning Policy Statements

5.17. Planning Policy Statements (PPSs) set out the policies of the Department of the Environment (the Department) on particular aspects of land-use planning and apply to the whole of Northern Ireland. Their contents will be taken into account in preparing development plans and are also material to decisions on individual planning applications and appeals.

[6] https://www.legislation.gov.uk/nisi/1985/171/contents

5.18. PPS 2 (Planning and Nature Conservation) sets out the Department's planning policies for the conservation, protection and enhancement of our natural heritage. It includes the following policies:

- Policy NH 1 - European and Ramsar Sites - International

"Where a development proposal is likely to have a significant effect (either alone or in combination) or reasonable scientific doubt remains, the Department shall make an appropriate assessment of the implications for the site in view of the site's conservation objectives. Appropriate mitigation measures in the form of planning conditions may be imposed. In light of the conclusions of the assessment, the Department shall agree to the development only after having ascertained that it will not adversely affect the integrity of the site."

- Policy NH 2 - Species Protected by Law

"Planning permission will only be granted for a development proposal that is not likely to harm a European protected species.

In exceptional circumstances a development proposal that is likely to harm these species may only be permitted where: -

- *There are no alternative solutions; and*
- *it is required for imperative reasons of overriding public interest; and*
- *there is no detriment to the maintenance of the population of the species at a favourable conservation status; and*
- *compensatory measures are agreed and fully secured.*

Planning permission will only be granted for a development proposal that is not likely to harm any other statutorily protected species and which can be adequately mitigated or compensated against.

Development proposals are required to be sensitive to all protected species, and sited and designed to protect them, their habitats and prevent deterioration and destruction of their breeding sites or resting places. Seasonal factors will also be taken into account."

- Policy NH 3 - Sites of Nature Conservation Importance – National

Planning permission will only be granted for a development proposal that is not likely to have an adverse effect on the integrity, including the value of the site to the habitat network, or special interest of:

- *Areas of Special Scientific Interest;*
- *Nature Reserves;*

- *National Nature Reserves; or*
- *Marine Nature Reserves*.

A development proposal which could adversely affect a site of national importance may only be permitted where the benefits of the proposed development clearly outweigh the value of the site. In such cases, appropriate mitigation and/or compensatory measures will be required."

5.19. PPS 18 (Renewable Energy) sets out the Department's planning policy for development that generates energy from renewable resources and that requires the submission of a planning application.

Local Development Plan

5.20. A Local Development Plan forms the basis of land use planning and decisions within the Borough. The current plan for the Causeway Coast and Glens Borough Council (CCGBC) Local Development Plan is the Northern Area Plan. It includes the following relevant ecological aims:

- POLICY ENV 1: Local Landscape Policy Areas:

"Planning permission will not be granted for development proposals that would be liable to affect adversely those features, or combination of features, that contribute to the environmental quality, integrity or character of a designated LLPA. Where development is permitted, it will be required to comply with any requirements set out for individual LLPAs in the District Proposals."

- POLICY ENV 2: Sites of Local Nature Conservation Importance:

"Planning permission will not be granted for development that would be liable to have a significant adverse effect on the intrinsic nature conservation interest of a designated Site of Local Nature Conservation Importance."

- POLICY ENV 3: Trees

"Development that would result in the loss of trees, hedges or other features that contribute to the character of the landscape, or are of nature conservation value, will not be permitted unless provision is made for appropriate replacement planting and the creation of new features."

- POLICY ENV 4: Development Adjacent to a Main River

"Development proposals on sites adjacent to a main river will only be acceptable provided the following criteria are met:

1. a biodiversity strip of at least 10 metres from the edge of the river is provided and accompanied with an appropriate landscaping management proposal;

2. public access and recreation provision is provided where appropriate;

3. there is no significant adverse impact on nature conservation;

4. the proposal will not compromise or impact on the natural flooding regime of the main river and complies with the requirements of PPS 15 (Revised): Planning and Flood Risk; and

5. any development would not prejudice future opportunities to provide a riverside walk."

Biodiversity Action Plans

5.21. The UK Biodiversity Action Plan (UKBAP) (Anon, 1995) was organised to fulfil the Rio Convention on Biological Diversity in 1992, to which the UK is a signatory. A list of national priority species and habitats has been produced with all listed species/habitats having specific action plans, defining the measures required to ensure their conservation.

5.22. Regional and local BAPs have also been organised to develop plans for species/habitats of nature conservation importance at regional and local levels. The Causeway Coast and Glens Borough Council Cluster of Ballymoney, Coleraine, Limavady and Moyle Councils BAP includes a number of priority species including, but not limited to, all bat species, barn owl, swift, yellowhammer, red squirrel, otter, harbour porpoise, bumblebee.

Guidance Documents

BS 42020:2013 Biodiversity[7]

5.23. The British Standards Institute has published *BS 42020:2013 Biodiversity: Code of practice for planning and development,* which offers a coherent methodology for biodiversity management. This document seeks to promote transparency and consistency in the quality and appropriateness of ecological information submitted with planning applications and applications for other regulatory approvals.

5.24. BS 42020:2013 cites Chartered Institute of Ecology and Environmental Management (CIEEM) EcIA Guidelines as the acknowledged reference on ecological impact assessment. These guidelines are consistent with the British Standard on Biodiversity, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

[7] *BS 42020:2013 Biodiversity. Code of practice for planning and development*

CIEEM Guidelines

5.25. CIEEM have produced guidance on Preliminary Ecological Appraisal[8] (PEA), Ecological Impact Assessment[9] (EcIA) and Ecological Report Writing[10].

[8] CIEEM (2017) *Guidelines for Preliminary Ecological Appraisal.*
[9] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.*
[10] CIEEM (2017) *Guidelines for Ecological Report Writing*

METHODOLOGY

Zone of Influence

5.26. The Zone of Influence (ZOI) is the area encompassing all predicated negative ecological effects from a proposed scheme and is informed by the habitats present within the site and the nature of the proposals. Due to the scale and nature of the proposal, it is considered that the following ZOI of the proposed wind farm, outlined in **Table 5-2** below, was appropriate for the gathering of information for the desk study.

Table 5-2: Zone of Influence for ecological features

ECOLOGICAL FEATURE	Zone of Influence (ZOI)
International/European statutory designations	15km
National statutory designations	5km or wherever hydrological influence extends, whichever is further
Protected and Priority Species	2km

Desk Based Assessment

5.27. A desk-based assessment was undertaken to collate available ecological information for the Application Site and the surrounding area. This included a search of statutory designated sites within a 5km radius of the Application Site including: Special Protection Areas (SPAs), Special Areas of Conservation (SACs), RAMSAR Sites, Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs). The description of each of these sites was obtained utilising the Multi-Agency Geographic Information for the countryside (MAGIC).

5.28. A Habitat Regulations Assessment (HRA) is required where a project may give rise to significant effects upon a Natura 2000 site. A HRA comprises a 'Test of Likely Significance' and if necessary, an 'Appropriate Assessment'.

5.29. Given the limited nature and extent of the proposals, a HRA is not deemed necessary in connection with the Proposed Development.

5.30. A data search was made through the National Biodiversity Data Centre (NBDC)[11] to obtain information regarding protected/notable species within close proximity of the Application Site. The Application Site is centred at approximate Irish Grid Reference (IGR) C 75602 14846.

[11] Available at: https://maps.biodiversityireland.ie/

5.31. Additional information on the suitability of habitats in the surrounding area for bats was also obtained from the NBDC in the form of a habitat suitability map. The map provided enhanced information on the recorded distribution of bats and broad-scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species.

Field Surveys

Extended Phase 1 Habitat Survey

5.32. Extended phase 1 habitat surveys of the consented wind farm site were undertaken in 2007 and 2008.

5.33. An updated extended phase 1 survey was undertaken over the course of three site visits on the 9th, 10th and 22nd January 2020 by Dara Dunlop BSc (Hons). The area surveyed, defined as the Ecological Survey Area (ESA), covered the land ownership boundary within which the consented wind farm falls.

5.34. Survey work was carried out in accordance with the Joint Nature Conservation Committee (JNCC) guidelines[12] in order to produce an extended phase 1 habitat map, which is contained within **Figure 5.2** of this document.

5.35. Both of these habitat classification methods provide a standardised system to record and map semi-natural vegetation and other wildlife habitats in order to assess their potential importance for nature conservation. The survey method used for both systems is comparable, apart from a slight variation in the naming of habitat types.

Species Scoping Survey

5.36. A species scoping survey was carried out to identify the presence of protected species, or the potential of the Application Site to support protected species. The aim of the survey was to provide an overview of the Application Site and to determine whether any further survey work was required.

5.37. **Table 5-3** below outlines the relevant habitat and field signs that indicate the presence of protected or notable species within the ESA.

[12] JNCC (2010) Handbook for Phase 1 habitat survey

Table 5-3: Indicative Habitats and Field Signs of Protected Species

Taxon	Indicative Habitat(s)	Field Signs (In Addition to Sightings)
Bats	Roosts – trees, buildings, bridges, caves, etc. Foraging areas – e.g. parkland, water bodies, streams, wetlands, woodland edges and hedgerow. Commuting routes – linear features (e.g.) hedgerows, water courses, tree lines).	In or on potential roost sites: droppings stuck to walls, urine spotting in roof spaces, oil from fur staining round roost entrances, feeding remains (e.g. moth wings under a feeding perch).
Badger	Found in most rural and many urban habitats.	Excavations and tracks: sett entrances, latrines, hairs, well-worn paths, prints, scratch marks on trees. Survey undertaken within the ESA.
Pine marten	Woodland.	Dens, scats, footprints.
Red squirrel	Woodland.	Dreys, feeding remains.
Otter	Watercourses.	Holts (or dens), prints, spraints (droppings), slide marks into watercourses, feeding signs (e.g. fish bones).
Reptiles	Rough grassland, log and rubble piles.	Sloughed skins.
Amphibians	Ponds within 500 m of suitable habitat within the site boundary. Suitable (terrestrial) habitat includes rough grassland, scrub and woodland, log and rubble piles and other debris, animal burrows.	No specific field signs.
Freshwater pearl mussels	Waterways.	Suitable substrate.

5.38. The species scoping survey determined that other species surveys were not deemed necessary. Chapter 7: Flora and Terrestrial Ecology of the Environmental Statement

submitted for the Original Consent also reached the same conclusion on the basis that the site was not identified as an important location for other protected species.

Bat Surveys

5.39. A separate report, detailing the bat survey work performed, is provided as **Technical Appendix 5.1: Bat Activity Report.** The following section summarises the methods employed in these surveys.

5.40. Dusk transect surveys and associated remote monitoring were carried out for each season of the bat active period in 2020. Seasons can be defined as Spring (May 1st-May 31st), Summer (June 1st-July 31st) and Autumn (August 1st-September 31st).

5.41. Each season a transect of the Application Site and ESA, covering the Consented Turbine locations and associated habitats which may be utilised by bats (see **Technical Appendix 5.1: Bat Activity Report**), was walked at a constant speed, starting 30 minutes before sunset and finishing after 2 hours and 30 minutes. Bat passes were recorded using an Echo Meter Touch 2 Pro handheld detector allowing for later sound analysis of calls. Wherever possible, bats within the survey area were identified to the species level. As well as the audio recording of bats within the area, any visual records during the transect surveys were mapped and the activity of these bats (commuting, foraging, etc.) was noted.

5.42. Six static automated bat detectors (Wildlife Acoustics Song Meter SM4 BAT FS bat detectors, full spectrum and zero crossing, with SMM-U2 microphone) were deployed within the ESA to record bat passes over five consecutive nights each season during suitable weather conditions.

5.43. It should be noted that the Proposed Development will only result in a small increase in the turbine foundations and crane pads, as well as the turbine type. Therefore, most infrastructure that is already consented will remain as per the Original Consent.

Evaluation Methods

5.44. The evaluation of ecological receptors is based upon the CIEEM guidelines[13] (2017) which suggests that the value or potential value of an ecological resource or feature (for example a habitat type, species or ecosystems) should be determined within a geographical context (e.g. rare at a local level). Attributing a value to a receptor, which is also a designated site, is generally precise, as the designations themselves provide an indication of value.

[13] CIEEM (2017) *Guidelines for the Ecological Impact Assessment in the UK and Ireland.* Available at: https://cieem.net

Adopted Design Principles

5.45. The evaluation of the ecological baseline has enabled the inclusion of integral design measures which will ensure impacts from the Proposed Development on ecological receptors can be reduced or avoided through the development design.

Impact Assessment Methods

5.46. The impact assessment process involves:

- identifying and characterising impacts and their effects;
- incorporating measures to avoid and mitigate negative impacts and effects;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects; and
- identifying opportunities for ecological enhancement.

5.47. The terms 'impact' and 'effect' are used commonly throughout ecological reports. Impact is defined as a change experienced by an ecological feature, while effect is defined as the outcome to an ecological feature from an impact. Impacts and effects can be positive, negative or neutral.

5.48. Assessment of potential impacts and effects needs to consider on-site, adjacent and more distant ecological features, including habitats, species and statutory and ecological designated sites.

5.49. This ecological impact assessment has been concluded by an experienced ecologist following CIEEM guidance.[14]

Significance of Effects

Assessment of Effects

5.50. This Chapter has been produced in line with best practice guidance[15] and professional judgement, in order to provide a methodology that is robust and fit for purpose for the proposed wind farm. The following provides an outline of the methodology used to provide a structured approach to determining potential effects of the project. The assessment involved the following process:

[14] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.* Available at: https://cieem.net
[15] *ibid.*

- Evaluation of nature conservation value;
- Impact assessment of project (including construction, operational and decommissioning phase for cumulative/in-combination effect, and as an individual development);
- Provision of mitigation measures;
- Assessment of residual effects.

Evaluation of Nature Conservation Value/Sensitivity

5.51. Nature Conservation Value is defined on the basis of the geographic context given in **Table 5-4** (in accordance with CIEEM guidance[16]). Attributing a value to an ecological feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of an importance level. In the case of species, assigning value is less straightforward as contextual information about distribution and abundance is fundamental, including trends based on historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population on site may be quite different (e.g. the site population may consist of a single transitory animal, which within the context of a thriving local/regional/national population of a species, is therefore of local or regional value rather than national or international).

5.52. Where possible, the valuation of habitat/populations within this assessment will make use of any relevant published evaluation criteria. Where relevant, information regarding the particular feature's conservation status is also considered to fully define its importance. This enables an appreciation of current population or habitat trends to be incorporated into the assessment.

Table 5-4: Valuing Ecological Features

Importance of Feature in Geographical Context	Description
International	An internationally designated site (e.g. SAC)
	Site meeting criteria for international designations or qualifying species of a SAC where there is connectivity
	Species present in internationally important numbers (>1% of biogeographic populations)

[16] CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.

National	A nationally designated site (Site of Special Scientific Interest (SSSI), or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation or qualifying species where there is connectivity
	Species present in nationally important numbers (>1% UK population)
Regional	Species present in regionally important numbers (>1% of Natural Heritage Zone population)
	Areas of habitat falling below criteria for selection as a SSSI (e.g. areas of semi-natural ancient woodland larger than 0.25ha)
Local	Local Nature Reserves (LNR)
	Areas of semi-natural ancient woodland smaller than 0.25ha
	Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows
Negligible	Usually widespread and common habitats and species. Features falling below local value are not normally considered in detail in the assessment process

Assessing the Magnitude of Change

5.53. Determining the magnitude of any likely effects requires an understanding of how the ecological features are likely to respond to the proposed development. This change can occur during construction or operation of the proposed development.

5.54. Effect magnitude refers to changes in the extent and integrity of an ecological receptor. A suitable definition of ecological 'integrity' is found within Scottish Executive circular 6/1995 updated in Scottish Executive 2000[17] which states that "The integrity of a site is the coherence

[17] Natura Casework Guidance: How to consider plans and projects affecting Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) Available at: https://www.nature.scot/natura-casework-guidance-how-consider-plans-and-projects-affecting-special-areas-conservation-sacs

of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified". Although this definition is used specifically regarding European level designated sites (SACs and SPAs), it is applied to wider countryside habitats and species for the purposes of this assessment.

5.55. Effects can be adverse, neutral or beneficial. Effects are judged in terms of magnitude in space and time. There are five levels of spatial effects and five levels of temporal effects as described in Table 5-5 and Table 5-6 respectively.

Table 5-5: Spatial Effect Magnitude

Spatial Magnitude	Description
Very High	Would cause the loss of the majority of a feature (>80%) or would be sufficient to damage a feature sufficient to immediately affect its viability.
High	Would have a major effect on the feature or its viability. For example, more than 20% habitat loss or damage.
Moderate	Would have a moderate effect on the feature or its viability. For example, between 10 - 20% habitat loss or damage.
Low	Would have a minor effect upon the feature or its viability. For example, less than 10% habitat loss or damage.
Negligible	Minimal change on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.

5-6: Temporal Effect Magnitude

Temporal Magnitude	Description
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken here as 30+ years), except where there is likely to be substantial improvement after this

	period, in which case the category Long Term may be more appropriate.
Long term	From 15 years up to (and including) 30 years.
Medium term	From 5 years up to (but not including) 20 years.
Short term	From 1 year and up to (but not including) 5 years.
Temporary	Up to 1 year.
Negligible	No effect.

Criteria for Assessing Cumulative Effects

5.56. SNH's cumulative assessment guidance[18] is used to inform the cumulative assessment in this chapter. Cumulative effects are not possible to evaluate through the study of one development in isolation but require the assessment of effects when considered in combination with other developments, projects or activities. However, in the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other EIA developments. The context in which these effects are considered is heavily dependent on the ecology of the feature assessed. For example, for water voles it may be appropriate to consider effects specific to individual catchments, should the distance between neighbouring catchments be sufficient to assume no movement of animals between them, whereas for blanket bog the region/Natural Heritage Zone may be the relevant spatial scale. Therefore, an assessment of cumulative impacts will be made for each scoped in feature, appropriate to its ecology.

Criteria for Assessing Significance

5.57. The potential significance of the effect was determined through a standard method of assessment based on professional judgement, considering the nature conservation value of the IEF and the magnitude of change.

5.58. **Table 5-7** details the significance criteria that have been used in assessing the effects of the proposed development. 'Major' and 'Moderate' impacts are considered to be Significant in accordance with EIA Regulations. 'Minor' and 'Negligible' impacts are considered to be Not Significant in accordance with EIA Regulations.

[18] SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments

5-7: Significance Criteria

Level of Significance of Effect	Description
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the integrity of the feature.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the feature.
Minor	The effect is likely to adversely affect the feature at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. The level of effect would be Minor and Not Significant.
Negligible	No material effect. The effect is assessed to be Not Significant.

5.59. Using these definitions, it is decided whether there would be any effects which would be sufficient to adversely affect the ecological feature to the extent that its Conservation Status deteriorates above and beyond that which would be expected should baseline conditions remain (i.e. the 'do nothing' scenario).

Assessment Limitations

5.60. Results of the assessment undertaken by Neo Environmental are representative of the time that surveying was undertaken.

5.61. The absence of specific species records returned during the data search does not necessarily indicate absence of a species or habitat from an area, but rather that these have not been recorded or are perhaps under-recorded within the search area.

5.62. An extended phase 1 habitat survey does not aim to produce a full botanical or faunal species list or provide a full protected species survey but, enables competent ecologists to ascertain an understanding of the ecology of the site in order to:

- Broadly identify the nature conservation value of a site and preliminary assess the significance of any potential impacts on habitat/species recorded; and/or
- Confirm the need and extent of any additional specific ecological surveys that are required to identify the true nature conservation value of a site.

BASELINE CONDITIONS

Environmental Designated Sites Baseline

5.63. The Proposed Development at Smulgedon does not lie within any statuary designated sites. Within 15km of the Application Site boundary there are three Special Areas of Conservation (SACs): Carn – Glenshane Pass SAC, Banagher Glen SAC and Rive Roe and Tributaries SAC. There are eight non-statutory environmental designation sites within 5km of the Proposed Development. The Proposed Development lies within 400m of two non-Natura statutory designated environmental sites, namely Smulgedon ASSI and Brockagh Quarry ASSI.

5.64. Each of these sites are outlined in **Table 5-8** below, and detailed within **Figure 5.1.**

5.65. There are two statuary designated sites outside of the 15km boundary, but with hydrological connectivity to the Proposed Development, these have been outlined in **Table 5-9** below.

5.66. The site descriptions are derived from the original site citations available from DAERA[19].

Table 5-8: Designated Sites

Site Code	Site Name	Qualifying Features	Distance (km), Distance	Potential Connectivity with the Proposed Development Site
SAC				
UK0030360	River Roe and Tributaries SAC	• Atlantic salmon *Salmo salar* • Otter *Lutra lutra* • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • Old sessile oak woods with *Ilex* and *Blechnum*	1.73km southwest	Yes

[19] DAERA website available at - https://www.daera-ni.gov.uk/

UK0030110	Carn – Glenshane Pass SAC	• Blanket bogs	4.56km south	No
UK0030083	Banagher Glen SAC	• Tilio-Acerion forests of slopes, screes and ravines • Old sessile oak woods with Ilex and Blechnum	12.43km southwest	No
ASSI				
ASSI 395	Brockagh Quarry ASSI	• Scarce Blue-tailed Damselfly	0.26km east	Yes
ASSI 258	Smulgedon ASSI	• Species-rich wet grassland	0.37km northwest	Yes
ASSI 259	Castle River Valley ASSI	• Lowland meadows	0.86km northwest	Yes
ASSI 257	Ballymacallion ASSI	• Species-rich dry grassland	1.59km south	No
ASSI 246	River Roe and Tributaries ASSI	Also designated as a SAC (above) • Atlantic salmon *Salmo salar* • Otter *Lutra lutra* • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Old sessile oak woods with Ilex and Blechnum	1.73km southwest	Yes

ASSI 256	Errigal Glen ASSI	• Small Cow-wheat *Melampyrum sylvaticum* • Historic records of Yellow Bird's-nest Orchid *Monotropa hypopitys* • Bird Cherry *Prunus padus*	2.64km east	No
ASSI 267	Coolnasillagh ASSI	• Species-rich wet grassland	3.60km northeast	No
ASSI 167	Carn / Glenshane Pass ASSI	• Intact blanket bog	4.56km south	No

Table 5-9: Designated Sites >15km from the Application Site with hydrological connectivity

Site Code	Site Name	Qualifying Features	Distance (km), Distance	Potential Connectivity with the Proposed Development Site
RAMSAR				
GB974	Lough Foyle Ramsar Site	• Wetland complex including intertidal sand and mudflats with extensive seagrass beds, saltmarsh, estuaries and associated brackish ditches • Whooper swan *Cygnus cygnus*	15.91km northwest	Hydrological

		• Light-bellied brent goose *Branta bernicla hrota* • Bar-tailed godwit *Limosa lapponica* • Red-throated diver *Gavia stellata* • Great crested grebe *Podiceps cristatus* • Mute swan *Cygnus olor* • Bewick's swan *Cygnus columbianus* • Greylag goose *Anser anser*, • Shelduck *Tadorna tadorna* • Teal *Anas crecca* • Mallard *Anas platyrhynchos* • Wigeon *Anas penelope* • Eider *Somateria mollissima* • Red-breasted merganser *Mergus serrator* • Oystercatcher *Haematopus ostralegus* • Golden plover *Pluvialis apricaria*		

		• Grey plover *Pluvialis squatarola* • Lapwing *Vanellus vanellus* • Knot *Calidris canutus* • Dunlin *Calidris alpina* • Curlew *Numenius arquata* • Redshank *Tringa totanus* • Greenshank *Tringa nebularia*		
ASSI				
ASSI 51	Lough Foyle ASSI	• Invertebrate assemblage • Bar-tailed Godwit *Limosa lapponica* • Great Cormorant *Phalacrocorax carbo* • Curlew *Numenius arquata* • Dunlin *Calidris alpina* • Eider *Somateria mollissima* • Golden Plover *Pluvialis apricaria* • Great Crested Grebe *Podiceps cristatus* • Greylag Goose *Anser anser*	15.91km northwest	Hydrological

		• Knot *Calidris canutus* • Lapwing *Vanellus vanellus* • Light-bellied Brent Goose *Branta bernicla hrota* • Mallard *Anas platyrhynchos* • Oystercatcher *Haematopus ostralegus* • Red-breasted Merganser *Mergus serrator* • Redshank *Tringa totanus* • Shelduck T*adorna tadorna* • Teal *Anas crecca*		
NNR				
N/A	Roe Estuary Nature Reserve	• Vast numbers of small seashore animals such as lugworms, shrimps, ragworms and periwinkles. • Large beds of mussels and extensive areas of eel-grass	16.77km northwest	Hydrological

Habitats Baseline

5.67. An extended phase 1 habitat survey was undertaken across the 9th, 10th and 22nd January 2020 by Dara Dunlop, and identified 13 habitat types within the ESA. Each of these is outlined below along with the relevant target notes. See **Figure 5.2** for the phase 1 habitat classification map.

5.68. Habitats present within the survey area include:

- Coniferous Plantation (A1.2.1)
- Scattered Scrub (A2.2)
- Unimproved Acid Grassland (B1.1)
- Built-up Areas (J3)
- Semi-Improved Acid Grassland (B4)
- Wet Heath (D2)
- Dry Heath / Acid Grassland (D5)
- Wet Heath / Acid Grassland Mosaic (D6)
- Blanket Bog (E1.6.1)
- Valley Mire (E3.1)
- Drainage Ditches (J2.6)
- (Species Poor) Intact Hedge (J2.1.1)
- (Species Poor) Hedgerow with Trees (J2.3.1)

5.69. The ESA is a comprised of acid grassland (unimproved or semi-improved), small areas of blanket bog, wet and dry heath (also in mosaic with acid grassland) and small areas of scrub.

5.70. Fields with the ESA are bordered by barbed wire fences. There are very limited hedgerows and treelines within the ESA. A small hawthorn hedge ((Species Poor) Intact Hedge (J2.1.1)) runs alongside the west side of the Belraugh Road. There is a small hedgerow primarily comprised of gorse in the centre of the ESA.

5.71. There is a field of semi-improved grassland in the east of the ESA grazed by sheep. In the west a small patch of semi-improved grassland occurs near cattle feeding area in the centre of the ESA. The grassland in these field is short and comprised of common species including sheep's sorrel (*Rumex acetosella*), white clover (*Trifolium repens*), ribwort plantain (*Plantago lanceolata).* The remaining grassland in the east of the ESA is unimproved acid grassland (B1.1).

5.72. Wet Heath (D2) and Wet Heath / Acid Grassland Mosaic (D6) make up the remaining habitats. They are characterised by generally moist areas of relatively thin peat and fewer patches of sphagnum than the blanket bog habitats. Species that dominate these habitats include star sedge (*Carex echinata*), Yorkshire fog (*Holcus lanatus*), sweet vernal-grass (*Anthoxanthum odoratum*), sharp-flowered rush (*Juncus acutiflorus*) and jointed rush (*Juncus articulatus*).

5.73. Drainage Ditches (J2.6) run through the ESA, but there are no major watercourses.

5.74. Gortnamoyagh Forest (Coniferous Plantation (A1.2.1)) surrounds the ESA on its southern and eastern boundary.

5.75. In comparison to the phase 1 habitat extents noted in Figure 7.1 of the Environmental Statement submitted for the Original Consent, the extents of dry heath, wet heath, blanket bog, valley mire, wet flush and continuous bracken have all decreased, with increases in unimproved acid grassland and dry heath / acid grassland mosaic.

Protected and Notable Species Baseline

Desk Based

5.76. The potential presence of protected species within the study area was assessed though a data search conducted through the NBDC. This identified records of invasive, rare, scarce and protected species within 2km of the Application Site, which is located within the 2km grid squares C71M and C71S. A database search was also carried out for adjacent grid squares to ensure a full assessment of the 2km radius, including squares C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C77715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612 and C7712.

5.77. Additional information on the suitability of habitat in the surrounding area for bats was also obtained from the NBDC in the form of a habitat suitability map. The map provided enhanced information on the recorded distribution of bats and broad-scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species.

5.78. In addition, the extended phase 1 habitat survey included a species scoping survey in order to assess the potential of the site to support protected species.

5.79. **Table 5-10** below summarises the protected/notable species recorded within the search area (excluding birds, for which please refer to **Chapter 6: Ornithology**) and their potential to be present within the Application Site boundary at Smulgedon.

Table 5-10: Summary of Biological Records

Species	Grids with Recordings of Species	Suitable Habitat or Field Signs Observed within ESA	Potential for Species within Application Site
MAMMALS			
Leisler's bat (*Nyctalus leisleri*)	C7416	Yes	Yes
Badger (*Meles meles*)	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Otter (*Lutra lutra*)	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Red squirrel (*Sciurus vulgaris*)	C7715	No	No
Red deer (*Cervus elaphus*)	C754	Yes	Yes

Irish hare (*Lepus timidus*)	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
HERPTILES -NONE			
INVERTEBRATES			
Scarce blue-tailed damselfly (*Ischnura pumilio*)	C7614, C7714	No	No

5.80. Table 5-11 below details the results of the NBDC Bat Suitability Index search undertaken for the Development.

Table 5-11: Bat Suitability Index

Species	Index Score
Soprano pipistrelle (*Pipistrellus pygmaeus*)	25
Brown long-eared bat (*Plecotus auritus*)	8
Common pipistrelle (*Pipistrellus pipistrellus*)	26
Lesser horseshoe bat (*Rhinolophus hipposideros*)	0
Leisler's bat (*Nyctalus leisleri*)	21
Whiskered bat (*Myotis mystacinus*)	1
Daubenton's bat (*Myotis daubentonii*)	12
Nathusius's pipistrelle (*Pipistrellus nathusii*)	0
Natterer's bat (*Myotis nattereri*)	16

Field Survey

Bats

5.81. Records of Leisler's bat were identified within 2km of the Application Site during the data search; no other species of bat were identified in the desk study.

5.82. The Application Site does not offer optimal habitat for bats: there are only a few scattered trees within the ESA and no tall hedgerows, with hedgerows wholly absent from the Application Site. It is considered that the ESA and Application Site are of **low suitability** for commuting and foraging bats.[20]

5.83. To determine the use of the Application Site and ESA by bats, and to help assess the impact of the Proposed Development, bat surveys were carried during the active bat season 2020 (May – September).

5.84. Full details of surveys and results are detailed in **Technical Appendix 5.1: Bat Survey Report**.

Other Mammals

5.85. The data search returned records of badger (*Meles meles*) within 2km of the Application Site.

5.86. The majority of habitats within the ESA would not be regarded to be good habitat for badger, with only small areas of semi-improved grassland providing potential habitat for foraging badger. Due to the damp upland nature of the land and the lack of fields boundaries, it is considered unlikely that the site would support sett building by badger.

5.87. No evidence of badger was observed during the 2020 surveys, nor was evidence of badger found during the surveys for the Original Consent in 2007 and 2008.

5.88. Records of otter (*Lutra lutra*) were identified within the 2km search area.

5.89. The majority of habitats are considered to be sub-optimal for otter. There are drainage ditches throughout the ESA but they are shallow and overgrown.

5.90. No evidence of otter was observed during the 2007, 2008 or 2020 ecology surveys.

5.91. The data search produced records for red squirrel (*Sciurus vulgaris*) within the 2km search area from the Application Site. Suitable habitat for red squirrel was noted in the coniferous forest (Gortnamoyagh Forest) surrounding the ESA, but is absent from the Application Site, which is unsuitable for the species.

5.92. The data search produced records for red deer (*Cervus elaphas*). Suitable habitat for red deer was noted and a single adult red deer was observed within the ESA on two occasions during

[20] Collins, J. (ed) (2016) Bat Survey for Professional Ecologists: Good Practice Guidelines (3rd Edition) The Bat Conservation Trust, London

the July bat surveys (once accompanied by young). This species is of negligible interest within the context of the Application Site.

Herptiles

5.93. Although no records of herptiles were identified during the data search, suitable habitat for the common frog (*Rana temporaria*) was found in the form of drainage ditches. No signs of herptiles were observed during the survey walkover.

5.94. The terrestrial ecology chapter submitted for the Original Consent also noted that no adult amphibians were seen during surveys, but that common frogs and smooth newts (*Lissotriton vulgaris*) could be expected to breed in the wet ditches and some of the deeper bog pools, although this was not considered ideal habitat for either species.

Invertebrates

5.95. The scarce blue-tailed damselfly (*Ischunura pumilio*), for which the adjacent Brockagh ASSI is designated, was identified during the data search. However, the scarce blue-tailed damselfly has very specialist habitat requirements, being associated with shallow, unshaded water with slow flow over a soft substrate, with sparse and low vegetation. The only open water habitats within the ESA are drainage ditches, which are heavily shaded with vegetation and are therefore unsuitable for this species.

5.96. This species was not observed during the walkover surveys, nor were any other locally important invertebrate species.

Fish

5.97. The application for the Original Consent highlighted the presence of Atlantic salmon and brown trout in the Agivey River to the east of the Application Site, over 10km from the boundary. However, the watercourses within the Application Site were considered too small to support breeding interest for this species.

Future Baseline

5.98. Assuming a lag between the baseline studies and the commencement of construction phase of the Proposed Development, it is necessary to consider possible changes to baseline conditions during this time. No substantial habitat modifications or changes that could influence ecological interest in the ecology core study area are foreseen. The findings of the current 2020 ecological survey and those undertaken in 2007 and 2008 were found to be similar, with the main ecological features that may be impacted upon within the Application Site in the absence of mitigation being the wet and dry heath / acid grassland mosaics.

POTENTIAL EFFECTS IN THE ABSENCE OF MITIGATION

Do Nothing Scenario

5.99. In the absence of the Proposed Development or the Consented Development (the 'Do nothing' scenario), the current agricultural farming practices will continue within the Application Site. Therefore, the land will likely retain its present ecological value. However, some minor construction work has already started on site and it has been outlined by the Applicant the project will be constructed out as per the Original Consent or this amended proposal (should consent be achieved).

Construction Stage

Environmental Designated Sites

5.100. This section discusses and evaluates the likely impacts of the Proposed Development affecting the environmental designated sites which are within the Zone of Influence (ZOI) of the Proposed Development (i.e. there is an ecological or hydrological connection between the Proposed Development and the designated site). It should be noted that minor construction work for the Original Consent has already commenced in accordance with the original conditions.

5.101. Of the eleven environmental designated sites present within the relevant study areas, the Application Site has connectivity with one SAC and four ASSIs.

5.102. As no pathway for impacts exist between the Application Site and the other environmental designated sites, **no impacts** will occur, resulting in **Negligible effects**. Therefore, these designated sites have not been considered below.

5.103. Potential impacts from the proposed wind farm have been considered for the ecological features associated with the designated sites. Where sites are hydrologically connected, these impacts may occur from the contamination of surface and/or ground waters. Those features which are ecologically connected to a development site, and are mobile, may be impacted upon through disturbance as well as loss of habitat through contamination of surface waters.

5.104. Aquatic systems and the species/habitats which are dependent on these systems are sensitive to pollution/contamination of surface waters. Pollution can result from any of the following entering a body of surface or groundwater:

- Poisonous, noxious or polluting matter;
- Waste matter (including silt, cement, concrete, oil, petroleum spirit, chemicals, solvents, sewage and other polluting matter);
- Other harmful activities detrimentally affecting the status of a waterbody.

5.105. The status of a waterbody can be affected not only by chemical pollution, but also by activities directly or indirectly affecting ecology, including changes in physico-chemical parameters such as temperature and turbidity or physical modification to the hydrology of a waterbody.

5.106. **Table 5-13** below details common water pollutants and their effect on the aquatic environment (Table extracted from Ciria guidance[21]).

Table 5-13: Common water pollutants and their effects on the aquatic environment

Common Water Pollutants	Adverse effect on aquatic environment
Silt	Reduces water quality, clogs fish gills, covers aquatic plants, impacts aquatic invertebrates, leads to a reduction in prey for species including otter and fish species, leads to degradation of habitat including that of juvenile freshwater pearl mussels
Bentonite (very fine silt)	Reduces water quality, clogs fish gills, covers aquatic plants, impacts aquatic invertebrates, leads to a reduction in prey for species including otter and fish species, leads to degradation of habitat including that of juvenile freshwater pearl mussels
Cement or concrete wash water (highly alkaline)	Changes the chemical balance, is toxic to fish and other wildlife. This can lead to direct impacts for aquatic species (including otter), or indirect through loss of prey resources
Detergent	Removed dissolved oxygen, can be toxic to fish and other wildlife present within the aquatic environment
Hydrocarbons (e.g. oil, diesel)	Suffocates aquatic life, damaging to the wildlife (e.g. birds), and to water supplies including industrial abstractions
Sewage	Reduces water quality, is toxic to aquatic wildlife including otter, and damages water supplies

[21] Ciria (2015) Environmental good practice on site guide, fourth edition

River Roe and Tributaries SAC

5.107. The River Roe and Tributaries SAC is located 1.73km from the Application Site at its closest point, but is hydrologically connected with it approximately 12km north of the Application Site near Limavady.

5.108. The River Roe and Tributaries SAC has been designated for supporting Annex I habitats and Annex II species, outlined above (**Table 5-8**).

5.109. Habitats within the Application Site are considered to be sub-optimal for otter. However, otter is a highly mobile species and can travel significant distances across land while foraging. It is therefore considered that if otters are present within or adjacent to the Proposed Development, these may be the same individuals associated with the SAC.

5.110. No evidence of otter was observed during the walkover survey of the ESA in 2020, nor was evidence observed on previous visits undertaken in 2007 and 2008.

5.111. It is therefore considered unlikely that otters are present within the local area. Based on the current findings, a **Negligible Spatial and Negligible Temporal** effect magnitude is considered appropriate for this species.

5.112. Atlantic salmon are confined to the aquatic habitat and therefore are sensitive to pollution from developments entering this habitat through contamination of surface waters.

5.113. By preventing surface water pollution through the Proposed Development design measures, it is considered that the Proposed Development **will not significantly impact** upon local otter, Atlantic salmon and priority habitats. Therefore, the Proposed Development will **not significantly affect** these qualifying features of the SAC.

5.114. It is considered that the effects from the Proposed Development to the aquatic environment and qualifying interests within the SAC will be **Low Spatial and Short-Term Temporal**.

Carn – Glenshane Pass SAC

5.115. Carn – Glenshane Pass SAC is located 4.56km south of the Application Site and has been designated for supporting an area of largely intact blanket bog.

5.116. This habitat is also present within the ESA, but not within the Application Site. Moreover, the blanket bog habitats within the ESA only comprise small fragments. The Proposed Development will not lead to fragmentation of this habitat. Additionally, there is no pathway connecting the habitats of the SAC with the Application Site.

5.117. Given the separation distance and the lack of hydrological pathways, there will be **Negligible direct or indirect effects** for this site.

Banagher Glen SAC

5.118. Banagher Glen SAC is located 12.43km southwest of the Application Site and has been designated for supporting Annex I habitats, above (**Table 5-8**). Given the separation distance from the Proposed Development and the lack of hydrological pathways, there will be **Negligible direct or indirect effects** for this designated site.

Brockagh Quarry ASSI

5.119. Brockagh Quarry is located 0.26km east of the Application Site, and has been designated for supporting a rare invertebrate species, scarce blue-tailed damselfly.

5.120. This site was designated in 2013, after the ecology surveys were carried out for the Consented Application.

5.121. Scarce blue-tailed damselfly have very specialist habitat requirements, being associated with shallow, unshaded water with slow flow over a soft substrate, with sparse and low vegetation. Brockagh Quarry ASSI is a disused quarry, with shallow shaded pools and flooded vehicle tracks that provide the specialist conditions for this protected species. No habitats with which the scarce blue-tailed damselfly is associated will be affected by the Original Consent or the Amendment Application. The only open water habitats within the ESA are drainage ditches, which are largely located away from the Application Site and heavily shaded with vegetation.

5.122. No species of damselfly or dragonfly were noted during the 2020 ecology site visits.

5.123. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect upon this ASSI.

Smulgedon ASSI

5.124. Smulgedon ASSI is located 0.37km northwest of the Application Site, and has been designated for supporting species rich wet grassland.

5.125. The development does not fall within the ASSI; therefore, there will be no direct habitat loss. Smulgedon ASSI is located northwest of the Application Site, separated by the Legavallon Road and areas of heath and grassland. The development will cause no fragmentation of its habitat.

5.126. As outlined in **Chapter 7: Hydrology and Hydrogeology**, the Application Site falls within a catchment divide. Two proposed turbine locations in the north of the site are within the Castle River catchment together with Smulgedon ASSI, forming a hydrological pathway for potential impacts upon the ASSI. However, drainage from the Application Site is impeded from running onto the ASSI by blocked and damaged culverting. While a potential connection therefore exists, this connection is not functional at the time of writing. Nonetheless, to account for potential clearance and repair of the culverting in future, the connection is considered to exist.

5.127. This being the case, it is It is considered that the Proposed Development will have a **Moderate Spatial and Short-term Temporal** effect upon this ASSI in the absence of mitigation. This will be **significant** in terms of the EIA Regulations.

Castle River Valley ASSI

5.128. The Castle River Valley ASSI is located 0.86km northwest of the Application Site, and has been designated for its lowland meadows.

5.129. As noted above, the northern portion of the site drains into the Castle River catchment, offering a hydrological pathway for potential impacts on the ASSI's interest features.

5.130. Given that a small amount of draining water associated with the Proposed Development could enter the ASSI via this route, some impact upon the designated habitats is possible. However, at this distance from the ASSI it is considered that this would lead to less than 10% habitat loss or damage.

5.131. It is therefore considered that the Proposed Development will have a **Low Spatial and Short-term Temporal** effect upon this ASSI in the absence of mitigation.

Ballymacallion ASSI

5.132. Ballymacallion ASSI is located 1.59km south of the Application Site. Given the lack of ecological or hydrological pathways, there will be **Negligible direct or indirect effects** upon this designated site.

River Roe and Tributaries ASSI

5.133. The River Roe and Tributaries has been designated as both an ASSI and a SAC (described above).

5.134. The section the Roe and River Tributaries that is within the 5km ZOI for non-statutory designated sites is not hydrologically connected to the Proposed Development. Given proximity of the site there is a chance that otter, a mobile species associated with the ASSI, could utilise the Application Site. However, Chapter 7: Flora and Terrestrial Ecology of the Original Consent application did not conclude any importance of the site for otter or any need for mitigation or protection measures in light of this species. Although not stated in the original chapter, this may have been due to the presence of the network of larger watercourses in the Limavady area, providing more optimal resources for this species and reducing any need for it to use the ESA.

5.135. It is therefore considered that there will be **Negligible direct or indirect effects** upon this designated site.

Errigal Glen ASSI

5.136. Errigal Glen ASSI is located 2.64km east of the Application Site. Given the lack of hydrological or ecological pathways, there will be **Negligible direct or indirect effects** upon this designated site.

Coolnasillagh ASSI

5.137. Coolnasillagh ASSI is located 3.60km northeast of the Application Site. Given the lack of hydrological or ecological connectivity with the Application Site, there will be **Negligible direct or indirect effects** upon this designated site.

Carn / Glenshane Pass ASSI

5.138. Carn / Glenshane Pass ASSI has been designated as both an ASSI and a SAC (described above).

5.139. Given the separation distance from the Proposed Development and the lack of hydrological pathways, there will be **Negligible direct or indirect effects** upon this site.

Lough Foyle Ramsar Site

5.140. The Lough Foyle Ramsar Site is located approximately 15.91km from the Application Site, and is a site of International importance. It is designated for its wetland habitat and for nationally or internationally important populations of 23 waterfowl and wader species (see **Table 5-9** above).

5.141. The Ramsar Site has a potential hydrological connection with the Application Site via drainage from the northern part of the Application Site, which may enter the Castle River. The Castle River forms a tributary to the River Roe approximately 12km to the northwest of the site, and this in turn flows into Lough Foyle approximately 6km further northwest. However, drainage from the Application Site is impeded from running into the Castle River by blocked and damaged culverting. While a potential connection therefore exists, this connection is not functional at the time of writing. Nonetheless, to account for potential clearance and repair of the culverting in future, the connection is considered to exist.

5.142. An important breeding lapwing population is one of the qualifying features of the Ramsar Site, and lapwing is also known to be present at the Application Site. However, the Lough Foyle Ramsar Site is not considered to be connected to the Application Site ornithologically (see **Chapter 6: Ornithology**).

5.143. By preventing surface water pollution through the Proposed Development design measures, it is considered that the Proposed Development will not significantly impact upon waders or waterfowl and habitats associated with this Ramsar Site. Therefore, the Proposed Development will not significantly affect these qualifying features of the designated site.

5.144. Due to the separation distance between the Application Site and the point of potential contamination (circa 18km downstream), allowing for significant dilution of any contaminated run-off that does enter the aquatic environment, it is considered that the impacts from the Proposed Development to the aquatic environment and qualifying interests of the Ramsar Site will be **Low Spatial and Short-Term Temporal** in the absence of mitigation.

Lough Foyle ASSI

5.145. Lough Foyle ASSI is located approximately 15.91km from the Application Site, and is a site of is of special scientific interest because of its coastal flora, fauna and physiographical features (see **Table 5-9**).

5.146. As it overlaps with the Lough Foyle Ramsar Site, considerations surrounding its hydrological connectivity are the same as those noted above for Lough Foyle Ramsar Site. Due to the separation distance between the Application Site and the point of potential contamination (18km downstream), allowing for significant dilution of any contaminated run-off entering the aquatic environment, it is considered that the impacts from the Proposed Development to the aquatic environment and qualifying interests of the Lough Foyle SPA will be **Low Spatial and Short-Term Temporal** in the absence of mitigation.

Roe Estuary NNR

5.147. Roe Estuary NNR is located approximately 16.77km from the Application Site, and is a nature reserve because of its coastal flora and fauna (see **Table 5-9**).

5.148. As it overlaps with the Lough Foyle Ramsar Site / Lough Foyle ASSI, considerations surrounding its hydrological connectivity are the same as those noted above. It is considered that the impacts from the Proposed Development to the aquatic environment and qualifying interests of the Roe Estuary Nature Reserve will be **Low Spatial and Short-Term Temporal** in the absence of mitigation.

Habitats

5.149. The main effects during the construction phase would be the loss of habitat.

5.150. The increase in area from turbine foundations and crane pads, relative to the Original Consent, are expected to be insignificant within the context of the overall scale of the consented wind farm development. As such, habitat loss is considered to be low and will not alter the conclusions made within ecology chapter within the Original Consent. A **Low Spatial and Low Temporal** effect magnitude is considered appropriate to describe the loss of habitat in the absence of mitigation.

5.151. The Original Consent included a Habitat Management Plan (HMP) for the long-term management of the Application Site as part of the land falling within the Original Consent.

Protected and Notable Species

Bats

5.152. Bats are of an International importance, and are protected by Irish and European legislation.

5.153. Bats (including pipistrelle and *Myotis* species) generally commute and forage along linear features, such as a stream/river, hedgerow or woodland edges. However, on occasion bats will cross open features, particularly species with strong echolocation such as Leisler's bat (*Nyctalus leisleri*). Leisler's bat were the only species of bat recorded in the 2km data search around the Application Site.

5.154. The Application Site is considered to be of **low** suitability for roosting, commuting and foraging bats. There are limited hedgerows and treelines within the ESA, and as these will not be removed or disturbed under the Original Consent or the Proposed Development, there will be **no loss of roosting habitat**.

5.155. Dusk transect and static activity surveys were carried out during the 2020 active bat season. The results of these surveys are detailed in full in **Technical Appendix 5.1: Bat Activity Report.**

Badger

5.156. At the time of the walkover survey, no signs of badger activity were noted; habitat throughout the ESA is considered to be of low suitability for badger, with no potential for sett-building.

5.157. Badger is, though, a highly mobile species known to be present within the wider local area. In the absence of mitigation, the construction phase therefore has the potential to impact upon badger (e.g. accidental trapping of badger in excavations). However, even in the unlikely event this will occur, the Proposed Development will have an effect magnitude of **Low Spatial and Short-term Temporal** for badger. This is **Not Significant** in terms of the EIA Regulations.

Otter

5.158. Otter are known to be present within the wider landscape; however, limited suitable habitat for this species is present within and adjacent to the Application Site.

5.159. No evidence of otter was observed during the walkover survey of the ESA in 2020, nor was evidence observed on previous visits undertaken in 2007 and 2008.

5.160. It is therefore considered unlikely that otter are present within the ESA. Based on the current findings, an effect magnitude of **Negligible Spatial and Negligible Temporal** is appropriate for this species. Therefore, this is **Not Significant** in terms of the EIA Regulations.

Other Mammals

5.161. Suitable habitat for Irish hare was observed within the ESA, Irish Hare are often found in unimproved areas of tall species rich vegetation. A small amount of suitable habitat will be affected by the Proposed Development.

5.162. However, given the small scale of the loss and the availability of suitable habitat in the surrounding area it is considered that the Proposed Development will have an effect magnitude of **Low Spatial and Short-term Temporal** for Irish Hare. This is **Not Significant** in terms of the EIA Regulations.

Herptiles

5.163. The drainage ditches offer potential for supporting herptile species, particularly common frog. As there will be no loss of drainage ditches, and only a relatively small loss of grassland the potential **impacts will not be significant** for local herptile species.

5.164. An effect magnitude of **Negligible Spatial and Negligible Temporal** is appropriate for this species. Therefore, this is **Not Significant** in terms of the EIA Regulations.

Fish

5.165. The application for the Original Consent concluded that Atlantic salmon and brown trout in the Agivey River to the east of the Application Site, over 10km from the boundary, were too far and isolated from potential impacts for these to be of any significance. The watercourses within the Application Site were also considered too small to support breeding interest for this species. This assessment is considered to remain valid.

5.166. Atlantic salmon are also considered above in relation to the River Roe and Tributaries SAC. Taken together, an effect of **Low to Negligible Spatial and Short-term Temporal** magnitude is considered appropriate for fish species, given the limited potential for impacts. This is **Not Significant** in terms of the EIA Regulations.

Operational Stage

Environmental Designated Sites

River Roe and Tributaries SAC and ASSI

5.167. During the operational phase the Proposed Development will not lead to an increase in human or mechanical activity compared to the existing use of the Application Site or the likely activity in the event of the Original Consent being built out. Activity will be limited to intermittent visits for security checks and to manage habitats and infrastructure. Given there will be no ground disturbance or use of chemicals during this phase, it is considered that the

effects from the Proposed Development on the aquatic environment within the SAC will be **Negligible Spatial and Short-term Temporal**.

Brockagh Quarry ASSI and Smulgedon ASSI

5.168. During the operational phase, the Proposed Development will not lead to an increase in human activity compared to the existing use of the Application Site. Given the lack of ground disturbance or use of chemicals during this phase, it is considered that the effects from the Proposed Development upon the aquatic environment within the ASSI will be **Negligible Spatial and Short-term Temporal**.

Lough Foyle Ramsar Site, Lough Foyle ASSI and Roe Estuary NNR

5.169. During the operational phase, the Proposed Development will not lead to an increase in human or mechanical activity compared to the existing use of the Application Site or the likely activity in the event of the Original Consent being built out. Activity will be limited to intermittent visits for security checks and to manage habitats and infrastructure. Given there will be no ground disturbance or use of chemicals during this phase, it is considered that the effects from the Proposed Development on the aquatic environment within the Lough Foyle will be **Negligible Spatial** and **Long-term Temporal**.

Habitats

5.170. No additional loss of habitats will occur during the operational phase. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect upon habitats. Therefore, this is **Not Significant**.

Protected and Notable Species

Bats

5.171. During the operational phase of the Proposed Development there will be no changes in habitat availability (in the absence of mitigation/enhancement) for bat species. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect upon bat species. Therefore, this is **Not Significant**.

Badger

5.172. The operational phase will not lead to loss of habitat or a higher level of disturbance than currently experienced within the Application Site. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect upon badger. This is **not significant**.

Otter

5.173. As detailed above the operational phase will not lead to loss of habitat or a higher level of disturbance. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect on otter. This is **not significant**.

Herptiles

5.174. The operational phase will not lead to further loss of habitats or disturbance for herptile species. It is considered that the Proposed Development will have a **Negligible Spatial and Negligible Temporal** effect on herptile species. This is **not significant**.

Decommissioning Stage

Environmental Designated Sites

5.175. It is considered that the potential impacts during the decommissioning phase are likely to be more minor than those of the construction phase. The general work activities that will be undertaken during these phases will be similar to those of the construction phase, but that ground disturbed by construction will be restored to its former state during decommissioning.

5.176. It is considered that the Proposed Development will have an effect of **Negligible Spatial and Negligible Temporal** magnitude upon the River Roe and Tributaries SAC and the ASSIs with connectivity. This is **not significant**.

5.177. It is considered that the Proposed Development will have an impact of **Negligible Spatial and Negligible Temporal** magnitude upon Lough Foyle Ramsar Site / ASSI and the Roe Estuary NNR. This is **not significant**.

Habitats

5.178. In the absence of mitigation, it is unlikely that there will be further loss of habitat during this phase. Following the completion of the decommissioning stage, the land can be largely reinstated back to a its current agricultural use.

5.179. It is considered that the Proposed Development will have an effect of **Negligible Spatial and Negligible Temporal** magnitude for habitats. This is **not significant**.

Protected and Notable Species

Bats

5.180. It is unlikely that suitable roosting habitat will be impacted during the decommissioning stage of the Proposed Development. The removal of infrastructure for the Application Site will not lead to loss or fragmentation of habitats for bats.

5.181. It is considered that the Proposed Development will have an effect of **Negligible Spatial and Negligible Temporal** magnitude for bat species. This is **not significant** in terms of the EIA Regulations.

Badger

5.182. Given the lack of suitable habitat, and the limited level of disturbance to suitable habitat, it is unlikely that local badger populations will be impacted during the decommissioning stage.

5.183. However, badger are a highly mobile species and the location and use of suitable habitat may vary over the lifetime of the Proposed Development. However, even in the unlikely event badger use of the site increases, the decommissioning stage will have an effect of not more than **Low Spatial and Short-term Temporal** magnitude for badger. This is **Not Significant** in terms of the EIA Regulations.

Otter

5.184. From the current survey findings, if there was to be no change in otter activity within the Application Site, the Proposed Development will have an effect of **Low Spatial and Short-term Temporal** magnitude for otter. This is **not significant**.

Herptiles

5.185. As there will be no further habitat loss during this phase (in the absence of mitigation/enhancement) an effect of **Negligible Spatial and Negligible Temporal** magnitude is appropriate for this species. This is **not significant**.

MITIGATION MEASURES

Environmental Designated Sites

5.186. In the absence of mitigation, the Proposed Development will have a **Moderate Spatial and Short-term Temporal** effect upon the Smulgedon ASSI and a **Low Spatial and Short-term Temporal** effect upon the River Roe and Tributaries SAC / ASSI, Castle River Valley ASSI.

5.187. The following mitigation measures will be implemented to remove hydrological impact pathways upon designated sites:

- Handling of hydrocarbons and any potentially polluting chemical will be conducted in a bunded compound with an impermeable ground membrane layer. The compound will be located outside the catchment of Castle River that converges with the SAC and ASSI;
- Drainage ditches and balancing ponds will be created around any excavation works associated with the site entrance and access tracks to reduce the possibility of sediment laden runoff entering the rivers. The balancing pond at the site entrance will be actively managed to control water levels and ensure that any runoff is contained, especially during times of rainfall;
- Active management of runoff from the access tracks leading to turbines 1 and 2 will reduce the potential of sediment entering Castle River, which drains into the River Roe SAC. Measures will include placing semi-permeable obstructions (e.g. straw bales) on the upslope of the tracks and drainage ditches on the downslope. Outfall pipes will drain into a bunded section of the drainage ditch to allow suspended solids to settle. Further measures may include the use of organic flocculent to further facilitate the settlement of suspended solids;
- Excavation works will not be conducted during heavy or prolonged rain events. This will reduce the possibility of sediment entering groundwater or the Castle River.

5.188. These specific measures, along with the use of best practice and embedded mitigation, will hydrologically disconnect the Smulgedon ASSI, Castle River Valley ASSI and River Roe and Tributaries SAC / ASSI from the potentially polluting processes of the Proposed Development.

5.189. Although **no significant effects** will occur to the designated sites outside of the 15km ZOI linked hydrologically with the Proposed Development (Lough Foyle Ramsar / ASSI and the Roe Estuary NNR) in the absence of mitigation, due to the separation distance between the Application Site and the point of potential contamination (18km downstream), allowing for

significant dilution of any contaminated run-off entering the aquatic environment, precautionary measures have been outlined in order to safeguard against any potential contamination of the aquatic environment. These effects can be mitigated through standard pollution prevention measures and standard good practice measures during the construction phase.

Habitats

5.190. The wind farm was originally consented with the primary means of mitigation being the avoidance of sensitive habitats as far as practicable. This has ensured that these habitats would **not be subject to any significant effect.** There has been no significant change in habitats since the Original Consent and the Proposed Development will cover a very small area, with only minor changes proposed to the turbine foundations, laydown areas and crane pads.

5.191. The Original Consent included a Habitat Management Plan (HMP) for the long-term management of the Application Site and adjacent areas. The recommendations of this plan will be implemented: as there has not been a significant change in the habitat composition, recommendations will still be relevant for the Amendment Application.

5.192. The objectives of the HMP are as follows:

- *'Ensure the protection of areas outside the working zone;*
- *Restore habitats within the working zone but outside the footprint of windfarm infrastructure;*
- *Enhancement of the existing habitats on the wider site; and*
- *Where required, off-set the loss of priority habitats such as Blanket bog.'*

5.193. The HMP focuses in particular on habitats of conservation importance identified in the original surveys carried out in 2007 and 2008 and addresses or amends mitigation measures relating to habitats as proposed within the original Environmental Statement (2009).

5.194. The HMP measures (including vegetation sampling by quadrats) will apply to the construction period, and years 1, 3, 5 and 10 of operation, and reports shall be submitted (to NIEA) within 6 months of each monitoring year.

Protected and Notable Species

5.195. Although **no significant effects** will occur upon protected and notable species within the Proposed Development, pre-construction surveys for badger have been recommended as a precautionary measure to assess the presence of badger within the Application Site prior to the construction phase.

5.196. The HMP also recommended that prevent injury to protected species (including; badger, Irish hare, smooth newt, common frog, red deer) all excavations, JCB buckets, pipes, plant, pits, and trenches to be checked for sheltering animals at the start of each working day.

RESIDUAL EFFECTS

Environmental Designated Sites

5.197. **No significant impacts** for designated sites during the construction, operational or decommissioning phases are predicted in the absence of mitigation, therefore residual impacts will also be **not significant**.

5.198. The residual effect magnitude of **Negligible Spatial and Negligible Temporal** is still appropriate for these features. This is considered **Not Significant**.

Habitats

5.199. The residual effect magnitude of **Negligible Spatial and Negligible Temporal** is appropriate for these features. This is **Not Significant**.

Protected and Notable Species

5.200. With the implementation of the recommended mitigation measures outlined above and the guidelines within the Landscape Ecology Management Plan**, Negligible Spatial and Negligible Temporal effects** are predicted for the construction and decommissioning stages.

5.201. **Negligible Long-Term effects** are predicted for ecology during the operational phase.

5.202. In line with the Original Consent and the HMP any pre-commencement surveys and habitat management will be undertaken by a suitably qualified ecologist. An Ecological Clerks of Works will be required to monitor construction works. Where necessary further mitigation measures to ensure no significant impacts occur from the Proposed Development will be considered and discussed with relevant authorities.

5.203. The residual effect magnitude of **Negligible Spatial and Negligible Temporal** is appropriate for these species. This is **not significant** in terms of the EIA Regulations.

CUMULATIVE EFFECTS

5.204. As well as singular effects, cumulative effects also need to be considered. Cumulative impacts can be an issue when proposals have a small impact on local ecology. If other proposals also have a small impact, the combined result can have a significant impact on ecology.

5.205. Wind farm developments within 10km of the Proposed Development and single turbine developments within 5km of the Proposed Development are summarised in Tables 5-14 and 5-15 below.

Table 5-14: Wind farm developments within 10km of the Proposed Development

Planning Reference	Planning Status	Description	Distance
LA01/2018/0200/F	Under Consideration	Construction of a wind farm comprising 9 no wind turbines (maximum 149.9mto blade tip) and associated infrastructure.	9.97km
LA01/2017/1654/F	Under Consideration	Construction of a wind farm comprising 6 no. wind turbines (maximum 149.9 metres to blade tip), an electrical substation / control building, energy storage area, construction compound, junction improvements.	6.31km
LA01/2017/1124/F	Pending	Proposed amendment to the overall tip height of the consented	0.98km

		Craiggore Wind Farm (B/2012/0268/F)	
LA01/2016/0315/F	Withdrawn	Amendments to consented Brockaghboy No 2 Wind farm (H/2014/0241/F)	4.77km
LA01/2016/0061/F	Permission Granted	Construct a three turbine extension to the operational Dunbeg Wind Farm (consented under PAC REF. 2009/A0363 to planning reference B/2007/0560/F)	4.02km

Table 5-14: Single turbine developments within 5km of the Proposed Development

Planning Reference	Planning Status	Description	Distance
LA01/2015/1005/F	Application Withdrawn	640m NE of 27 Peters Road, Limavady. Proposed single wind turbine on a 60m hub with 50m blade diameter, giving 85m tip height.	
LA01/2015/0670/F	Permission Granted	697m NE of 31 Drumhappy Road, Dungiven. Relocation of wind turbine previously approved under planning ref: B/2011/0063/F. Turbine to have a 40m hub height and a 39m rotor diameter.	

LA01/2015/0271/F	Application Withdrawn	lands 265m North East of 15 Peters Road, Dungiven. Erection of single wind turbine – 40m hub height with 27m blade length, associated access and 2 no electricity cabinets.	
B/2014/0252/F	Application Withdrawn	697m NE of 31 Drumhappy Road, Dungiven. Change of wind turbine previously approved under planning ref: B/2011/0063/F to EWT with 50m hub height and 54m rotor diameter	
B/2013/0232/F	Permission Granted	Approx 200m south east of 197 Legavallon Road, Dungiven. Erection of a 225kW wind turbine with a tower height of 31 metres.	
B/2012/0291/F	Application Withdrawn	240m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind turbine with hub height of 40m on site of existing quarry.	
B/2012/0290/F	Permission Granted	340m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind turbine with hub height of 40m on site of existing quarry.	

C/2013/0402/F	Permission Granted	461m South/South East of 49 Gortnamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a max output not exceeding 250kW.	
C/2012/0477/F	Application Withdrawn	517m south south east 49 Gornamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a maximum output not exceeding 250kW.	
C/2010/0442/F	Permission Refused	292m North East of 247 Legavallon Road, Garvagh. Proposed A29 225kW wind turbine, with 30m hub	

5.206. Smulgedon wind farm has been included in the cumulative assessment of the five wind farm developments, as they were all submitted after it has been consented. As these have all been consented the cumulative effects were deemed acceptable.

5.207. The increase in footprint of the development is considered to be **negligible** in terms of habitat loss and **no significant effects** have been predicted for habitats or terrestrial species as a result of the proposed amendments.

5.208. No significant increase in risk since 2007 is predicted for bird species. While risk for hen harrier has increased very slightly, it is unlikely that in-combination effects of construction disturbance and long-term operational disturbance would result in significant impacts for hen harrier. Risk for kestrel has stayed approximately the same, and risk for buzzard appears to

have decreased. **No significant cumulative effects** are predicted on birds. Please see **Chapter 6: Ornithology** for full details.

5.209. Since bat activity at the site was generally considered to be negligible to low (see **Technical Appendix 5.1 Bat Activity Report**) and the development is considered to be of low risk to bat species, it is considered that there will be **no significant cumulative** effects.

5.210. Therefore, it has been concluded that there will be **no significant cumulative** effects on any ecological feature assessed within this Biodiversity Chapter.

SUMMARY & CONCLUSION

5.211. The proposed amendments to the Original Consent for Smulgedon Wind Farm consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, **no significant effects** were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

5.212. A total of 13 habitat types were noted within the ESA during the extended phase 1 habitat survey undertaken in January 2020. The main effects for habitats during the construction and decommissioning phases is the loss of habitat. The increase in area from turbine foundations and crane pads, relative to the Original Consent, are expected to be insignificant within the context of the overall scale of the consented wind farm development.

5.213. The **small loss of habitat under the development footprint is considered to be negligible** to nature conservation within the local area.

5.214. With the implementation of best practice and mitigation measures there will be **no significant adverse effects** on habitats within the Application Site. The Original Consent included a Habitat Management Plan (HMP) for the long-term management of the Application Site and adjacent areas. The recommendations of this plan will be implemented.

5.215. **No significant effects** will occur upon protected and notable species within the Proposed Development, pre-construction surveys for badger have been recommended as a precautionary measure to assess the presence of badger within the Application Site prior to the construction phase. To prevent injury to protected species, all excavations, JCB buckets, pipes, plant, pits, and trenches to be checked for sheltering animals at the start of each working day (outlined in **Table 5-15** below).

5.216. There are 11 environmentally designated sites present within the relevant study areas, five of which have connectivity with the Application Site, namely the River Roe and Tributaries SAC and ASSI, Brockagh Quarry ASSI, Smulgedon ASSI and Castle River Valley ASSI. There are three designated sites outside of the 15km boundary, hydrologically connected to the Proposed Development, namely, Lough Foyle Ramsar, lough Foyle ASSI and the Roe Estuary NNR. Potential impacts during the construction, operation and decommissioning stages of the proposed wind farm have been considered for the ecological features associated with the designated sites.

5.217. With the implementation of best practice and mitigation measures there will be **no significant adverse effects** on any environmental designated site connected to the Application Site.

5.218. Standard best practice pollution prevention measures and recommended survey work as part of the relevant mitigation measures are also outlined within Table 5-15 below.

Table 5-15: Integral design measures and standard best practice

Site/ Species	Potential Development Impacts	Phase of Development	Measures implemented
INTEGRAL DESIGN MEASURES			
Aquatic environment	Pollution	Construction	2m buffer around drainage ditches.
Badger, Irish Hare, Smooth Newt, Common Frog, Red Deer	Risk of injury	Construction	All excavations, JCB buckets, pipes, plant, pits, and trenches to be checked for sheltering animals at the start of each working day.
STANDARD BEST PRACTICE MEASURES			
Aquatic environment	Pollution	Construction	Best practice pollution prevention measures implemented prior to and throughout the construction phase to prevent contaminants entering the aquatic environment.
Badger	Accidental trapping with excavations	Construction	All excavations should be securely covered, or a suitable means of escape provided at the end of each working day.
MITIGATION MEASURES			
Priority Habitats	Destruction	Construction / Operation	Follow site specific actions for high value habitats recommended in the HMP.
Badger	Destruction/disturbance of badger setts.	Pre-construction	Pre-commencement survey (Measures dependant on survey findings).

Chapter 6: Ornithology

6. ORNITHOLOGY

INTRODUCTION

6.1. This chapter describes the ornithological baseline conditions and considers the potential effects of the construction, operational and decommissioning phases of the Proposed Development. The chapter notes the methods used to identify ornithological significance within the Application Site and surrounding area, and the procedures used to identify the importance of existing bird populations. The ornithology work undertaken in connection with the previously consented development is referenced where appropriate. An assessment of any potential significant effects posed by the Proposed Development will be undertaken and a suite of mitigation measures will be provided to reduce potential effects on ornithological receptors.

6.2. Works have been undertaken in accordance with the relevant Northern Ireland Environmental Agency (NIEA) and NatureScot (formerly Scottish Natural Heritage; SNH) guidelines[1,2,3,4,5]. NIEA advise that the relevant NatureScot standards and guidance should be used in the ecological assessment of onshore wind proposals in Northern Ireland. It should be noted that this Chapter is produced in an Environmental Statement (ES) format at the request of the council.

6.3. Supporting this chapter are the following technical appendices and figures:

- Figure 6.1: Application Site and Vantage Point Survey Map
- Figure 6.2: Ornithological Designations
- Appendix 6.1: Ornithology Survey Results and Collision Risk Modelling
  - Figure 6.1.1: Hen Harrier Flight Activity
  - Figure 6.1.2 Buzzard Flight Activity
  - Figure 6.1.3: Kestrel Flight Activity

[1] NIEA (2018) EIA Scoping Advice: Wind Farms. Department of Agriculture, Environment and Rural Affairs, Belfast.
[2] Scottish Natural Heritage (2018). Assessing the cumulative impact of onshore wind farm on birds. Scottish Natural Heritage, Edinburgh.
[3] Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Edinburgh.
[4] Scottish Natural Heritage (2016). Assessing Connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Edinburgh.
[5] Scottish Natural Heritage (2018), Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Areas. Scottish Natural Heritage, Edinburgh.

- Figure 6.1.4: Snipe Flight Activity
- Figure 6.1.5: April BBS Results
- Figure 6.1.6: May BBS Results
- Figure 6.1.7: June BBS Results
- Figure 6.1.8: July BBS Results

Background

6.4. The area that encompass the amendment application (the "Application Site") is located at Smulgedon, approximately 9km to the north east of Dungiven and 8km west of Garvagh in County Derry/Londonderry, Northern Ireland. The Application Site is centred at approximate Grid Reference (NGR) E276110 N41474 and covers circa 6.12 ha. Its location is shown on **Figure 6.1**.

STUDY AREA

6.5. The various areas of study considered during the ornithological assessment of the Proposed Development are outlined within **Table 6-1** below. Due to the scale and nature of the Proposed Development, it is considered that the following distances from the Application Site are appropriate for gathering relevant ornithological information for assessment.

Table 6-1 Study Areas.

Study Type	Distance
Ornithological records	10km and 2km
Ornithological designated sites	20km
Vantage point surveys	0.5km
Breeding bird surveys	Ownership boundary + 0.05km*

* While the surveys were designed primarily to ascertain the ornithological interest of the Application Site itself, an area including lands within and adjacent to the ownership boundary was deemed suitable for breeding bird surveys, in part to facilitate comparison with the surveys and reporting relating to the Original Application Area.

6.6. The above study areas have been defined in recognition of guidelines[6] in place during the scoping stage (noted in the following sections, where relevant) and are considered appropriate in assessing any potential effects on ornithology arising from the Proposed Development.

DEVELOPMENT DESCRIPTION

6.7. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

6.8. For a full description of the Proposed Development and the various elements, please see Chapter 1: Introduction of this Environmental Statement.

6.9. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Adopted Design Principles

6.10. Where possible, measures have been implemented as part of the iterative design process to prevent the various phases of the Proposed Development affecting sensitive ornithological features.

6.11. While project design was completed with respect to the Original Application and therefore fell outside Neo Environmental's remit, the Proposed Development follows these same principles. Measures incorporated into the Proposed Development design are therefore taken to include the following, in line with the consented design:

- Best practice pollution prevention
- 2m buffer around watercourses / drainage ditches

[6] Scottish Natural Heritage (2017) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms

- Siting of turbines away from sensitive habitat (blanket bog and wet flushes)

SCOPE OF THE ASSESSMENT

6.12. The aims of this assessment are to:

- Give reference to relevant legislation, policy and guidance;
- Provide detailed desk study and site surveys to establish existing ornithological interests within the site;
- Evaluate the potential effects, either direct or indirect, of the Proposed Development on birds, and the significance of these effects;
- Identify appropriate mitigation and avoidance measures against any potentially adverse effects the Proposed Development may pose to local ornithology;
- Evaluate any significant residual effects from the Proposed Development following mitigation.

STATEMENT OF AUTHORITY

6.13. This Chapter has been produced by ornithologists registered with the Chartered Institute of Ecology and Environmental Management (CIEEM). All associated survey work has been carried out in line with the relevant professional guidance, namely CIEEM's Guidelines for Preliminary Ecological Appraisal[7], Ecological Impact Assessment[8], and Report Writing[9]. The individuals below produced this ES Chapter.

6.14. Tyrone Nelson has 25 years of ornithological survey experience, having previously worked for the RSPB (Royal Society for the Protection of Birds), NIEA (Northern Ireland Environment Agency), Birdwatch Ireland, the Ulster Wildlife Trust and CEDaR (the Centre for Environmental Data and Research) and has been carrying out ornithological impact assessments for developments for 15 years. He has successfully carried out environmental assessments for over thirty renewables projects in both Northern Ireland and the Republic of Ireland. A full member of CIEEM, he founded Nelson Ecology in 2009 and continues to lead the company as Managing Director. Tyrone has also been Chairman of the Inch Wildfowl Reserve Trust since 2016.

[7] CIEEM (2017) *Guidelines for Preliminary Ecological Appraisal.*
[8] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.*
[9] CIEEM (2017) *Guidelines for Ecological Report Writing.*

6.15. Daniel Flenley has over 14 years of ornithology and ecology experience, including undertaking surveys and writing associated reports. A graduate member of the Chartered Institute of Ecology and Environmental Management (CIEEM), he is currently applying for full membership. Daniel has experience in undertaking and managing a range of surveys and assessments including Ecological Impacts Assessments (EcIAs), extended phase 1 habitat surveys and ornithological and protected species surveys, for over 200 projects. These include a variety of development types such as energy, commercial, industrial and transport infrastructure. Daniel has held or worked under various survey and mitigation licences.

6.16. Steven Fyffe has over eight years' experience in the ecology and nature conservation sector and has undertaken and assisted with a range of ecological surveys and assessments including extended phase 1 habitat, ornithological and protected species surveys. Steven is a graduate member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

LEGISLATION, POLICY & GUIDANCE

6.17. The Proposed Development has been assessed against existing European, national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance.

EUROPEAN LEGISLATION

6.18. European legislation relevant to the Proposed Development is outlined within Table 6.2 below.

Table 6-2: Relevant European Legislation

Directive	Main Provisions
EU Birds Directive EC/79/409	European Union members meet their obligations for bird species under the Bern Convention and Bonn Convention, and more generally by the means of the EU Birds Directive. The Birds Directive sets out the criteria for Special Protection Areas including; a list of species requiring protection in Annex 1 of the Directive and mechanisms for protecting wild birds naturally occurring in Europe. This Directive is transposed into national legislation principally by the 'EC (Birds and Natural Habitats) Regulations 2011'[10]. The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State.
EU Habitats Directive 92/43/EEC	The EU Habitats Directive sets out the framework for the designation and protection of sites for nature conservation for species and habitats listed in Annex II, IV and V. The directive was adopted in 1992 as a response to the Bern Convention. *"The main aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation*

[10] Office of the Attorney General (2011), European Communities (Birds and Natural Habitats) Regulations 2011, available at www.irishstatutebook.ie

	status, introducing robust protection for those habitats and species of European importance." The protection of species outlined in the Habitats Directive is transposed into national legislation principally by 'EC (Natural Habitats) Regulations 1997 (amended)'[11].
Environmental Liability Directive 2004/35/EC	The Environmental Liability Directive aims to make those causing damage to the environment (water, land and nature) legally and financially responsible for that damage. The directive covers environmental damage caused by or resulting from occupational activities to: Species and natural habitats are protected under the 1992 Habitats Directive and the 1979 Wild Birds Directive. Damage to protected species and natural habitats is "*any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species*".
Ramsar Convention	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) came into force in 1975. It is an international treaty for the conservation and wise use of wetlands.
Bern Convention	The Bern Convention came into force in 1982, with the principal aims to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III.
Bonn Convention	The Bonn convention came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral Agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities.

NATIONAL LEGISLATION

6.19. The principal national legislation governing the protection of wildlife and natural resources in Northern Ireland are:

[11] Office of the Attorney General (1997), European Communities (Natural Habitats) Regulations 1997 (amended 1998, 2005), available at www.irishstatutebook.ie

- **The Wildlife (Northern Ireland) Order 1985**[12] - this is the principal legislation for the protection of wildlife in Northern Ireland and outlines strict protection for species that have significant conservation value.
    - It is an offence to intentionally kill, injure, or take any wild bird or their eggs or nests, with special penalties for Schedule 1 species.
- The Wildlife (Northern Ireland) Order 1985 was amended in 2011 by **The Wildlife and Natural Environment Act (Northern Ireland) 2011**, giving protection to a wider range of wildlife, providing additional enforcement powers and penalties for related offences. It also introduced a statutory duty on all public bodies to further the conservation of biodiversity.
- **The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended).**
- The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985.
- The Environment (Northern Ireland) Order 2002.

PLANNING POLICY

Planning Policy Statements

6.20. Planning Policy Statements (PPSs) set out the policies of the Department of the Environment (the Department) on particular aspects of land-use planning and apply to the whole of Northern Ireland. Their contents will be taken into account in preparing development plans and are also material to decisions on individual planning applications and appeals.

6.21. PPS 2 (Planning and Nature Conservation) sets out the Department's planning policies for the conservation, protection and enhancement of our natural heritage. It includes the following policies:

- Policy NH 1 - European and Ramsar Sites - International

"Where a development proposal is likely to have a significant effect (either alone or in combination) or reasonable scientific doubt remains, the Department shall make an appropriate assessment of the implications for the site in view of the site's conservation objectives. Appropriate mitigation measures in the form of planning conditions may be imposed. In light of the conclusions of the assessment, the Department shall agree to the

[12] https://www.legislation.gov.uk/nisi/1985/171/contents

development only after having ascertained that it will not adversely affect the integrity of the site."

- Policy NH 2 - Species Protected by Law

"Planning permission will only be granted for a development proposal that is not likely to harm a European protected species.

In exceptional circumstances a development proposal that is likely to harm these species may only be permitted where: -

- *There are no alternative solutions; and*
- *it is required for imperative reasons of overriding public interest; and*
- *there is no detriment to the maintenance of the population of the species at a favourable conservation status; and*
- *compensatory measures are agreed and fully secured.*

Planning permission will only be granted for a development proposal that is not likely to harm any other statutorily protected species and which can be adequately mitigated or compensated against.

Development proposals are required to be sensitive to all protected species, and sited and designed to protect them, their habitats and prevent deterioration and destruction of their breeding sites or resting places. Seasonal factors will also be taken into account."

- Policy NH 3 - Sites of Nature Conservation Importance – National

Planning permission will only be granted for a development proposal that is not likely to have an adverse effect on the integrity, including the value of the site to the habitat network, or special interest of:

- *Areas of Special Scientific Interest;*
- *Nature Reserves;*
- *National Nature Reserves; or*
- *Marine Nature Reserves*.

A development proposal which could adversely affect a site of national importance may only be permitted where the benefits of the proposed development clearly outweigh the value of the site. In such cases, appropriate mitigation and/or compensatory measures will be required."

6.22. PPS 18 (Renewable Energy) sets out the Department's planning policy for development that generates energy from renewable resources and that requires the submission of a planning application.

Local Development Plan

6.23. A Local Development Plan forms the basis of land use planning and decisions within the Borough. The current plan for the Causeway Coast and Glens Borough Council Local Development Plan is the Northern Area Plan. It includes the following relevant ecological aims:

- POLICY ENV 1: Local Landscape Policy Areas:

  "Planning permission will not be granted for development proposals that would be liable to affect adversely those features, or combination of features, that contribute to the environmental quality, integrity or character of a designated LLPA. Where development is permitted, it will be required to comply with any requirements set out for individual LLPAs in the District Proposals."

- POLICY ENV 2: Sites of Local Nature Conservation Importance:

  "Planning permission will not be granted for development that would be liable to have a significant adverse effect on the intrinsic nature conservation interest of a designated Site of Local Nature Conservation Importance."

- POLICY ENV 3: Trees

  "Development that would result in the loss of trees, hedges or other features that contribute to the character of the landscape, or are of nature conservation value, will not be permitted unless provision is made for appropriate replacement planting and the creation of new features."

- POLICY ENV 4: Development Adjacent to a Main River

  "Development proposals on sites adjacent to a main river will only be acceptable provided the following criteria are met:

  1. a biodiversity strip of at least 10 metres from the edge of the river is provided and accompanied with an appropriate landscaping management proposal;

  2. public access and recreation provision is provided where appropriate;

  3. there is no significant adverse impact on nature conservation;

  4. the proposal will not compromise or impact on the natural flooding regime of the main river and complies with the requirements of PPS 15 (Revised): Planning and Flood Risk; and

  5. any development would not prejudice future opportunities to provide a riverside walk."

Biodiversity Action Plans

6.24. The UK Biodiversity Action Plan (UKBAP) (Anon, 1995) was organised to fulfil the Rio Convention on Biological Diversity in 1992, to which the UK is a signatory. A list of national priority species and habitats has been produced, with all listed species/habitats having specific action plans defining the measures required to ensure their conservation.

6.25. Regional and local BAPs have also been organised to develop plans for species/habitats of nature conservation importance at regional and local levels. The Local BAP (LBAP) for the Causeway Coast and Glens Council Cluster of Ballymoney, Coleraine, Limavady and Moyle Councils includes the priority bird species barn owl *Tyto alba*, swift *Apus apus* and yellowhammer *Emberiza citrinella*.

Guidance Documents

A Handbook on Environmental Impact Assessment

6.26. The Handbook[13] is intended to provide competent authorities, statutory consultees and others involved in the Environmental Impact Assessment (EIA) process with practical guidance and a ready source of information about the process.

BS 42020:2013 Biodiversity

6.27. The British Standards Institute has published BS 42020:2013 Biodiversity: Code of Practice for Planning and Development, which offers a coherent methodology for biodiversity management. This document seeks to promote transparency and consistency in the quality and appropriateness of ecological information submitted with planning submissions and applications for other regulatory approvals.

6.28. BS 42020:2013 cites CIEEM's EcIA Guidelines as the acknowledged reference on ecological impact assessment. These guidelines are consistent with the British Standard on Biodiversity, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

CIEEM Guidelines

6.29. The Chartered Institute of Ecology and Environmental Management (CIEEM) have produced guidance on Ecological Impact Assessment[14] (EcIA) and Ecological Report Writing[15].

6.30. EcIA is a process of identifying, quantifying and evaluating potential effects on habitats, species and ecosystems from activities such as those related to development.

[13] SNH (2018) Environmental Impact Assessment Handbook V5.
[14] CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine. Version 1.1.
[15] CIEEM (2017) Guidelines for Ecological Report Writing.

6.31. The aims of their EcIA guidelines are to:

- promote good practice;
- promote a scientifically rigorous and transparent approach to Ecological Impact Assessment (EcIA);
- provide a common framework for EcIA in order to promote better communication and closer cooperation between ecologists involved in EcIA; and
- provide decision-makers with relevant information about the likely ecological effects of a project.

Other Guidance/Reference Documents

6.32. A number of sources of guidance were additionally used to inform the assessment. These sources are detailed below.

- NIEA (2018) EIA Scoping Advice: Wind Farms.
- Scottish Natural Heritage (2018) Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas.
- Scottish Natural Heritage (2013) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.
- Scottish Natural Heritage (2014) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.
- Scottish Natural Heritage (2017) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.
- Scottish Natural Heritage (2010) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities.
- Gilbert *et al.* (1998) Bird Monitoring Methods. RSPB.
- Band *et al.* (2007) Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms.
- Scottish Natural Heritage (2012) Assessing the Cumulative Impact of Onshore Wind Farm Developments.

- Scottish Natural Heritage (2018) Assessing the Cumulative Impact of Onshore Wind Farms on Birds.
- Scottish Natural Heritage (2013) Assessing Connectivity with Special Protection Areas (SPAs).
- Scottish Natural Heritage (2014) Assessing the Impact of Small-Scale Wind Energy Proposals on The Natural Heritage. Version 2.
- Scottish Natural Heritage (2014) Flight Speeds and Biometrics for Collision Risk Modelling.
- Scottish Natural Heritage (2015) Good Practice During Wind Farm Construction.
- Scottish Natural Heritage (2015) Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations.
- Scottish Natural Heritage (2016) Assessing Connectivity with Special Protection Areas (SPAs).
- Scottish Natural Heritage (2018) Wind Farm Impacts on Birds - Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model.
- Scottish Natural Heritage (2010) Avoidance Rate Information & Guidance Note: Use of Avoidance Rates in The SNH Wind Farm Collision Risk Model.
- Natural England & DEFRA (2015) Wild Birds: Surveys and Monitoring for Onshore Wind Farms.
- DOE (2015) DOE Planning & Environment: Standing Advice for Planning Officers and Applicants Seeking Planning Permission for Land Which May Impact on Wild Birds.
- Alerstam, T., Rosén,M., Bäckman, J., Ericson, P.G.P. & Hellgren, O. (2007) Flight Speeds among Bird Species: Allometric and Phylogenetic Effects. *PLoS Biology*.
- Ruddock, M. & Whitfield, D. (2007) A review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.
- Bright, J.A., Langston, R.H.W. and Anthony, S. (2009) Mapped and written guidance in relation to birds and onshore wind energy development in England. RSPB Research Report No 35. RSPB, Sandy.

- Whitfield, D.P. & Madders, M. (2006) A Review of the Impacts of Wind Farms on Hen Harriers *Circus cyaneus* and an Estimation of Collision Avoidance Rates.
- Hardy, J., Humphry, C., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013) Raptors: A Field Guide to Surveying and Monitoring.

METHODOLOGY

Desk-based Assessment

6.33. A desk-based assessment was undertaken to collate available ornithological information for the Application Site and the surrounding area. This included a search of ornithological designated sites within a 20km radius of the Proposed Development, including: Special Protection Areas (SPAs), Ramsar Sites, Areas of Special Scientific Interest (ASSIs) declared on account of bird species, UK Important Bird Areas (IBAs) and RSPB reserves. The description of each of these sites was obtained utilising the DAERA, Ramsar Convention and BirdLife International websites[16,17,18].

6.34. A data search was undertaken through the National Biodiversity Data Centre (NBDC)[19] to obtain information regarding protected/notable species within close proximity of the Application Site.

6.35. Where appropriate, information from the original Ornithology Chapter of the Smulgedon Wind Farm Environmental Statement (dated February 2009) have also been considered and summarised. It should be noted that any effects from the original consent were deemed appropriate and that this revised proposal is for the same number of wind turbines, just with larger rotor diameters.

Field Surveys

Target Species

6.36. NatureScot has compiled a list of priority species which are potentially at risk from onshore windfarms[20]. As per NatureScot guidance, certain species have been identified for survey and divided into target and secondary species groups. This is based on their sensitivity to wind development and their known or likely occurrence within the bird survey study areas outlined in Table 6-1 above. Table 6-3 below lists these target and secondary species.

Table 6-3 Target and Secondary Species

Target species		Secondary Species	
Peregrine falcon	*Falco peregrinus*	Buzzard	*Buteo buteo*
Hen harrier	*Circus cyaneus*	Sparrowhawk	*Accipiter nisus*

[16] Available at: https://www.daera-ni.gov.uk/

[17] Available at: https://rsis.ramsar.org/

[18] Available at: http://datazone.birdlife.org/site/search

[19] Available at: https://www.biodiversityireland.ie/

[20] SNH (2018) Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas.

Curlew	*Numenius arquata*	Kestrel	*Falco tinnunculus*
Golden plover	*Pluvialis apricaria*	Goshawk	*Accipter gentilis*
		Golden eagle	*Aquila chrysaetos*
		Snipe	*Gallinago gallinago*
		Lapwing	*Vanellus vanellus*
		Redshank	*Tringa totanus*
		Herring gull	*Larus argentatus*

Flight Activity Surveys (Vantage Point)

6.37. Flight activity surveys were undertaken, as per recommended guidance[21], for flight activity levels of target species. Data was then assessed to identify interactions such as potential bird collisions with turbines.

6.38. Vantage point surveys were undertaken at a single location with a broad viewshed at a distance no greater than 2km during hours of daylight. This covered the entire survey area, namely the land encompassing all turbines and within a 500m radius of each proposed turbine location.

6.39. The location of this vantage point is detailed in Table 6-4.

Table 6-4 Vantage Point Location

Vantage Point Reference	Vantage Point Location	
	Easting	Northing
1	276318	414980

6.40. The vantage point location was chosen to afford the maximum viewshed of the study area, providing sufficient coverage to assess potential collision and displacement effects.

6.41. The vantage point was surveyed for six hours per month, over one year between August 2019 and July 2020, totalling 72 hours.

6.42. Details collected during these surveys include:

- Species;
- Time identified;
- Flight height;
- Abundance;
- Direction of flight;

[21] Scottish Natural Heritage (2017) Recommended bird survey methods to inform impact assessment of onshore windfarms.

- Flight path;
- Weather conditions.

6.43. Flight height was split into three categories: below rotor height, within rotor height and above rotor height.

Breeding Bird Surveys

6.44. Breeding bird surveys were undertaken using Brown and Shepherd methodology outlined in Gilbert *et al.* (1998)[22] in accordance with NIEA and NatureScot guidance to inform impact assessment of onshore windfarms, thereby identifying any effects on breeding birds. Behaviour indicative of breeding status includes:

- Presence of nest, eggs and/or chicks;
- Alarm calling;
- Territorial displays or song flight;
- Displays of distraction;
- Aggressive behaviours;
- Carrying food or nesting material;
- Pairs observed together.

Evaluation Methods

Collision Risk Modelling

6.45. Birds that utilise the airspace within the turbine area at potential collision heights are at risk of collision with turbines during the lifetime of the Proposed Development. The risk of collision with moving wind turbine blades is presumed to be related (although not necessarily linearly) to the amount of flight activity over the site, the topography of the site, the species behaviour, and the ability of birds to detect and manoeuvre around rotating turbine blades. On this basis, it is clear that collision rates are likely to increase with a windfarm's proximity to large concentrations of birds, whether this is breeding and foraging birds, wintering birds, or those utilising specific areas for local or large-scale migration.

6.46. Band *et al.* (2007)[23] describe a method of quantifying potential bird collisions with onshore turbines in which: (i) the activity rate per unit area per season is extrapolated; (ii) the likelihood

[22] Gilbert *et al.* (1998) Bird Monitoring Methods. RSPB.
[23] Band *et al.* (2007) Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms.

of a collision with a blade for a bird passing through the rotor swept area is calculated; and (iii) an 'avoidance rate' is applied to account for behavioural adaptation of birds to the presence of turbines. This results in a figure for the likely mortality rate associated with the Proposed Development, which is then assessed within the context of the relevant species populations to determine the significance of any losses. Collision risk modelling is only performed for target species (see **Table 6-3** above), as these are the features of interest considered to be most sensitive to potential collision-related mortality.

6.47. Please refer to **Volume 11: Technical Appendix 6.1** for further details of collision risk modelling undertaken.

Adopted Design Principles

6.48. As noted above, project design was completed with respect to the Original Application and therefore fell outside Neo Environmental's remit. However, the Proposed Development is an amendment to the Original Consent with no changes to the turbine layout. Integral design measures related to the Original Consent were therefore evaluated in light of the updated ornithological baseline to ensure impacts from the Proposed Development on ornithological receptors could still be considered to be reduced or avoided through the development design (e.g. through avoiding particular bird habitats such as blanket bog and wet flushes).

Assessment of Effects

6.49. In order to provide a methodology that is robust and fit for purpose for this proposed windfarm, this assessment has been undertaken by considering best practice guidance[24] and using professional judgement. The following provides an outline of the methodology used to give a structured approach to determining the potential effects of the project:

- Evaluation of nature conservation value;
- Impact assessment of project; and
- Provision of mitigation measures.
- For the purpose of this Ornithology Chapter the following definitions[25] are used for the terms 'impact' and 'effect':

– Impact – Actions resulting in changes to an ecological feature.

– Effect – Outcome to an ecological feature from an impact.

[24] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.
[25] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine.

Evaluation of Nature Conservation Value/Sensitivity

6.50. The initial stage of EcIA involves assigning a nature conservation value to each ornithological feature or receptor (i.e. species) present within defined study areas. Ornithological receptors are assigned a nature conservation value based on evaluation criteria adapted from existing guidelines, and on professional judgement. Levels of values used as a guide in the evaluation process can be found within Table 6-5.

Table 6-5 Determining Factors of a Population's Nature Conservation Importance/Sensitivity

Importance	Description
High	Populations receiving protection by a SPA, proposed SPA, Ramsar Site or ASSI, or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1% national breeding or wintering population).
Medium	The presence of species listed in Annex 1 of the Birds Directive (where population does not meet the designation criteria under designated site selection guidelines). The presence of breeding species listed on Schedule 1 of the Wildlife (Northern Ireland) Order 1985. The presence of target species noted on the latest Birds of Conservation Concern (BoCC) Red List. Regularly occurring migratory species which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed development. Species present in regionally important numbers (>1% regional breeding population).
Low	All other species' populations not covered by the above categories.

Assessing Magnitude

6.51. An effect is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. Effects can be adverse, neutral or favourable.

6.52. In determining the magnitude of effects, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.

Table 6-6 Level of Value

Level of Value	Examples
International (European or Global)	Habitats and/or species that meet published criteria for international designation, such as World Heritage Sites, Biosphere Reserves, Biogenetic Reserves, Ramsar Sites or sites of EC importance i.e. SPAs. Outstanding examples of ecological features in a European context (e.g. high density, core part of species population) of

	habitat types and species listed in Annex I and Annex II of the Habitats Directive.
National (UK)	Bird species that meet published criteria for national designation such as ASSIs, NNRs or Marine Nature Reserves (MNRs). Outstanding examples of ornithological features in a national context (i.e. high density, core part of species population, etc.) or species listed in Schedule 1 of the Wildlife (Northern Ireland) Order 1985 and UK Priority Species.
Regional (Northern Ireland)	Species not satisfying international (e.g. SPA) or national (e.g. ASSI) designation criteria, but that are good examples of the following: important populations of UK priority species; sites containing regionally important numbers of a single species (e.g. >1% of Northern Ireland population for birds); species outlined in a LBAP to be of regional rarity or localisation.
District (Windfarm site and up to 20km beyond, including SPAs)	Viable populations of species identified in a LBAP. Good population sizes and/or assemblages of Red/Amber List birds.
Local (Windfarm site and up to 5km beyond)	Common breeding, wintering or migrant bird species. Occasional breeding/foraging use by Red List bird species. Non-critical populations or non-critical use of resource (e.g. a limited area of foraging resource) of certain widespread and/or abundant bird species of conservation concern.
Negligible	Very common and abundant species.
Negative	Those bird species scheduled under Section 15, Schedule 9 of the Wildlife (Northern Ireland) Order 1985.

Table 6-7 Spatial Magnitudes

Spatial	Description
Very High	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% population loss or increase in additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 21-80% population loss or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 6-20% population loss or increase in additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 1-5% population loss or increase in additive mortality.

Negligible	Very slight reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: < 1% population loss or increase in additive mortality.

6.53. In line with CIEEM guidance[26], the temporal magnitude of effects should be defined in relation to the lifespan of each organism in question.

Table 6-8 Temporal Magnitudes

Temporal	Description
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 30 years), except where there is likely to be substantial improvement after this period. Where this is the case, Long-term may be more appropriate.
Long-term	Multiple generations or, for long-lived species such as seabirds, approximately 15-30 years (except where there is likely to be substantial improvement during this period. Where this is the case, medium-term may be more appropriate.).
Medium-term	A single generation, or for longer-lived bird species approximately 5-15 years.
Short-term	A single season or, for long-lived bird species, up to approximately 5 years.
Negligible	Part of one season; for long-lived species, <12 months

Criteria for Assessing Cumulative Effects

6.54. Cumulative effects of the Proposed Development, combined with other installed, approved or proposed windfarm projects within 10km, have been considered.

6.55. SNH[27] has provided guidance on assessing cumulative effects on birds. This assessment follows the principles set out in that guidance. According to SNH:

"The key principle for all cumulative impact assessments is to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process".

Criteria for Assessing Significance

6.56. The potential significance of the effect was determined through a standard method of assessment based on professional judgement, considering the nature conservation value of the Important Ornithological Feature (IFO) and the magnitude of change.

[26] CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Costal and Marine. Version 1.1.
[27] Scottish Natural Heritage (2012) Assessing the cumulative impact of onshore wind farm developments. Scottish Natural Heritage, Edinburgh.

6.57. Table 6-9 details the significance criteria that have been used in assessing the effects of the Proposed Development. 'Major' and 'Moderate' effects are considered to be Significant in accordance with EIA Regulations. 'Minor' and 'Negligible' effects are considered to be Not Significant in accordance with EIA Regulations.

Table 6-9 Significance of Effect

Significance	Description
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the integrity of the feature.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the feature.
Minor	The effect is likely to affect the feature adversely at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. The level of effect would be Minor and Not Significant.
Negligible	No material effects. The effect is assessed to be Not Significant.

Impact Assessment of the Proposed Development

6.58. An impact assessment of the Proposed Development has been undertaken to define any significant effects on ornithological features. Methods of impact prediction used in this assessment include direct measurements and expert opinion. Published information is also used to determine impacts. Impacts are considered in relation to the probability of the impact occurring and whether they are predicted to be direct, indirect, temporary, permanent, reversible or irreversible.

6.59. For each potential impact resulting from the Proposed Development, an assessment of impact magnitude and effect significance is provided based on the current guidelines.

6.60. The magnitude of an impact is assessed in conjunction with the nature conservation value of the receptor to provide an indication of effect significance. Impact magnitude is ranked according to a scale from **None** to **High**, based on increasing magnitude. In recognising a continuum of effect significance, these are ranked according to a scale from **None** to **Major**, based on increasing adverse impact. A Positive category is also provided to indicate where there is a predicted increase in conservation status compared to the baseline.

6.61. For the purpose of this assessment, a significant effect on ornithology or nature conservation is defined as any effect of **Moderate** or **Major** significance.

Table 6-10 Matrix for Assessing the Significance of Effects

		Magnitude of Impact			
		High	Medium	Low	Negligible
Value of Ornithological Feature	International	Major	Major	Moderate	Minor
	National	Major	Major	Moderate	Minor
	Regional	Major	Moderate	Minor	Minor
	District	Moderate	Moderate	Minor	Negligible
	Local	Minor	Minor	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Mitigation Measures

6.62. Mitigation measures have been recommended where it is anticipated that a significant effect may result without measures being implemented in accordance with best practice guidelines or to fulfil legal obligations. An assessment of post-mitigation effects is provided to show the overall residual effects of the Proposed Development.

Assessment Limitations

6.63. Results of the assessment undertaken by Neo Environmental are representative of the time that surveying was undertaken.

6.64. The absence of specific species records returned during the data search does not necessarily indicate absence of a species or habitat from an area, but rather that these have not been recorded (or are perhaps under-recorded) within the search area.

BASELINE CONDITIONS

Ornithological Designated Sites

6.65. The Proposed Development is not situated in or adjacent to any statutory or non-statutory sites designated for ornithological interest. Within 20km of the proposed windfarm development, there are three designated sites with ornithological interest. Details of qualifying features of these sites can be found in **Table 6-11** below; the sites are illustrated in **Figure 6.2**.

6.66. The qualifying features are derived from the original site citations available from DAERA, the Ramsar Convention and BirdLife International[28,29,30].

Table 6-11 Ornithological Designated Sites within 20km of the Application Site.

Site Code	Site Name	Qualifying Features	Distance (km) and Direction	Potential Connectivity with the Application Site
Special Protection Area (SPA) (20km)				
None within 20km of the Application Site				
Ramsar Site (20km)				
GB974	Lough Foyle Ramsar Site	• Wetland complex including intertidal sand and mudflats with extensive seagrass beds, saltmarsh, estuaries and associated brackish ditches	15.91km northwest	Hydrological

[28] DAERA website available at: https://www.daera-ni.gov.uk/

[29] Available at: https://rsis.ramsar.org/

[30] Available at: http://datazone.birdlife.org/site/search

		• Whooper swan *Cygnus cygnus* • Light-bellied brent goose *Branta bernicla hrota* • Bar-tailed godwit *Limosa lapponica* • Red-throated diver *Gavia stellata* • Great crested grebe *Podiceps cristatus* • Mute swan *Cygnus olor* • Bewick's swan *Cygnus columbianus* • Greylag goose *Anser anser*, • Shelduck *Tadorna tadorna* • Teal *Anas crecca* • Mallard *Anas platyrhynchos* • Wigeon *Anas penelope* • Eider *Somateria mollissima*		

		• Red-breasted merganser *Mergus serrator* • Oystercatcher *Haematopus ostralegus* • Golden plover *Pluvialis apricaria* • Grey plover *Pluvialis squatarola* • Lapwing *Vanellus vanellus* • Knot *Calidris canutus* • Dunlin *Calidris alpina* • Curlew *Numenius arquata* • Redshank *Tringa totanus* • Greenshank *Tringa nebularia*		
GB967	Ballynahone Bog Ramsar Site	• Lowland raised bog	17.67km southeast	No
UK Important Bird Area (UK IBA) (20km)				
	Lough Foyle and River Foyle IBA	• Wintering waterfowl • Whooper swan • Brent goose *Branta bernicla*	15.91km northwest	Hydrological

		• Greylag Goose • Wigeon • Red-throated diver • Golden plover • Bar-tailed godwit		
Area of Special Scientific Interest (ASSI) (10km)				
None designated for ornithological reasons within 10km of the Application Site				
RSPB Reserve (10km)				
None within 10km of the Application Site				

Bird Habitats

6.67. The Survey Area (Ownership boundary) comprises small areas of unimproved acid grassland, dry heath / acid grassland mosaic, wet heath / acid grassland mosaic, dry heath, semi-improved grassland, scattered scrub and drainage ditch. The most abundant of these habitats within the Application Site is unimproved acid grassland.

6.68. These habitats could all support foraging, hunting or dispersing birds. On the basis of these habitats, common passerine species would also be considered likely to breed within scrubbier areas. Some ground-nesting breeding birds could also be supported, although vegetation structure tends towards dense and rank across the majority of the site, limiting its suitability for species such as skylark. The combination of grassland and nearby wet areas indicates potential suitability for breeding waders.

6.69. Species expected to be present on the basis of the habitats would generally be limited to common and widespread species, though exceptions would include potential for scarcer raptors such as hen harrier to use the site.

6.70. It should be noted that the revised Application Site is quite small only encompassing the turbine foundations and associated crane pad/laydown areas.

6.71. Please refer to **Chapter 5: Ecology** for additional details of habitats.

Ornithological Data

NBDC

6.72. **Table 6-12** below summarises the protected/notable bird species recorded within the search area, and their potential to be present within the Application Site boundary at Smulgedon.

Table 6-12: Summary of Ornithological Records

Species	Grids with Recordings of Species	Suitable Habitat or Field Signs Observed within Survey Area	Potential for Species within Application Site
House martin *Delichon urbicum*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Meadow pipit *Anthus pratensis*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Lapwing *Vanellus vanellus*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Curlew *Numenius arquata*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes

Yellowhammer *Emberiza citrinella*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Peregrine falcon *Falco peregrinus*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Sparrowhawk *Accipiter nisus*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Snipe *Gallinago gallinago*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Fieldfare *Turdus pilaris*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes

Grey heron *Ardea cinerea*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Redwing *Turdus iliacus*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes
Snow bunting *Plectrophenax nivalis*	C7417, C7517, C7617, C7717, C7316, C7416, C7516, C7616, C7716, C7816, C7315, C7415, C7515, C7615, C7715, C7815, C7314, C7414, C7514, C7614, C7714, C7814, C7313, C7413, C7513, C7613, C7713, C7813, C7412, C7512, C7612, C7712	Yes	Yes

Environmental Statement (2009)

6.73. The Environmental Statement (ES) for the consented development notes comments from the RSPB and British Trust for Ornithology (BTO) that hen harrier (*Circus cyaneus*) was known to winter in the area at the time of writing. Common buzzard (*Buteo buteo*) and lapwing were recorded by the RSPB in the Sperrins in 1998.

6.74. Sparrowhawk, kestrel, peregrine falcon, snipe, curlew, skylark (*Alauda arvensis*) and common buzzard were observed at or close to the site during the 2006-2007 baseline surveys.

Breeding Bird and Vantage Point Surveys (2019-2020)

6.75. A total of 30 species were recorded during the breeding bird surveys (BBS; see **Figures 6.1.4 to 6.1.7**) carried out, with eight of these noted as probable or confirmed breeders. This compares with 35 species, of which 28 were breeding, in 2007 (as noted in Technical Appendix A8 submitted for the Original Consent).

6.76. Of the three species originally assigned high conservation importance and recorded within the BBS study area in 2007, only one (buzzard) was recorded in 2020. Buzzard is now only considered to be of medium conservation importance due to significant increases in its population size over the past 15 years. Although buzzard was recorded during surveys in the breeding season, the findings of the ornithological surveys undertaken for the Proposed Development suggest that the Application Site is not a key part of any breeding pair's territory.

6.77. Crossbill, which was noted in plantation to the south in 2007, was recorded as two birds flying over the study area in July 2020. This does not indicate specific use of the site, and is considered to relate to passing individuals likely associated with the nearby Gortnamoyagh Forest. Crossbills are not considered to be at particular risk of wind development[31].

6.78. In terms of species assigned medium conservation importance, a single lapwing was recorded flying over the study area in 2020. This is unlikely to indicate use of the site, and is considered to relate to a passing individual residing elsewhere in the local area.

6.79. In terms of species originally assessed as of low conservation significance, skylarks were again recorded, but in low numbers. Snipe was not recorded during the 2020 BBS, although a single bird was recorded early in the breeding season during a VP watch. The breeding passerine assemblage was again considered to be of low nature conservation importance.

6.80. A maximum of one hen harrier was noted on five occasions during the ornithological surveys undertaken for the Proposed Development (see **Figure 6.1.1** in **Volume 3** for flight activity). However, the findings suggest that the Application Site is not a key part of any breeding hen harrier pair's territory.

6.81. Kestrels were recorded in the potential breeding months of March, April, July and August, although overall activity averaged less than one flight of 2.5 minutes per three hours of observation (see **Figure 6.1.3** in **Volume 3** for flight activity). However, no evidence of likely breeding activity was recorded, suggesting that the site is not a key part of any breeding territory. A young male was also seen making a single hunting flight in October 2019, indicating a low level of post-fledging/dispersal use of the site.

6.82. Studies undertaken within operational windfarms have revealed that different species of birds have a different level of collision risk with wind turbines. The potential for bird species colliding with the turbine varies depending on wind turbine dimensions and location.

6.83. The NatureScot Collision Risk Model (CRM) provides an estimate of the potential number of bird collisions likely to occur at a proposed windfarm. This CRM first estimates the number of collisions that would occur if the birds were to take no avoidance action. It then applies an avoidance rate to take account of the likely degree of successful avoidance.

6.84. Data for CRM were collected during vantage point (VP) surveys between August 2019 and July 2020. These surveys were undertaken over 12 months at the proposed wind turbine locations.

[31] Scottish Natural Heritage (2017) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.

The only target species recorded was hen harrier, which was only recorded on five instances as a single bird flying wholly below collision risk height. This equates to a collision risk of 0 (no collisions predicted to result from the Proposed Development).

6.85. Please refer to **Technical Appendix 6.1** for additional details of ornithological survey results and collision risk modelling.

Summary of Sensitive Receptors

6.86. This section evaluates those Important Ornithological Features (IFOs) which have been 'scoped in' due to being of Medium or High Nature Conservation Importance, and are known to be present within the Application Site or surrounding areas as confirmed through current survey results, ornithological records and consultations. These IFOs have been outlined within **Table 6-13** below.

6.87. The Environmental Statement (2009) additionally considered effects on snipe and skylark despite the facts these two species are of Low Nature Conservation Importance. For the purposes of the current assessment, skylark is not considered as an IFO and is instead treated as part of the Application Site's general breeding bird assemblage. Snipe, however, is considered separately as it is one of only two wader species recorded during the surveys completed in 2019 and 2020 for the Proposed Development. Wader species are considered at potential risk due to the presence of ornithologically designated wetland sites in the study area and, independent of this, the presence of potentially suitable wader habitat within the Application Site.

Table 6-13 Sensitive Receptors

Receptor	Schedule 1	UK Conservation Status	Details	Present Within Study Area
Peregrine falcon	Yes	Green List	Thanks to reductions in persecution and organochlorine pesticide use, peregrine populations have recovered from historic lows. 100 pairs were reported in Northern Ireland in 2014[32]. Nonetheless, the species remains listed on Schedule 1 of the Wildlife (Northern Ireland) Order 1985.	Yes

[32] Jones, C. (2014) Peregrine Falcon (Falco peregrinus). Available at: https://irelandswildlife.com/peregrine-falcon-falco-peregrinus/

Hen harrier	Yes	Red List	In 2017, the RSPB reported a 22% decline in breeding pairs in Northern Ireland since 2010 to 46 pairs[33]. The UK population has declined by 13% to 545 pairs in the same period.	Yes
Buzzard	Yes	Green List	Another historically threatened species still listed on Schedule 1 of the Wildlife (Northern Ireland) Order 1985, common buzzard now has a UK breeding population of 57,000 to 79,000 pairs[34]. Recent range expansion has seen this species become very common and widespread throughout Ireland, including in Northern Ireland[35]. Its population across Northern Ireland and Eire was estimated as 3,500 to 4,000 individuals in 2012[36], with 1,000 to 2,000 pairs estimated for Northern Ireland alone in 2013[37].	Yes
Sparrowhawk	Yes	Green List	Another formerly persecuted raptor listed on Schedule 1, but now probably the commonest bird of prey in Ireland[38]. Widespread in Northern Ireland. UK population numbers 35,000 breeding pairs in summer[39], of which perhaps 4,000 occur in Northern Ireland[40].	Yes
Kestrel	Yes	Amber List	Kestrels declined 33% in the UK over the 25 years prior to 2015[41], although	Yes

[33] RSPB (2017) Hen harriers on the decline in Northern Ireland. Available at: http://ww2.rspb.org.uk/our-work/rspb-news/news/444206-hen-harriers-on-the-decline-in-northern-ireland-

[34] RSPB (n.d.) Buzzard. Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/buzzard; accessed on 30th September 2020.

[35] Available at: https://birdwatchireland.ie/birds/buzzard; accessed on 30th September 2020.

[36] Mee, A. (2012) An overview of monitoring for raptors in Ireland. *Acrocephalus* 33 (154/155): 239–245.

[37] Musgrove, A. *et al*. (2013) Population estimates of birds in Great Britain and the United Kingdom. British Birds 106: 64–100

[38] Available at: https://birdwatchireland.ie/birds/sparrowhawk; accessed on 30th September 2020.

[39] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/sparrowhawk; accessed on 30th September 2020.

[40] Robinson, R.A. (2005-2020) BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford. Available at: http://www.bto.org/birdfacts; accessed on 30th September 2020.

[41] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. and Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108:708-746.

			this rate is reducing. Data from Eire suggests recent declines may be shallower across Ireland as a whole[42]. The UK breeding kestrel population is an estimated 46,000 pairs[43], with numbers in Northern Ireland estimated at 1,000 pairs[44].	
Red-throated diver	Yes	Green List	A winter visitor to all Irish coasts, though not known to breed in Northern Ireland[45]. UK wintering population totals 17,000 birds[46].	Yes
Curlew	No	Red List	In Northern Ireland, the species has undergone an 82% decline in abundance since 1987, with an estimated population size of 526 breeding pairs in 2013[47]. UK breeding and wintering populations tally circa 66,000 pairs and 144,000 individuals respectively[48].	Yes
Golden plover	No	Green List	UK population numbers 38,000-59,000 breeding pairs and 420,000 wintering birds[49]. However, the declining Northern Irish breeding population was thought perhaps to be as small as 10-20 pairs in the mid-2000s[50].	Yes
Snipe	No	Amber List	The UK population of snipe has undergone moderate breeding and wintering declines overall in the past twenty-five years, with particularly steep declines in lowland wet	Yes

[42] Colhoun, K. & Cummins, S. (2019) Birds of Conservation Concern in Ireland 2014–2019. BirdWatch Ireland: Greystones.

[43] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kestrel

[44] Musgrove, A. *et al*. (2013) Population estimates of birds in Great Britain and the United Kingdom. British Birds 106: 64–100

[45] Available at: https://birdwatchireland.ie/birds/red-throated-diver; accessed on 30th September 2020.

[46] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/red-throated-diver

[47] Colhoun, K., Mawhinney, K. & Peach W. J. (2015) Population estimates and changes in abundance of breeding waders in Northern Ireland up to 2013. *Bird Study* 62:3, 394-403, DOI: 10.1080/00063657.2015.1058746

[48] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/curlew; accessed on 30th September 2020.

[49] RSPB (n.d.) Golden Plover. https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/golden-plover/

[50] Allen & Mellon Environmental Ltd. (2006) Pluvialis apricaria – golden plover. Available at: http://www.habitas.org.uk/

			grassland. The UK breeding population still stands at 80,000 pairs[51]. In Northern Ireland, the species has undergone a 70% decline in abundance since 1999, with an estimated population size of 1123 breeding pairs in 2013[52].	
Lapwing	Yes	Red List	In Northern Ireland, the species has undergone an 89% decline in abundance since 1987, with an estimated population size of 860 breeding pairs in 2013[53]. UK breeding and wintering populations tally circa 140,000 pairs and 650,000 individuals respectively[54].	Yes
All other wader species	Dotterel, Dunlin, Black-tailed godwit, Greenshank, Redshank, Ruff, Whimbrel	Red List (8 species), Amber List (18 species), Green List (4 species)	Wader species are in decline both across the UK and in Northern Ireland[55]. Eight breeding UK wader species are now red-listed due to global threat, historical declines, or recent population or range declines of 50% or more over 25 years. Eighteen UK wader species are amber-listed due to declines of 25-50% over 25 years, or due to localisation, rarity or international importance[56].	Yes
All waterfowl species	Garganey, Goosander, Black-	Red List (8 species), Amber List	UK waterbird numbers dropped approximately 25% in the ten years up to 2019[57], while wintering waterbirds	Yes

[51] RSPB (n.d.) Snipe. Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/snipe/; accessed on 30th September 2020.

[52] Colhoun, K., Mawhinney, K. & Peach W. J. (2015) Population estimates and changes in abundance of breeding waders in Northern Ireland up to 2013. *Bird Study* 62:3, 394-403, DOI: 10.1080/00063657.2015.1058746

[53] Colhoun, K., Mawhinney, K. & Peach W. J. (2015) Population estimates and changes in abundance of breeding waders in Northern Ireland up to 2013. *Bird Study* 62:3, 394-403, DOI: 10.1080/00063657.2015.1058746

[54] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/lapwing; accessed on 30th September 2020.

[55] Colhoun, K., Mawhinney, K. & Peach W. J. (2015) Population estimates and changes in abundance of breeding waders in Northern Ireland up to 2013. *Bird Study* 62:3, 394-403, DOI: 10.1080/00063657.2015.1058746

[56] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. and Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108:708-746.

[57] Frost, T.M., Calbrade, N.A., Birtles, G.A., Mellan, H.J., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. & Austin, G.E. (2020) *Waterbirds in the UK 2018/19: The Wetland Bird Survey*. BTO, RSPB and JNCC, in association with WWT. British Trust for Ornithology, Thetford.

	necked grebe, Common scoter, Bewick's swan, Whooper swan	(20 species), Green List (3 species)	declined by 15% in Ireland in five years in the early 2010s[58]. Twenty-eight out of 31 breeding UK waterfowl species are now listed as of conservation concern[59]. Within Northern Ireland, diving duck species[60] and whooper swans[61] are known to be among those that have suffered recent declines.	

6.88. Due to the absence of peregrine falcon, sparrowhawk, red-throated diver, waterfowl and waders (including curlew and golden plover but excluding snipe and lapwing) recorded within or adjacent to the relevant study areas during the current ornithological surveys, it is considered that the Application Site is of **Negligible** value for each of these groups. They have therefore been scoped out of the Impact Assessment.

6.89. As it has been concluded that the Proposed Development is not connected with Ballynahone Bog Ramsar Site (please refer to **Table 6.11** above), this site has also been scoped out of further assessment.

Future Baseline

6.90. Assuming a lag between the baseline studies and the commencement of construction phase of the Proposed Development, it is necessary to consider possible changes to baseline conditions during this time. This is done for two options, namely:

- Scenario 1: continued agricultural use (the 'do nothing' scenario);
- Scenario 2: consented windfarm is constructed.

Scenario 1

6.91. The findings of the current 2019-2020 ornithological surveys and those undertaken in 2006-2007 were found to be similar in respect of birds, suggesting that the ornithological community using the site is relatively stable. No substantial habitat modifications or changes

[58] Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2019) Estimates of waterbird numbers wintering in Ireland, 2011/12–2015/16. *Irish Birds* 41:1-12.
[59] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. and Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108:708-746.
[60] Tománková, I. (2013). The causes of diving duck population declines on Lough Neagh, Northern Ireland. PhD thesis, Queen's University Belfast.
[61] Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2019) Estimates of waterbird numbers wintering in Ireland, 2011/12–2015/16. *Irish Birds* 41:1-12.

that could influence ornithological interest at the Application Site are foreseen. Measures such as pre-commencement nesting bird checks will accommodate any unpredictable occurrences.

Scenario 2

6.92. The Original Consent is expected to proceed, with some minor construction works already undertaken on site. Condition discharge related to the Original Consent included a Habitat Management Plan (HMP) for the long-term management of the Application Site and adjacent areas.

6.93. While the actions described in this largely focus on avoiding damage and compensating for habitats to be lost under the Original Consent, there will be some habitat enhancement to areas of blanket bog and dry heath due to the cessation of winter grazing by livestock. This is expected to deliver some minor ornithological benefits.

Potential Effects In The Absence of Mitigation

6.94. The following provides an assessment of effects of the Proposed Development on ornithology in the absence of mitigation.

6.95. The main aims of presenting pre-mitigation effects are to:

- Define potential significant effects associated with the Proposed Development; and
- Provide a rational basis for requirement and scale of mitigation measures proposed to minimise residual effects.

Effects of Windfarms on Ornithological Species

6.96. The main threats to ornithological species (breeding, passage and wintering) include:

- Direct habitat loss through construction of windfarm infrastructure;
- Indirect habitat loss through displacement and disturbance;
- Increased energy expenditure due to barrier effects; and
- Death through collision or interaction with turbine blades.

Scenario 1

6.97. In the absence of the Proposed Development (the 'do nothing' scenario), the current agricultural farming practices will continue within the Application Site. Therefore, the land will likely retain its present ecological value.

Scenario 2

6.98. In the planned and likely event that the Original Consent is fully implemented, the HMP will increase the Application Site's potential for bird species. The future baseline in this scenario therefore involves a slight increase in ornithological interest.

Construction Stage

6.99. Effects during the construction phase will mainly be restricted to habitat loss, both permanent and temporary. It is anticipated that the construction phase will last approximately 8 months.

Ornithological Designated Sites

6.100. This section discusses and evaluates the likely impacts of the Proposed Development affecting the ornithological designated sites which are within the Zone of Influence (ZOI) of the Proposed Development (i.e. there is a hydrological or ornithological connection between the Proposed Development and the designated site).

6.101. Of the three ornithological designated sites present within the relevant study areas, the Application Site has connectivity to one Ramsar Site and one IBA.

6.102. As no pathway for impacts exist between the Application Site and Ballynahone Bog Ramsar Site, **no impacts** will occur, resulting in **Negligible effects**. Therefore, this designated site has not been considered below.

6.103. Potential impacts from the proposed wind farm have been considered for the ornithological features associated with the designated sites. Where sites are hydrologically connected, these impacts may occur from the contamination of surface and/or ground waters. Those features that are ornithologically connected to a development site, and are mobile, may be impacted upon through disturbance as well as loss of their habitat.

6.104. Aquatic systems and the species/habitats which are dependent on these systems are sensitive to pollution/contamination of surface waters. Pollution can result from any of the following entering a body of surface or groundwater:

- Poisonous, noxious or polluting matter;
- Waste matter (including silt, cement, concrete, oil, petroleum spirit, chemicals, solvents, sewage and other polluting matter);
- Other harmful activities detrimentally affecting the status of a waterbody.

6.105. The status of a waterbody can be affected not only by chemical pollution, but also by activities directly or indirectly affecting ecology, including changes in physico-chemical parameters such as temperature and turbidity or physical modification to the hydrology of a waterbody.

6.106. **Table 6-14** below details common water pollutants and their effect on the aquatic environment (Table adapted for ornithological interest from CIRIA guidance[62]).

Table 6-14: Common Water Pollutants and Their Effects on the Aquatic Environment

Common Water Pollutants	Adverse effect on aquatic environment
Silt	Reduces water quality, clogs fish gills, covers aquatic plants, impacts aquatic invertebrates, leads to a reduction in prey

[62] CIRIA (2015) Environmental Good Practice on Site guide, 4th edition

	for some species, leads to degradation of habitat
Bentonite (very fine silt)	Reduces water quality, clogs fish gills, covers aquatic plants, impacts aquatic invertebrates, leads to a reduction in prey for some species, leads to degradation of habitat
Cement or concrete wash water (highly alkaline)	Changes the chemical balance, is toxic to fish and other wildlife. This can lead to direct impacts for aquatic species, or indirect impacts through loss of prey resources
Detergent	Removes dissolved oxygen; can be toxic to fish and other wildlife present within the aquatic environment
Hydrocarbons (e.g. oil, diesel)	Suffocates aquatic life, damaging to wildlife (e.g. birds), and to water supplies including industrial abstractions
Sewage	Reduces water quality, is toxic to aquatic wildlife, and damages water supplies

Lough Foyle Ramsar Site

6.107. The Lough Foyle Ramsar Site is located approximately 15.91km from the Application Site, and is a site of International importance. It is designated for its wetland habitat and for nationally or internationally important populations of 23 waterfowl and wader species (see Table 6-11 above).

6.108. The Ramsar Site has a potential hydrological connection with the Application Site via drainage from the northern part of the Application Site, which may enter the Castle River. The Castle River forms a tributary to the River Roe approximately 12km to the northwest of the site, and this in turn flows into Lough Foyle approximately 6km further northwest. However, drainage from the Application Site is impeded from running into the Castle River by blocked and damaged culverting. While a potential connection therefore exists, this connection is not functional at the time of writing. Nonetheless, to account for potential clearance and repair of the culverting in future, the connection is considered to exist.

6.109. An important breeding lapwing population is one of the qualifying features of the Ramsar Site, and lapwing is also known to be present at the Application Site. However, the Lough Foyle Ramsar Site is not considered to be connected to the Application Site ornithologically. Lapwing families stay close to the nest during the breeding season, as lapwing chicks are nidifugous

(they leave the nest early) and feed on prey found in grassland and wetland habitats nearby[63]. Any successfully breeding lapwings associated with the Ramsar Site would remain in its vicinity, and certainly not travel as far as 15km while the chicks are fledging. It is therefore considered that any lapwings present within or adjacent to the Application Site are very unlikely to be individuals forming part of the Ramsar Site's qualifying breeding lapwing population.

6.110. By preventing surface water pollution through the Proposed Development design measures, it is considered that the Proposed Development will not significantly impact upon waders or waterfowl and habitats associated with this Ramsar Site. Therefore, the Proposed Development will **not significantly affect** these qualifying features of the designated site.

6.111. Due to the separation distance between the Application Site and the point of potential contamination (circa 18km downstream), allowing for significant dilution of any contaminated run-off that does enter the aquatic environment, it is considered that the impacts from the Proposed Development to the aquatic environment and qualifying interests of the Ramsar Site will be **Low Spatial and Short-Term Temporal**. Therefore, effects are **Minor Adverse** and **Not Significant**.

Lough Foyle and River Foyle IBA

6.112. The Lough Foyle and River Foyle IBA is located approximately 15.91km from the Application Site, and is a site of International importance. It is designated for its populations of seven waterfowl and wader species and its overall wintering waterfowl interest (see **Table 6-11**).

6.113. As it overlaps with the Lough Foyle Ramsar Site, considerations surrounding its hydrological connectivity are the same as those noted above for Lough Foyle Ramsar Site. However, none of the wader or waterfowl species for which this IBA is designated were recorded during the bird surveys associated with the Proposed Development, and no wildfowl were observed on or close to the Application Site. The Lough Foyle and River Foyle IBA therefore lacks ornithological connectivity with the Application Site.

6.114. Due to the separation distance between the Application Site and the point of potential contamination (18km downstream), allowing for significant dilution of any contaminated run-off entering the aquatic environment, it is considered that the impacts from the Proposed Development to the aquatic environment and qualifying interests of the Lough Foyle and River Foyle IBA will be **Low Spatial and Short-Term Temporal**. Therefore, effects are **Minor Adverse** and **Not Significant**.

Habitat Loss

6.115. Land-take directly under the Proposed Development footprint (turbine foundations, crane pads and laydown areas) will result in permanent loss of habitats. Land directly under the

[63] Beintema, A.J., Thissen, J.B., Tensen, D. & G.H. Visser (1991) Feeding Ecology of Charadriiform Chicks in Agricultural Grassland. In: Breeding Ecology of Meadow Birds (Charadriiformes); Implications for Conservation and Management. PhD thesis by A.J. Beintema.

Proposed Development footprint comprises of unimproved acid grassland, dry heath / acid grassland mosaic, wet heath / acid grassland mosaic, dry heath, semi-improved grassland, scattered scrub and drainage ditch. The areas to be lost form an extremely small fraction of these habitats in the local area, and the increase in area lost relative to the Original Consent is considered to be insignificant within the context of the overall scale of the consented wind farm development. Please refer to **Chapter 5: Ecology** for further details of the habitat loss associated with the Proposed Development.

6.116. As such, habitat loss is considered to be negligible and will not alter the conclusions made within the ornithology chapter submitted for the Original Consent. A **Negligible Spatial and Short-term Temporal** impact magnitude and a **Minor Adverse** effect are considered appropriate to describe the loss of habitat upon all bird species during construction in the absence of mitigation.

6.117. This is therefore **Not Significant**.

Disturbance

6.118. During the construction phase, disturbance to bird species is likely to occur as a result of increased human activity/presence, visual impact from the movement of vehicles and other machinery, and possibly due to noise generated from the works.

6.119. The degree of disturbance is dependent on:

- The duration of the construction period;
- Bird species present within the site;
- Seasonal patterns of habitat use;
- Availability of alternative habitat.

6.120. It is likely that displacement of some bird species that are currently present within the Application Site will occur during the construction period. However, any impacts on breeding birds will be confined to areas in the locality of temporary construction compounds, turbines, tracks and other infrastructure. Additional disturbance in areas of turbine foundations and crane pads compared to the Original Consent will be negligible. The magnitude of impact for all breeding birds will be **Low Spatial** and **Short-term Temporal**.

6.121. This will result in a **Minor Adverse** and **Not Significant** effect. As already highlighted, the Consented Development will proceed in any event, so there will be a negligible increase when comparing the effects from both projects.

Important Ornithological Features

Hen Harrier

Impact

6.122. Hunting or dispersing hen harrier may be displaced from the site during construction by disturbance or direct habitat loss.

Sensitivity

6.123. Hen harrier is an Annex I (EU Birds Directive) and Schedule 1 (Wildlife (Northern Ireland) Order) species, and therefore classified as being of **Medium** Nature Conservation Concern.

Magnitude of Impact

6.124. The Northern Irish hen harrier population is 46 pairs (92 birds). Whilst this may be slightly outdated (the current estimates are based on 2017 figures), it may be taken as a precautionary population size including unpaired and non-breeding birds.

6.125. Although a maximum of one hen harrier was noted during the ornithological surveys undertaken for the Proposed Development, the findings of the surveys suggest that the Application Site is not a key part of any breeding pair's territory.

6.126. Given the level of site use by this species and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude. The level of site use amounts to occasional presence of 1.1% of the regional hen harrier population, but at a sufficiently low frequency for no mortality or breeding failure to be considered likely (see **Figure 6.1.1** in **Volume 3** for flight activity).

Significance of Effect

6.127. The unmitigated effect on the regional hen harrier population from construction is classified as **Minor Adverse**, and is therefore **Not Significant**.

Kestrel

Impact

6.128. Hunting or dispersing kestrels may be displaced from the site during construction by disturbance or habitat loss.

Sensitivity

6.129. Kestrel is a Schedule 1 (Wildlife (Northern Ireland) Order) species, and therefore classified as being of **Medium** Nature Conservation Concern.

Magnitude of Impact

6.130. The Northern Irish kestrel population is estimated as 1,000 pairs (2,000 adult birds). A maximum of two kestrels were noted during the ornithological surveys undertaken, amounting to 0.1% of the regional population.

6.131. Given the level of site use by this species (see **Figure 6.1.3** in **Volume 3** for vantage point flight activity) and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude.

Significance of Effect

6.132. The unmitigated effect on the regional kestrel population from construction is classified as **Minor Adverse**, and is therefore **Not Significant**.

Buzzard

Impact

6.133. Hunting or dispersing buzzards may be displaced from the site during construction by disturbance or direct habitat loss.

Sensitivity

6.134. Common buzzard is a Schedule 1 (Wildlife (Northern Ireland) Order) species, and therefore classified as being of **Medium** Nature Conservation Concern.

Magnitude of Impact

6.135. The buzzard population in Northern Ireland and Eire was estimated as 1,000 to 2,000 pairs (2,000 to 4,000 breeding individuals) in 2012, but has increased since this time. A precautionary population estimate of 4,000 birds in Northern Ireland is therefore considered reasonable.

6.136. Given the level of site use by this species and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude. The level of site use amounts to occasional presence of 0.025% of the regional estimated buzzard population at a sufficiently low

frequency for mortality or breeding failure to be considered unlikely. Please see **Figure 6.1.2** in **Volume 3** for flight activity.

Significance of Effect

6.137. The unmitigated effect on the regional buzzard population from construction is classified as **Minor Adverse** and is therefore **Not Significant**.

Snipe

Impact

6.138. Foraging and dispersing snipe may be displaced from the site during construction by disturbance or habitat loss.

Sensitivity

6.139. Snipe does not qualify for the categories of High or Medium Nature Conservation Concern, and is therefore classified as being of **Low** Nature Conservation Concern.

Magnitude of Impact

6.140. The Northern Irish breeding snipe population has been assessed as 1,123 pairs (2,246 birds). Whilst this may be outdated (the estimate is based on 2013 figures), it may be taken as a precautionary population size including unpaired and non-breeding birds.

6.141. The findings of the ornithological surveys undertaken for the Proposed Development suggest that the Application Site is not a part of a breeding snipe pair's territory. A single snipe was recorded on one occasion (see **Figure 6.1.4** in **Volume 3** for flight activity).

6.142. Given the level of site use by this species and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude. The level of site use amounts to (at most) occasional presence of 0.045% of the regional snipe population at a sufficiently low frequency for mortality or breeding failure to be considered very unlikely.

Significance of Effect

6.143. The unmitigated effect on the regional snipe population from construction is classified as **Negligible** and is therefore **Not Significant**.

Lapwing

Impact

6.144. Foraging and dispersing lapwing may be displaced from the site during construction by disturbance or habitat loss.

Sensitivity

6.145. Lapwing is a Schedule 1 (Wildlife (Northern Ireland) Order) species, and therefore classified as being of **Medium** Nature Conservation Concern.

Magnitude of Impact

6.146. The Northern Irish breeding lapwing population has been assessed as 860 pairs (1,720 birds). Whilst this may be outdated (the estimate is based on 2013 figures), it may be taken as a precautionary population size including unpaired and non-breeding birds.

6.147. The findings of the ornithological surveys undertaken for the Proposed Development suggest that the Application Site is not a key part of any lapwing breeding territory. The only lapwing seen was recorded in direct flight over the site rather than making use of the habitats within it (see **Figure 6.1.7**).

6.148. Given the level of site use by this species and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude. The level of site use amounts to (at most) occasional presence of 0.058% of the regional lapwing population at a sufficiently low frequency for mortality or breeding failure to be considered very unlikely.

Significance of Effect

6.149. The unmitigated effect on the regional lapwing population from construction is classified as **Minor Adverse** and is therefore **Not Significant**.

Other Bird Species

Impact

6.150. Breeding, foraging, dispersing/migrating and wintering birds of other species may be displaced from the site during construction by disturbance or habitat loss.

Sensitivity

6.151. These species are of **Low** Nature Conservation Concern as they do not qualify for any higher category using the criteria outlined above.

Magnitude of Impact

6.152. Given the lack of any significant ornithological interest among the assemblage of these other bird species using the site, and the length of the proposed construction period, it is predicted that impacts from the construction phase will result in an impact of **Negligible Spatial** and **Short-term Temporal** magnitude. A small number of breeding pairs of these species could suffer breeding failure or mortality in the absence of mitigation.

Significance of Effect

6.153. The unmitigated effect on these species (deemed to be of **Local** value using the criteria above) from construction is therefore classified as **Negligible** and **Not Significant**.

Operational Stage

6.154. The operational lifetime of the Proposed Development is 30 years. During the operational period the main impacts on bird species include disturbance, displacement, barrier effect and collision risk.

Disturbance, Displacement and Barrier Effect

6.155. Maintenance activities during the operational phase may lead to temporary disturbance. However, as these activities will be over a shorter period of time, and on a lesser scale than activities during the construction phase, effects will be lower than those predicted for the construction phase.

6.156. For the purposes of this assessment, it is assumed that no measurable displacement effects would be associated with access tracks or other static infrastructure during the operational phase, as no significant level of activity will occur within these areas.

6.157. Certain ornithological species are also known to be displaced from habitat immediately surrounding operational windfarms. In a study undertaken by Pearce-Higgins *et al.*[64], levels of turbine avoidance suggest breeding bird densities may be reduced by 15-53% within a 500m buffer of turbines. However, effects vary between sites and species. A further study undertaken by Pearce-Higgins *et al.*[65] showed that there were no displacement effects on any

[64] Pearce-Higgins, J.W., Stephen, L., Langston, R.W., Bainbridge, I.P. and Bullman, R. (2009) The distribution of breeding birds around upland wind farms. Journal of Applied Ecology, 46: 1323-1331.
[65] Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R.H.W. (2012). Greater impacts of Windfarms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49: 386-394.

bird species from windfarms during the operational phase other than those that had already occurred during construction. The effects occurring during the construction phase for some species were reversed during the operational phase.

Ornithological Designated Sites

Lough Foyle Ramsar Site

6.158. During the operational phase, the Proposed Development will not lead to an increase in human or mechanical activity compared to the existing use of the Application Site or the likely activity in the event of the Original Consent being built out. Activity will be limited to intermittent visits for security checks and to manage habitats and infrastructure. Given there will be no ground disturbance or use of chemicals during this phase, it is considered that the effects from the Proposed Development on the aquatic environment within the Ramsar Site will be **Negligible Spatial** and **Long-term Temporal**.

6.159. This is therefore considered **Not Significant**.

Lough Foyle and River Foyle IBA

6.160. As outlined above for Lough Foyle Ramsar Site, the operational phase the Proposed Development will not lead to an increase in activity that could contribute to groundwater contamination. Given the above findings it is considered that the Proposed Development will have **Negligible Spatial** and **Long-term Temporal** effects upon this IBA.

6.161. This is therefore considered **Not Significant**.

Important Ornithological Features

Hen Harrier

Impact

6.162. Foraging or dispersing hen harrier may be at risk of displacement from habitat around turbines, thereby impacting on productivity or survival rates.

Sensitivity

6.163. Medium.

Magnitude of Impact

6.164. In the UK, the hen harrier suffers unusually high levels of human persecution[66] and this may make hen harriers in the UK more sensitive to a wide range of disturbance, including displacement around turbines. Preliminary results at site within Northern Ireland and Argyll suggest that displacement of foraging activity may occur up to 200-300m around turbines[67].

6.165. Five flights by hen harrier have been recorded within 500m of the proposed turbine locations (see **Figure 6.1.1**). Impacts as a result of disturbance are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

6.166. Displacement as a result of habitat loss is considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

Significance of Effect

6.167. The unmitigated effect of displacement and related impacts is classified as **Minor Adverse** and is therefore **Not Significant**.

Kestrel

Impact

6.168. Hunting or dispersing kestrel may be at risk of displacement from habitat around turbines or other infrastructure, thereby impacting on productivity or survival rates.

Sensitivity

6.169. Medium.

Magnitude of Impact

6.170. Twenty-two flights by kestrel were recorded within 500m of the proposed turbine locations during the vantage point and breeding bird surveys (see **Figures 6.1.3, 6.1.5 and 6.1.6**). However, this mostly relates to the presence of a single bird making short flights within the survey area but outside the Application Site; two birds were seen on only one occasion. Impacts as a result of disturbance are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

6.171. Displacement as a result of habitat loss is considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

Significance of Effect

[66] Etheridge, B., Summers, R.W. & Green R.E. (1997) The effects of illegal killing and destruction of nests by humans on the population dynamics of the hen harrier Circus cyaneus in Scotland. Journal of Applied Ecology 34, 1081-1105.

[67] Whitfield, D.P. & Madders, M. (2006) A Review of the Impacts of Wind Farms on Hen Harriers Circus Cyaneus and an Estimation of Collision Avoidance Rates.

6.172. The unmitigated effect of displacement and related impacts is classified as **Minor Adverse** and is therefore **Not Significant**.

Buzzard

Impact

6.173. Hunting or dispersing buzzard may be at risk of displacement from habitat around turbines or other infrastructure, thereby impacting on productivity or survival rates.

Sensitivity

6.174. Medium.

Magnitude of Impact

6.175. Thirteen flights by buzzard were recorded within 500m of the proposed turbine locations (see **Figures 6.1.2 and 6.1.8**). Impacts as a result of disturbance are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

6.176. Displacement as a result of habitat loss is considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

Significance of Effect

6.177. The unmitigated effect of displacement and related impacts is classified as **Minor Adverse** and is therefore **Not Significant**.

Snipe

Impact

6.178. Foraging or dispersing snipe may be at risk of displacement from habitat around turbines or other infrastructure, thereby impacting on productivity or survival rates.

Sensitivity

6.179. Low.

Magnitude of Impact

6.180. One flights by snipe was recorded within 500m of the proposed turbine locations. Impacts as a result of disturbance are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

6.181. Displacement as a result of habitat loss is considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

Significance of Effect

6.182. The unmitigated effect of displacement and related impacts is classified as **Negligible** and is therefore **Not Significant**.

Lapwing

Impact

6.183. Foraging or dispersing/migrating lapwings may be at risk of displacement from habitat around turbines or other infrastructure, thereby impacting on productivity or survival rates.

Sensitivity

6.184. Medium.

Magnitude of Impact

6.185. Two flights by lapwing were recorded within 500m of the proposed turbine locations. Impacts as a result of disturbance are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

6.186. Displacement as a result of habitat loss is considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude.

Significance of Effect

6.187. The unmitigated effect of displacement and related impacts is classified as **Minor Adverse** and is therefore **Not Significant**.

Collison Risk

6.188. Potential threats of displacement and collision risk from the windfarm are mutually exclusive. Birds which are displaced from the windfarm air space will no longer be at risk of collision. However, for many species the degree of risk of either impact is not fully understood. As such, where both potential risks have been identified for particular species or species groups[68], both risks have been considered below. The likelihood or significance of risk is discussed in relation to individual species where relevant information is available.

Target Species

6.189. The low level of flight activity for all target bird species equates to a low collision risk. The only target species recorded during the VP surveys was hen harrier, for which collision risk is

[68] Langston, R.H.W. and Pullan, J.D. (2003) Windfarms and birds: an analysis of the effects of wind farms on birds and guidance on environmental assessment criteria and site selection issues. Report T-PVS/Inf (2003) 12, by BirdLife International to the Council of Europe, Bern Convention on the Conservation of European Wildlife and Natural Habitats. RSPB/BirdLife in the UK.

calculated as 0 (no collisions predicted to result from the Proposed Development). It is therefore concluded that potential collision risk for all target species is **Not Significant**.

Other Species

6.190. Collision risk is not usually calculated for secondary species. Section 3.2 of the relevant SNH guidance[69] suggests that:

particularly high presence on the site

may present an issue for windfarm proposals. The numbers and activity levels of secondary species observed during both the VP surveys and BBS are considered low to moderate. Collision risk for these species is therefore likely to be **Not Significant**.

Decommissioning Stage

Environmental Designated Sites

6.191. It is considered that the potential impacts during the decommissioning phase are likely to be more minor than those of the construction phase. The general work activities that will be undertaken during these phases will be similar to those of the construction phase, but the ground disturbed by construction will be restored to its former state during decommissioning.

6.192. It is considered that the Proposed Development will have an impact of **Negligible Spatial** and **Negligible Temporal** magnitude upon the Ramsar Site and IBA with connectivity.

6.193. The Proposed Development is therefore predicted to have **Minor Adverse** and **Not Significant** effects.

Important Ornithological Features

6.194. As noted above, the potential impacts during the decommissioning phase are likely to be more minor than those of the construction phase.

6.195. Considering the predicted effect magnitudes during the construction phase, the overall effect of decommissioning on the IFOs is assessed as **Minor Adverse**, and is therefore **Not Significant** in the context of the EIA Regulations.

[69] Scottish Natural Heritage (2013) Recommended bird survey methods to inform impact assessment of onshore windfarms.

MITIGATION MEASURES

Ornithological Designated Sites

6.196. In the absence of mitigation, the Proposed Development will have a **Low Spatial and Short-Term Temporal** effect upon both the Lough Foyle Ramsar Site and the Lough Foyle and River Foyle IBA.

6.197. Although **no significant effects** will therefore occur to the designated sites linked hydrologically with the Proposed Development, mitigation measures have been outlined to remove hydrological pathways for impact upon these designated sites. Precautionary measures have also been outlined in order to safeguard against any potential contamination of the aquatic environment, and in turn any bird species relying upon it. Please see **Chapter 5: Ecology** and **Chapter 7: Hydrology and Hydrogeology** for full details of these measures.

Mitigation and Enhancement During Construction Phase

6.198. In the absence of mitigation, no significant effects have been predicted for the IFOs outlined within this ornithological assessment. However, small numbers of breeding birds (and particularly ground-nesting species) will be directly impacted during the construction phase and are potentially at risk.

6.199. To ensure that eggs, young and active nests of bird species protected under the Wildlife (Northern Ireland) Order 1985 (as amended) are not impacted, breeding bird protection will be implemented in line with the consented Construction Method Statement and Conditions 4 and 5 of the consented development. This includes the following measures: pre-commencement bird surveys where construction works are to be undertaken between April and July inclusive, weekly ornithological monitoring protection during the breeding season, strict supervision of any vegetation clearance potentially affecting nesting birds, and habitat enhancement of the existing habitats away from the turbine envelope.

6.200. Owing to increased presence of hen harrier, kestrel and lapwing during the most recent surveys when compared with 2007, buffer distances have been specified in **Table 6-16** below as mitigation to protect these species. The manner in which these are to be applied will remain the same as for the consented breeding bird protection measures.

6.201. Condition discharge related to the Original Consent also included a Habitat Management Plan (HMP) for the long-term management of the Application Site and adjacent areas. The recommendations of this plan will be implemented; as there has not been a significant change in the habitat composition, recommendations will still be relevant for the Amendment Application.

6.202. The objectives of the HMP are as follows:

- *'Ensure the protection of areas outside the working zone;*

- *Restore habitats within the working zone but outside the footprint of windfarm infrastructure;*
- *Enhancement of the existing habitats on the wider site; and*
- *Where required, off-set the loss of priority habitats such as Blanket bog.'*

6.203. The HMP focuses in particular on habitats of conservation importance identified in the original surveys carried out in 2007 and 2008 and addresses or amends mitigation measures relating to habitats as proposed within the original Environmental Statement (2009). Successful implementation of the HMP will in turn improve habitat quality for all IFOs, while also reducing the likely effects of habitat loss and displacement where these are present.

6.204. The HMP measures will commence during the construction period.

Mitigation During Operational Phase

6.205. HMP measures will also apply to years 1, 3, 5 and 10 of operation, and it is during the operational phase that the main effects of the HMP will be brought to bear upon bird species. Reports shall be submitted to NIEA within six months of the end of each monitoring year.

Mitigation During Decommissioning Phase

6.206. As outlined previously, potential unmitigated effects during the decommissioning phase are likely to be similar to, but less severe than, those predicted for the construction phase. Therefore, the bird survey and protection area measures outlined above within the construction phase mitigation are also applicable to the decommissioning phase, and will equally be implemented during decommissioning.

Mitigation and Enhancement Summary

6.207. **Table 6-16** summarises the mitigation and enhancement measures related to potential effects on ornithological receptors during each phase of the Proposed Development, together with residual effects (see also below).

Table 6-16 Summary of Potential Significant Effects, Mitigation and Enhancement

Species and Effect	Mitigation/Enhancement Proposed	Means of Implementation	Residual Effect/Outcome
Construction			
Hen Harrier Minor Adverse	Breeding bird protection, including pre-construction surveys, and HMP	Avoid construction activity within 500m of active nests (no active nest sites currently known within 500m)	Not significant

		Commencement of habitat management activities	
Kestrel Minor Adverse	Breeding bird protection, including pre-construction surveys, and HMP	Avoid construction activity within 500m of active nests (no active nest sites currently known within 500m) Commencement of habitat management activities	Not significant
Buzzard Minor Adverse	Breeding bird protection, including pre-construction surveys, and HMP	Avoid construction activity within 500m of active nests (no active nest sites currently known within 500m) Commencement of habitat management activities	Not significant
Snipe Negligible	Breeding bird protection, including pre-construction surveys, and HMP	Avoid construction activity within 100m of active nests (no active nest sites currently known within 100m) Commencement of habitat management activities	Not significant
Lapwing Minor Adverse	Breeding bird protection, including pre-construction surveys, and HMP	Avoid construction activity within 150m of active nests (no active nest sites currently within 150m) Commencement of habitat management activities	Not significant
Operation			
Displacement / Disturbance			
Hen Harrier Minor Adverse	Improve quality of available prey habitat away from turbine locations	Implementation of HMP	Not significant
Kestrel Minor Adverse	Improve quality of available prey habitat away from turbine locations	Implementation of HMP	Not significant
Buzzard Minor Adverse	Improve quality of available prey habitat	Implementation of HMP	Not significant

	away from turbine locations		
Snipe Negligible	Improve quality of available habitat away from turbine locations	Implementation of HMP	Not significant
Lapwing Minor Adverse	Improve quality of available habitat away from turbine locations	Implementation of HMP	Not significant
Collision Risk			
N/A			
Decommissioning			
Hen Harrier Minor Adverse	Breeding bird protection including pre-commencement surveys	Avoid decommissioning activity within 500m of active nests (no active nest sites currently within 500m)	Not significant
Kestrel Minor Adverse	Breeding bird protection including pre-commencement surveys	Avoid decommissioning activity within 500m of active nests (no active nest sites currently within 500m)	Not significant
Buzzard Minor Adverse	Breeding bird protection including pre-commencement surveys	Avoid decommissioning activity within 500m of active nests (no active nest sites currently within 500m)	Not significant
Snipe Negligible	Breeding bird protection including pre-commencement surveys	Avoid decommissioning activity within 100m of active nests (no active nest sites currently known within 100m)	Not significant
Lapwing Minor Adverse	Breeding bird protection including pre-commencement surveys	Avoid decommissioning activity within 150m of active nests (no active nest sites currently within 150m)	Not significant

RESIDUAL EFFECTS

Residual Construction Effects

6.208. With the implementation of breeding bird protection and compliance with current legislation in regards to breeding birds, the likelihood of works leading to effects upon breeding birds will be minimised. Where works commence prior to, or at the start of, a breeding season, it is likely that birds will seek an alternative nest site within the wider area rather than failing to breed. Where works commence during a breeding season, the implementation of breeding bird protection and the appropriate measures outlined in light of the pre-construction breeding bird survey will ensure effects are unlikely to be significant.

6.209. When considering mitigation measures, the magnitude of impact for all breeding birds will be **Negligible to Low Spatial** and **Short-term Temporal**, resulting in a **Minor Adverse** and **Not Significant** effect.

Residual Operational Effects

6.210. The implementation of the HMP will reduce potential negative effects for ornithological interest within and adjacent to the Application Site. Residual operational effects for the species considered are **Negligible to Minor Adverse** and **Not Significant**.

Residual Decommissioning Effects

6.211. As the mitigation for the decommissioning phase will be similar to the construction phase, but in the context of less severe effects, the residual impacts on IFOs will be **Negligible Spatial** and **Short-term Temporal**, resulting in a **Not Significant** residual effect on all IFOs.

CUMULATIVE EFFECTS

6.212. Cumulative impacts are defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments taken together[70]. There may be cumulative impacts of windfarms on ornithological species and their associated supporting habitats.

6.213. There are two aspects of cumulative effect to consider:

- The cumulative effect of two or more developments on an individual bird or territory. For example, where two different developments located a few kilometres apart may have an influence on the same territory of a breeding raptor;
- The cumulative effect of a number of developments within a region on the regional population of a species.

6.214. Within 10km of the Application Site there are 29 operational wind turbines, 38 consented wind turbines, four consented but possibly lapsed turbines and 24 wind turbines currently undergoing planning. Details of the (multiple-turbine) wind farm developments comprising the majority of this number are outlined in Table 6-15 below.

Table 6-15: Developments within 10km of the Proposed Development

Planning Reference	Name	Planning Status	Description	Distance
LA01/2018/0200/F	Dunbeg South	In Planning (Under Consideration)	Construction of a wind farm comprising 9 no. wind turbines (maximum 149.9m to blade tip) and associated infrastructure	9.97km
LA01/2017/1124/F	Craiggore	Consented	Proposed amendment to the overall tip height of the consented Craiggore Wind Farm (B/2012/0268/F)	1.39km

[70] Scottish Natural Heritage. (2012). Assessing the cumulative impact of onshore wind energy developments.

C/2007/1186/F	Brockaghboy	Operational	4 turbines, all 125m to blade tip	5.44km
H/2014/0241/F	Brockhagboy Extension	Operational	15 turbines; 125m to blade tip	6.88km
LA01/2016/0315/F		Withdrawn	Amendments to consented Brockaghboy No 2 Wind farm (H/2014/0241/F)	
LA09/2016/0241/F		Withdrawn	Amendments to consented Brockaghboy 2 wind farm (H/2014/0241/F)	
LA09/2016/0232/F	Corlacky Hill	In Planning	11 turbines; 150m to blade tip	6.75km
B/2013/0120/F LA01/2018/1151/F	Evishagaran	Consented	14 turbines Proposed amendment to the overall tip height of the consented Evishagaran Wind Farm from 125m to a maximum tip height of 140m	3.95km
C/2012/0276/F	Upper Ballyrogan	Consented	5 turbines, all 120m to blade tip	3.26km
LA01/2019/0890/F	Rigged Hill	In Planning	7 turbines, all 137m to blade tip	4.44km

6.215. Twenty-one single turbines were also consented within this 10km area. One of these (at Dunbeg South, 9.99km north of the Application Site) has a maximum tip height of 149m, though the majority are small turbines, with a much more limited impact than that of a wind energy development of similar scale to the Proposed Development.

6.216. Smulgedon wind farm has been included in the cumulative assessment of the surrounding wind farm developments submitted after the Original Consent had been granted. The only wind farm where this was not the case is the original Brockhagboy wind farm, which was submitted around the same time as the Original Consent application but has since been

extended. As these wind farms have all been consented, the cumulative effects have been deemed acceptable.

6.217. The increase in footprint of the development is considered to be **Negligible** in terms of habitat loss and **no significant effects** have been predicted for bird species as a result of the proposed amendments.

Hen Harrier

6.218. While risk for hen harrier has increased very slightly, it is unlikely that in-combination effects of construction disturbance and long-term operational disturbance would result in significant impacts for hen harrier. This is due to the very limited effects predicted upon the species, and the separation distance between the above consented/existing windfarms and the Proposed Development. A study from Scotland revealed that breeding female hen harriers hunt mostly within 1km of the nest and males mostly within 2km[71].

6.219. The only wind farm within this distance is Craiggore, for which (as noted above) cumulative effects were deemed acceptable. A single hen harrier was observed during the surveys connected with the Proposed Development. Therefore, even if the slight increase in risk was enough to impact one hen harrier also using Craiggore Wind Farm, this would still only affect 1.1% of the regional hen harrier population.

6.220. In the context of this Northern Irish population, the proposal is considered to have at most a cumulative effect of **Low Spatial** and **Long-Term Temporal** magnitude. The overall effect on hen harrier is therefore assessed as **Minor Adverse** and **Not Significant** in the context of the EIA Regulations.

Kestrel

6.221. Risk for kestrel does appear to have increased compared to 2007, where infrequent hunting over the northwest of the originally consented site was recorded. It is unlikely that in-combination effects of construction disturbance and long-term operational disturbance would result in significant impacts for kestrel. This is due to the limited effects predicted upon the species, and the separation distance between the above consented/existing windfarms and the Proposed Development.

6.222. Kestrel territories range between 1km and 10km, although only a small area around the nest is defended in a breeding territory[72]. A maximum of two kestrels were noted during the ornithological surveys undertaken, although there was no evidence that these were breeding. As territory size appears to depend quite strongly on the presence of neighbouring birds[73], it

[71] Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. *Bird Study*, 61:1, 48-55, DOI: 10.1080/00063657.2013.874976

[72] RSPB (n.d.) Breeding and Nesting Habits. Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kestrel/breeding-and-nesting-habits/; accessed on 13th October 2020.

[73] Village, A. (1990) The Kestrel. T & AD Poyser Ltd, London.

is likely that no more than one pair of kestrels (potentially just two non-breeding individuals) will be affected by the proposed development. This amounts to 0.1% of the regional population.

6.223. In the context of this Northern Irish population, the proposal is considered to have at most a cumulative effect of **Low Spatial** and **Long-Term Temporal** magnitude. The overall effect on kestrel is therefore assessed as **Minor Adverse** and **Not Significant** in the context of the EIA Regulations.

Buzzard

6.224. Risk for buzzard seems to have decreased, given the presence of a breeding pair in the 2007 breeding bird study area but no apparent breeding noted in 2020. It is unlikely that in-combination effects of construction disturbance and long-term operational disturbance would result in significant impacts for buzzard. This is due to the limited effects predicted upon the species, and the separation distance between the above consented/existing windfarms and the Proposed Development.

6.225. Mean buzzard territory size in Britain is 1.2km^2 (although known to be slightly larger in continental Europe)[74], with a core area of 0.5–1 km^2 usually being defended[75]. No other windfarms fall within this distance. Even if the potential level of impact was enough to impact a buzzard with a larger territory that was also using Craiggore Wind Farm, the recorded level of site use would still only affect 0.025% of the regional estimated buzzard population.

6.226. The proposal is considered to have at most a cumulative effect of **Negligible Spatial** and **Long-Term Temporal** magnitude. The overall effect on buzzard is therefore assessed as **Minor Adverse** and **Not Significant** in the context of the EIA Regulations.

Other Ornithological Species

6.227. Relative to the Original Consent, risk has not increased for any of the other IFOs (and has decreased for some such as peregrine and sparrowhawk), or indeed for the majority of bird species.

6.228. It is unlikely that, even in a worst-case scenario, in-combination effects of construction disturbance and long-term operational disturbance would result in significant impacts for other ornithological species which have been assessed within this ornithological study. This is due to the negligible effects for each species, and the separation distance between the above consented/existing windfarms and the Proposed Development (being larger than the breeding territories of many of these species).

[74] Smith, M.C. (2007) The return of the Common Buzzard to Warwickshire and its possible use as an indicator for the return of the Common Raven and the Red Kite.
[75] Hardey, J., Crick, H. *et al.* (2009) Buzzard: *Buteo buteo*. In: *Raptors: A Field Guide for Surveys and Monitoring*. Scottish Natural Heritage and The Stationery Office.

6.229. Therefore, it has been concluded that there will be **no significant cumulative effects** on any ornithological feature assessed within this Chapter.

Residual Cumulative Effects

6.230. Limited additional effects on hen harrier are likely when considering in-combination effects. Residual cumulative effects on hen harrier are **Minor Adverse** and **Not Significant**.

6.231. Residual cumulative effects on other IFOs are **Minor Adverse** and **Not Significant**.

SUMMARY & CONCLUSION

6.232. The results of the ornithology surveys completed in connection with the Proposed Development are broadly in keeping with those recorded for the Original Consent. Breeding bird surveys revealed reduced breeding bird use of the Application Site, though did include a single record of lapwing.

6.233. The only target species recorded during vantage point surveys was hen harrier, which was recorded on five instances as a single bird flying wholly below collision risk height. The low level of flight activity for all target bird species equates to a low collision risk.

6.234. In terms of secondary species, up to two kestrels (averaging less than two flights of 2.5 minutes' mean duration per 6 hours of monthly survey) and one buzzard (averaging less than one flight per 6 hours) were recorded, together with a single short flight by a lone snipe. These form only a very small proportion of the regional and national populations.

6.235. Potential effects on bird species (including but not limited to hen harrier, kestrel, buzzard, snipe and lapwing) as a result of the Proposed Development have been assessed for the construction, operation and decommissioning phases. The effects are considered **Not Significant**. However, small numbers of breeding birds (and particularly ground-nesting species) will be impacted directly by habitat loss and indirectly by disturbance during the construction phase. They are therefore potentially at risk, although this will amount to a **Not Significant** effect.

6.236. To ensure that eggs, young and active nests of bird species protected under the Wildlife and Countryside Act (as amended) are not impacted, breeding bird protection will be implemented in line with the consented Construction Method Statement and Conditions 4 and 5 of the consented development. This includes pre-commencement bird surveys where construction works are to be undertaken between April and July inclusive, weekly ornithological monitoring protection during the breeding season, strict supervision of any vegetation clearance potentially affecting nesting birds, and habitat enhancement of the existing habitats away from the turbine envelope.

6.237. Owing to increased presence of hen harrier, kestrel and lapwing during the most recent surveys when compared with 2007, buffer distances have been specified as mitigation to protect these species. The manner in which these are to be applied will remain the same as for the consented breeding bird protection measures.

6.238. With the implementation of the outlined measures, the proposals will result in a **Minor Adverse** and **Not Significant** effect for all Important Ornithological Features (IFOs).

6.239. No additional effects are likely when considering in-combination effects. Residual operational effects for all IFOs are **Minor Adverse** and **Not Significant**.

Chapter 7: Land, Soils and Water

7. LAND, SOILS AND WATER

INTRODUCTION

7.1. The aim of this Chapter is to identify the geological, hydrogeological and hydrological conditions of the Application Site and surrounding area, to assess the potential impacts of the Proposed Development and to recommend mitigation measures where appropriate. It should be noted that this Chapter is produced in an Environmental Statement (ES) format at the request of the council.

7.2. The key issues for the assessment of potential effects on the hydrological and hydrogeological resources relating to the Development include:

- Potential chemical pollution effects on the hydrological environment;
- Potential erosion and sedimentation effects on the hydrological environment;
- Potential impediments to stream flow;
- Potential effects on PWS;
- Potential changes in soil and peat interflow patterns;
- Potential for the compaction of soils;
- Potential effects on the hydrological function of GWDTEs;
- Potential for peat destabilisation and disturbance; and
- Potential for an increase in runoff and flood risk.

7.3. Effects during construction, operation and decommissioning have been assessed, as well as potential cumulative effects.

7.4. This chapter of the Environmental Statement is supported by the following Figures and Appendices:

- Appendix 7A – Figures (Volume 3)

  – Figure 7.1: Study Areas

  – Figure 7.2: Solid Deposits

  – Figure 7.3: Superficial Deposits

- Figure 7.4: Hydrological Catchment & Watercourses
- Figure 7.5: Soil Profiles

7.5. The Chapter is also supported by a number of Technical Appendices (Volume 4), which are:

- Technical Appendix 7.1: Peat Assessment
- Technical Appendix 7.2: Geotechnical Assessment

Project Description

7.6. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

7.7. For a full description of the Proposed Development and the various elements, please see Chapter 1: Introduction of this Environmental Statement (ES).

7.8. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Site Description and Receiving environment

7.9. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

7.10. The area that encompass the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a

small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

7.11. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

Statement of Authority

7.12. This Chapter has been produced by Michael McGhee and Paul Neary of Neo Environmental. Having completed a civil engineering degree in 2012, Michael has worked on numerous development types across the UK and Ireland whilst working towards becoming a Charted Engineer. Michael has over six years of environmental consultancy experience, mainly producing flood risk and drainage impact assessments for renewable energy projects as well as EIA chapters for a range of large projects.

7.13. Paul Neary BA H.Dip MA MSc MIEnvSc MIAI ACIFA CEnv is dual qualified as a Chartered Environmentalist, full Member of the Institute of Environmental Science and is also a Licensed Archaeologist. Paul has over 14 years of professional consultancy experience throughout the UK and Ireland. He has managed and produced Environmental Statements and chapters for large road projects, residential, mixed use, aggregate and energy projects and has worked on over 200 energy projects to date.

Consultation

7.14. Please refer to **Table 7-1** for all consultee responses received in relation to the land, soils and water effects of the Proposed Development.

Table 7-1: Consultees

Consultee & Date	Summary of Response	Addressed within ES
Robert Keightley, Department for Infrastructure (DFI)	Requested that if a watercourse is uncovered which was not previously evident, to contact the Department for Infrastructure immediately for investigations. Any proposal which affects the drainage function of a watercourse, such as the release of stormwater,	A site visit has been conducted and no new watercourses

(Email Response 18/11/19)	culverting, bridging, diverting, building adjacent to and/or over, requires written consent from the department. Details are required in advance of the construction period.	were uncovered. The drainage and watercourse crossings will be provided at the detailed design stage
C. Corr , Department for Infrastructure (DfI Rivers) (Email Response 15/11/19)	Stated that Brockagh Water is an undesignated watercourse and therefore maintenance responsibilities rests with riparian landowners. The Castle River is a designated watercourse from the Drumsurn Road (X:272,973 Y:416,116) to where it meets the Curly River between Limavady and Artikelly. Maintenance responsibilities for the designated reach rests with DfI Rivers. DfI Rivers has no current plans to carry out any improvement works to the Brockagh Water or Castle River. Under the terms of Schedule 6 of the Drainage (Northern Ireland) Order 1973 the applicant must submit to DfI Rivers for its consent any proposals to carry out works which affect any watercourse.	These matters have been fully addressed within this Chapter
Joe Maginness, NI Water (Email Response 13/12/19)	No NI Water clean water abstraction points would be affected by this windfarm proposal. There is no Lab analysing instrumentation within the 10km boundary. The Ballinrees Water Treatment Works is well beyond the 10km boundary and it is also protected due to surrounding regional elevations.	These matters have been fully addressed within this Chapter
Deara - Northern Ireland Environment Agency (NIEA) Water Info	A search of groundwater monitoring database showed no points within 5km of the site. A search of surface water monitoring stations resulted in a number being evident withinin 5km of the site. These are outlined later in the Chapter.	These matters have been fully addressed within this Chapter

(Email Response 20/11/19)		
DAERA - NIEA Drinking Water Inspectorate (Email Response 05/02/20)	Links to private water supplies application.	These matters have been fully addressed within this Chapter

LEGISLATION, POLICY & GUIDANCE

7.15. The development has been assessed against existing European, national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance:

European and National Policies & Guidance

Regional & Local Policies & Guidance

7.16. A review of relevant legislation has been conducted to ensure the Proposed Development complies with the following:

- The Water Framework Directive [2000/60/EC] [1];
- Water Environment (Water Framework Directive) Regulations (Northern Ireland)[2]
- The Fisheries Regulations (Northern Ireland) 2014[3];
- The Private Water Supplies Regulations (Northern Ireland) 2009[4];
- The Water Supplies (Water Quality) (Amendment) Regulations (Northern Ireland) Regulations 2017[5].
- Strategic Planning Policy Statement for Northern Ireland[6]
- PPS 15 (Revised): Development and Flood Risk[7].

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1 European Parliament (2000). "Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy" ("The Water Framework Directive").

2 The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017. Available online at: http://www.legislation.gov.uk/nisr/2017/81/contents/made.

3 Fisheries Regulations (Northern Ireland) 2014. Available online at: http://www.legislation.gov.uk/nisr/2014/17/made

4 The Private Water Supplies Regulations (Northern Ireland) 2009. Available online at: http://www.legislation.gov.uk/nisr/2017/211/contents/made.

5 The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2015. Available online at: https://www.legislation.gov.uk/nisr/2015/363/contents/made.

6 Department of the Environment, Strategic Planning Policy Statement for Northern Ireland (September 2015). Available at: http://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf

7 Department of Environment, Planning Policy Statement 15 (Revised): Development and Flood Risk (2014) – Available at: https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/pps15revised-2.htm

- DCAN 10 (Revised): Environmental Impact Assessment[8]

7.17. UK Pollution Prevention Guidelines have also been considered in the production of this Chapter. The suite of Pollution Prevention Guidelines (or Guidance for Pollution Prevention (GPP)), published by the Scottish Environmental Protection Agency (SEPA), the Environment Agency (EA) and the Northern Ireland Environment Agency (NIEA) were withdrawn on the 17th of December 2015. However, these documents provide sound advice and can be accessed online[9]. The PPGs which are most relevant to the Proposed Development include:

- PPG1 'General Guide to the Prevention of Pollution'
- GPP2 'Above Ground Oil Storage'
- GPP 5 'Works and Maintenance in or Near Water'
- PPG6 'Working at Construction and Demolition sites'
- PPG 7 'Safe Storage – The Safe Operation of Refuelling Facilities'

7.18. These PPGs/GPPs provide guidance as to the various environmental considerations and potential mitigation and prevention measures considered within this Chapter.

7.19. Other relevant guidance and regulation comprises the following:

- Planning Policy Statement (PPS) 18: Renewable Energy;[10]
- The Construction Industry Research and Information Association (CIRIA) Report C689 Culvert Design and Operation Guide;[11]
- CIRIA Report C532 Control of water pollution from construction sites;[12]
- CIRIA Report C648 Control of water pollution from linear construction proposed developments: technical guidance;[13]

8 Department of Environment, DCAN 10 (Revised): Environmental Impact Assessment (2012) Available at: https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/dcans/dcan_10__revised__-_environmental_impact_assessment.pdf

9 SEPA, Guidance. Available online: https://www.sepa.org.uk/regulations/water/guidance/

10 NI Planning Service, 2009. Planning Policy Statement 18: Renewable Energy. Available at: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/.

11 CIRIA. Report C689 Culvert Design and Operation Guide (2010)

12 CIRIA. ReportC532 Control of Water Pollution from Construction Sites (2001)

13 CIRIA. Report C648 Control of water pollution from linear construction proposed developments: technical guidance (2006)

- CIRIA Report C741 - Environmental Good Practice on Site Guide;[14]
- CIRIA Report C753 - The SuDS Manual;[15]
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Development;[16]
- Forest and Water, UK Forestry Standard Guidelines;[17]
- Wind farms and groundwater impacts - A guide to EIA and Planning considerations;[18]
- Best Practice Guidelines for the Irish Wind Energy Industry;[19]
- Standing Advice for development that may have an effect on the water environment;[20]

14 CIRIA. Report C741 – Environmental Good Practice on Site Guide (2015)

15 CIRIA. The SUDS Manual (2007). Available at: https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

16 Scottish Government. Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (2006)

17 Forestry Commission. UK Forestry Standard (2011). Available at: https://www.gov.uk/government/publications/the-uk-forestry-standard

18 DOE and NIEA. Wind farms and groundwater impacts - A guide to EIA and Planning considerations (2015). Available at: https://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/wind_farms_and_groundwater_impacts-3.pdf

19 Irish Wind Energy Association, 2012. Best Practice Guidance for the Irish Wind Energy Industry. Available at: https://www.iwea.com/policy/best-practice-guidelines

20 DAERA Standing Advice, Standing Advice for development that may have an effect on the water environment 2018. Available at: https://www.daera-ni.gov.uk/publications/standing-advice-development-may-have-effect-water-environment-including-groundwater-and-fisheries

METHODOLOGY

Study Area

7.20. There are three study areas for this Chapter which consist of the Core Study Area (CSA), a 5km Study Area, and a 10km Study Area, which can be viewed on **Figure 7.1: Appendix 7A, Volume 3**. The Core Study Area is defined as the area where construction works will take place and therefore direct effects will occur. For the purposes of this Chapter and for completeness, the Core Study Area will comprise the Original Application Site and the current Application Site. Where a feature is outside the Core Study Area boundary, there may still be hydrological connection and therefore the 5km and 10km Study Areas are considered appropriate depending on the feature.

Desk Based Assessment

7.21. A desk-based assessment of the Core Study Area will be undertaken to identify the geological, hydrological and hydrogeological baseline environment utilising publicly available information. The following sources have been consulted:

- The Geological Survey of Northern Ireland (GSNI);
- British Geological Survey (BGS) GeoIndex Digital Mapping;
- Department of Infrastructure Flood Maps (NI);
- NIEA river quality and natural heritage data; and
- Department of Agriculture, Environment, and Rural Affairs (DAERA) Natural Environment Map Viewer.

7.22. The desk study included:

- Identification of underlying soils, geology and hydrogeology;
- Identification of groundwater vulnerability;
- Assessment of topography and slope characteristics;
- Identification of catchments, watercourses, springs and water features;
- Collation of data provided through consultations; and
- Collation of flood plain information and water quality data.

Field Surveys

7.23. An initial walkover survey which covered the CSA was undertaken on the 27th and 28th of January 2020. Weather conditions during the site walkover were changeable with minor precipitation events and extended periods of dry weather.

7.24. The aim of the survey was to assess geological, hydrogeological and hydrological features within the Core Study Area, but more specifically within the Application Site, which had been identified from the desk-based assessment, whilst also identifying any additional previously unrecorded features. Watercourses within the CSA were documented photographically and descriptions recorded.

Evaluation Methods

7.25. The sensitivity of the hydrology, geology and hydrogeology features of the CSA have been identified utilising the criteria outlined within Tables 7.2 – 7.4 below. Sensitivity criteria are based on:

- the vulnerability of a receptor to a particular pressure (degree of environmental response to any particular impact); and
- the 'value' of the receptor (e.g. an area of international importance should be considered more sensitive to impact than an area of little or no conservation value).

Table 7-2: Criteria for Rating Site Attributes - Estimation of Importance of Soil and Geology Attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale	Site protected by International or EU legislation (World Heritage Sites, Geopark) Proven economically extractable mineral resource
High	Attribute has a high quality and rarity on local scale	Contaminated soil on site with previous heavy industrial usage Site protected by NI Legislation, e.g. ASSI Well drained and/or highly fertility soils Earth Science Conservation Review sites that are of ASSI standard Marginally economic extractable mineral resource

		Pristine or active peat bog habitat; evidence that peat body has an intact hydrological system or possibility that peat may not recover to pristine status.
Medium	Attribute has a medium quality and rarity on local scale	Site of local geological importance (Local Geological Site – previously Regionally Important Geological Site) SLNCIs are recognised by Planning Service and are intended to complement the network of nationally and regionally important sites Areas of Constraint on Mineral Development identified in development plans Pristine or active peat bog habitat; evidence that peat body has an intact hydrological system or possibility that peat could recover to pristine status
Low	Attribute has a low quality and rarity on local scale	Sites with little or no local geological/soils interest Degraded or inactive peat; small isolated areas of peat; soil not sensitive to change, e.g. degraded / grazed; shallow, evidence of widespread erosion. Significant active land drainage has occurred resulting in ongoing dewatering of peat

Table 7-3: Criteria for Rating Site Attributes - Estimation of Importance of Hydrological Attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale	A large, medium or small waterbody with an NIEA water quality classification of 'High' The hydrological receptor is of high environmental importance or is designated as national or international importance, such as a Special Area of Conservation (SAC) or an Area of Special Scientific Interest (ASSI)

		Regionally important surface water subject to abstraction for public drinking water supply, private water abstractions for populations exceeding 50 people, or large scale industrial/agricultural abstractions Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality and rarity on local scale	A large, medium or small waterbody with an NIEA water quality classification of 'Good' Designated for freshwater ecological interest e.g. salmonid fishery and/or salmonid spawning grounds present or freshwater pearl mussel Environmental equilibrium highly prone to natural fluctuations and cannot absorb further change without fundamentally altering its present character Surface water subject to abstractions for private water supplies for less than 50 homes Watercourse with significant active floodplain area Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality and rarity on local scale	Watercourse whose environmental equilibrium copes well with all-natural fluctuations but cannot absorb some changes greater than this without alteration of its present character A large, medium or small waterbody with an NIEA water quality classification of 'Moderate' The hydrological receptor is of regional environmental importance (such as Local Nature Reserves), as defined by NIEA

		Designated cyprinid fishery, possible salmonid species present and catchment locally important for fisheries Surface water subject to abstractions for private water supplies for less than 25 homes Some active floodplain area.
Low	Attribute has a low quality and rarity on local scale	Watercourse whose environment equilibrium is stable and is considered resilient to changes greater than natural fluctuations without detriment to its natural hydrological morphology and water quality characteristics Large, medium or small waterbody with an NIEA water quality classification of 'Poor' or 'Bad' The hydrological receptor is not of regional, national or international environmental importance Locally important amenity site for small range of leisure activities No drinking water supplies or small scale industrial/agricultural abstractions Not within the flood plain

Table 7-4: Criteria for Rating Site Attributes - Estimation of Importance of Hydrogeology Attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale	Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation Ground water subject to abstraction for public drinking water supply, private water abstractions for populations exceeding 50 people, or large scale industrial/agricultural abstractions Source Protection Zone 1

High	Attribute has a high quality and rarity on local scale	Principal aquifer providing locally important resource or supporting river ecosystem Groundwater provides large proportion of baseflow to local rivers Ground water subject to abstractions for private water supplies for less than 50 homes Source Protection Zone 2
Medium	Attribute has a medium quality and rarity on local scale	Course fishery Aquifer providing water for agricultural or industrial use with limited connection to surface water Ground water subject to abstractions for private water supplies for less than 25 homes Source Protection Zone 3
Low	Attribute has a low quality and rarity on local scale	Poor Bedrock Aquifer No drinking water supplies or small scale industrial/agricultural abstractions

Impact Assessment Methods

7.26. Following on from the identification of the baseline environment, the available data was utilised to identify and categorise potential impacts likely to affect the geological, hydrological and hydrogeological environment as a result of the Original Development and the proposed changes. Impacts have been categorised as follows:

- Direct: where the existing geological, hydrological or hydrogeological environment alongside or in close proximity to the proposed development is altered, in whole or in part.
- Indirect: where the geological, hydrological or hydrogeological environment beyond the proposed Development is altered by activities related to the construction or operation of the proposed Development.
- No Impact: where the proposed development has neither a negative nor a positive impact upon the geological, hydrological or hydrogeological environment.

7.27. The magnitude of potential impacts has been defined in accordance with the criteria outlined within Tables 7.5 – 7.8.

Table 7-5: Impact Assessment Criteria

Magnitude of Impact	Description
Imperceptible	An impact capable of measurement but without noticeable consequences
Slight	An impact that alters the character of the environment without affecting its sensitivities
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing or emerging trends
Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Profound	An impact which obliterates all previous sensitive characteristics

Table 7-6: Criteria for Rating Impact Significance - Estimation of Magnitude of Impact on Soil/ Geology Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Irreversible loss of a high proportion of local high fertility soils Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Irreversible loss of moderate proportion of local high fertility soils Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment
Small Adverse	Results in some measurable change in attribute quality or vulnerability	Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils Requirement to excavate and replace small proportion of peat, organic soils

		and/or soft mineral soils beneath alignment
Negligible	Results in an effect on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes

Table 7-7: Criteria for Rating Impact Significance - Estimation of Magnitude of Impact on Hydrology Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	A short- or long-term major shift in hydrochemistry or hydrological conditions sufficient to negatively change the ecology of the receptor. This change will equate to a downgrading of a NIEA water quality classification by two classes e.g. from 'High' to 'Moderate'. A sufficient material increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with PPS). Extensive loss of fishery Major risk of serious pollution incident Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change will equate to a downgrading of a NIEA water quality classification by one class e.g. from 'High' to 'Good.' A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention

		measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with PPS). Partial loss of fishery Moderate risk of serious pollution incident Partial reduction in amenity value
Small Adverse	Results in some measurable change in attribute quality or vulnerability	A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change will not result in a downgrading of the NIEA water quality classification. A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with PPS). Minor loss of fishery Low risk of serious pollution incident Slight reduction in amenity value
Negligible	Results in an effect on attribute but of insufficient magnitude to affect either use or integrity	No perceptible changes to the baseline hydrochemistry or hydrological environment. No change to the NIEA water quality classification. No increase in the probability of flooding onsite and offsite. Negligible risk of serious pollution

Table 7-8: Criteria for Rating Impact Significance - Estimation of Magnitude of Impact on Hydrogeological Attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to large proportion of aquifer

		Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply, springs and wells, river baseflow or ecosystems Potential high risk of pollution to groundwater from routine runoff
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss or extensive change to moderate proportion of aquifer Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems Potential medium risk of pollution to groundwater from routine runoff
Small Adverse	Results in some measurable change in attribute quality or vulnerability	Loss or extensive change to small proportion of aquifer Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems Potential low risk of pollution to groundwater from routine runoff
Negligible	Results in an effect on attribute but of insufficient magnitude to affect either use or integrity	No measurable effect upon an aquifer and risk of pollution from spillages

Significance of Effects

7.28. The significance of effects has been defined in accordance with the criteria outlined within Table 7.9 below. The importance of the attribute and the magnitude of the potential impact have been combined to identify the significance of the effect.

Table 7-9: Rating of Significant Environmental Impacts

Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
Large	Profound	Profound	Significant	Significant	Moderate
Moderate	Profound	Significant	Moderate	Moderate	Slight
Small	Significant	Moderate	Slight	Slight	Imperceptible
Negligible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible

Assessment Limitations

7.29. All data considered necessary to identify and assess the potential significant effects resulting from the Original Development and the proposed changes was taken from a variety of online sources as well as site visits. No onsite exploratory testing was completed and therefore high-level mapping data has been relied upon for a number of the baseline conditions.

7.30. The consulted sources contain records of all known geological, hydrogeological and hydrological features. However, it should be noted that some of the records retrieved are not exhaustive and various maps used are high level rather than site specific.

BASELINE CONDITIONS

7.31. This section presents the information gathered on the existing topographical, geological, hydrological and hydrogeological conditions of the CSA and its immediate surroundings.

Topography and Land use

7.32. The Development is located approximately 9km to the northeast of Dungiven and 8km west of Garvagh in County Londonderry.

7.33. The Core Study Area lies on undulating ground rising from approximately 210m Above Ordnance Datum (AOD) in the west to 290m AOD in the east. Local topography is broadly defined by undulating hills, with the CSA generally sloping from west to east. Two tributaries of Brockagh Water issue in the study area and drain to the east. Brockagh Water converges with Glenullin Water approximately 3km east of the CSA, before draining into Agivey River approximately 4.5km to the east. Several open agricultural field drains are present in the east of the CSA and allow for effective drainage of surface water.

7.34. The majority of the land is used for livestock grazing.

Meteorological Data

7.35. The National River Flow Archive (NRFA) (reports Average Annual Rainfall (AAR) at the Roe at Ardnargle gauging station, approximately 12km northwest of the Development, reporting 1,250 millimetres (mm) (1961 – 1990). This is a typical value for the region, with the Agivey at Whitehill gauging station approximately 17km east of the Development, reporting 1270mm AAR (1961 – 1990).

7.36. As monthly long-term climate data is not freely available from the NRFA, long term average rainfall data (1981 to 2010) obtained by the Meteorological Office at the Portglenone gauging station, approximately 22 km southeast of the Development, are presented in Table 7.5.

Table 7-10: Long term average rainfall data (1981 to 2010), Portglenone gauging station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	91.4	60.8	77.9	64.2	64	70	77.5	88.5	79.5	101.1	89.6	89.2

Designated Sites

7.37. The Core Study Area does not lie within any statuary designated sites.

7.38. There are eight non-statutory environmental designation sites within 5km of the CSA. The CSA lies directly adjacent to two non-statutory designated environmental sites; Smulgedon ASSI and Brockagh Quarry ASSI. Brochagh Quarry is not hydrologically connected with the Original Development and the proposed changes and therefore will not be discussed further.

Smulgedon ASSI

7.39. Drainage within the northern portion of the CSA adjacent to Smulgedon ASSI is predominantly characterised as diffuse overland drainage although a small number of dry shallow channels were observed during site walkovers. These, however, are poorly networked and show little or no evidence of frequent flow, and were not observed to link to any under-road culverts with the exception of a single culvert along the northwest site boundary. This culvert was observed to be blocked / damaged and it is highly unlikely that any flow can pass through this culvert.

7.40. Within Smulgedon ASSI, drainage comprises of semi-natural dendritic / parallel dendritic channel flow, overland diffuse flow and man-made drainage networks. Although an under-road culvert links the north-western portion of the site to the ASSI area, this culvert is both damaged and blocked. Therefore, runoff generated within the CSA is inhibited from directly entering the designated ASSI area.

7.41. Roadside drains and associated culverts are installed at regular intervals within the ASSI area adjacent to the road and are evident from a series of concrete block chambers fitted with man-hole covers. Although no flow was observed discharging from any of these culverts during site walkovers, discharge waters typically exit the culverts as diffuse overland flow rather than entering man-made channels.

7.42. Given the steep sloping nature of the CSA drainage tends to occur as infiltration to shallow groundwater throughflow along the upper slopes of the ASSI area, before forming seminatural dendritic drainage channels which link to the man-made channels along the mid / lower slopes. Surface water runoff within the lower elevations typically drains into a series of poorly networked drainage channels and eventually collects within a series of drains along the northern boundary of the designated ASSI area before forming minor tributaries to the Castle River.

Geology & Soil

Geology

7.43. The geological conditions of the CSA were identified utilising the GSNI interactive map (10k). It is underlain by underlain by basaltic rocks of the Antrim Lava Group of Tertiary (Palaeogene) age. This can be viewed on **Figure 7.2: Appendix 7A, Volume 3**.

Soil

7.44. Different soil types have different capabilities for soaking up water, the efficiency of which is dependent upon the structure and infiltration capacity. The GSNI interactive map (10k) has been utilised to obtain superficial geology. There are two type of soils distributed across the proposed CSA, including (see **Figure 7.3: Appendix 7A, Volume 3**):

- Till - Diamicton. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions.
- Peat - Peat. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by organic accumulations. These are located within the eastern and southern parts of the site, although it is likely the deposits are relatively thin and / or discontinuous.

7.45. On-site soil profiling was carried out in order to characterise the nature of drift deposits along the access route in places where it crosses underlying wet flushes and mires, and to determine the overall thickness of deposits at these locations. Core sample results can also be used as a guide to characterise typical soil horizons with close proximity to the sampling locations, which are presented in **Figure 7.5: Appendix 7A, Volume 3**, and are summarised in **Table 7-11**.

Table 7-11:Summary of Onsite Soil Profiles

Ref	Easting	Northing	Habitat	Classification
1	276238	414967	Basin Mire	0.3m Humic Soil - Pseudo-fibrous to semi-amorphous. Thin moderate to firm basal clay (~0.05m) into bedrock.
2	276224	414960	Basin Mire	0.7m Peat - Pseudo-fibrous to semi-amorphous. Thin moderate to firm brown basal clay (~0.05m) into bedrock.
3	276205	414955	Basin Mire	0.4m Humic Soil – Pseudo-fibrous to semi-amorphous. Thin firm brown basal clay (0.05m) into bedrock.
4	276193	414952	Basin Mire	1.2m Peat - Pseudo-fibrous to semi-amorphous. Thin firm basal clay (0.3m) into bedrock.
5	276269	414848	Wet Modified Bog	0.1m Humic Soil – Pseudo-fibrous to semi-amorphous. 0.8m thick soft compressible bluish grey clay becoming firmer brown clay towards base, bedrock below.

6	276248	414855	Wet Modified Bog	0.15m Humic Soil – Pseudo-fibrous to semi-amorphous. 0.6m thick soft compressible bluish grey clay becoming firmer brown clay towards base, bedrock below.
7	276235	414858	Wet Modified Bog	0.35m Humic Soil – Pseudo-fibrous to semi-amorphous. 0.2m thick soft compressible bluish grey clay becoming firmer brown clay towards base, bedrock below.
8	276222	414860	Wet Modified Bog	0.1m Humic Soil – Pseudo-fibrous to semi-amorphous. 0.45m thick soft compressible bluish grey clay becoming firmer brown clay towards base, bedrock below.
9	276034	414723	Valley Mire	0.9m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.1m) into bedrock.
10	276014	414726	Valley Mire	1.1m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.1m) into bedrock.
11	275993	414753	Valley Mire	1.2m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.15m) into bedrock.
12	275834	414797	Valley Mire	0.25m Humic Soil - Pseudo-fibrous to semi-amorphous. 0.15m firm brown clay towards base into bedrock below.
13	275828	414798	Valley Mire	0.5m Peat - Pseudo-fibrous to semi-amorphous, saturated. ~0.15m firm brown clay towards base into bedrock below.
14	275821	414795	Valley Mire	0.6m Peat - Pseudo-fibrous to semi-amorphous, saturated. ~0.15m firm brown clay towards base into bedrock below.
15	275769	414749	Valley Mire	1.2m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.3m) into bedrock.
16	275766	414738	Valley Mire	1.0m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.1m) into bedrock.

17	275764	414726	Valley Mire	1.1m Peat - Pseudo-fibrous to semi-amorphous, saturated. Thin firm brownish basal clay (~0.1m) into bedrock.

7.46. The samples show an inherently variable and discontinuous distribution of both humic and peat material associated with wet flushes and mires, along with varying degrees of saturation. In all cases a thin basal clay horizon was noted, ranging from 0.1m – 0.8m and varying in character from firm / stiff clay to deeper soft bluish compressible clay.

7.47. Saturated humic soils demonstrating high organic content (plant material clearly visible to becoming more decayed amorphous material) was noted within the wet modified bog area, and likely represents either remnant peat deposits or discontinuous shallow basin formations.

Peat

7.48. Peat instability is generally the result of a combination of causative factors. Several decommissioning / construction phase activities have the potential to increase the likelihood of peat slides in areas where peat is present at a sufficient depth and where gradients are sufficiently steep to result in a peat slide event.

7.49. Decommissioning and construction activities that have the potential to increase the likelihood of peat slides include locating proposed infrastructure including track networks on sloping ground which often involves removal of surface vegetation and excavation of peat and other soils.

7.50. A thin peat layer underlain by residual soils with a high clay content were evident during the site walkover and this was consistent with the findings of the soil profiling. Peat varies across the proposed Core Study Area ranging between 0.1 m and 1.2m. A report by Royal Haskoning identified only two areas where peat is likely to be of sufficient depth to warrant further investigation.

7.51. A further report by Commercial Earth looked into these areas in detail. The larger ombrotrophic mires (Area 1) formed primarily above elevations of 250mOD, and a smaller basin mire (Area 2) forming at lower levels of between 220m-230mOD. Onsite coring was conducted and the peat assessment report can be found in **Technical Appendix 7.1 (Volume 4)**.

7.52. Findings from the assessment are summarised as follows:

- The results of peat coring indicate that the assessment Area 1 which forms a plateau over the elevated portion of the site is largely devoid of peat (>0.5m depth). There were six isolated / discontinuous peat deposits ranging in thickness from 0.50 – 0.75m, with the largest deposit incorporating an area of 1178m^2.

- Planned access tracks through assessment Area 1 will affect only a very minor portion of peat within the most western boundary of the assessment area, ranging in thickness between 0.60 – 0.65m. Stability risk within this area is considered 'LOW'.
- The results of peat coring within assessment Area 2 indicates a more continuous and homogeneous deposit, extending more than 2,670m^2 and beyond the extent of the assessed area. Peat depth varies more considerably between 0.5 and 1.5m, however the planned access track traverses a corridor of more shallow peat between 0.5 and 0.9m in depth.
- The access track will affect approximately 775m^2 of land comprising these deposits. Stability risk within this area is considered 'MODERATE'.
- Slope stability analysis was carried out for the proposed access route, incorporating surcharge loading for worst case scenario, and for a range of simulations in order to determine a Factor of Safety (FoS) greater than 1.3 for cut slopes. Worst case scenarios were adopted within the models, and the results demonstrate that a final cut slope of 30° up to a depth of 1.0m is achievable for either side of them corridor embankment, even with surcharge and groundwater pressures incorporated into the model.

Overall Evaluation

7.53. The sensitivity is considered to be **High** as there is peat onsite which could be permanently altered by construction activities or chemical impact effects.

Hydrology

7.54. The proposed Application Site and the surrounding area lies within the Hydrometric Area No. 3, Lough Neagh & Lower Bann and the Hydrometric Area No. 2 Lough Foyle (Water Framework Directive) Catchment Areas. The CSA falls regionally and locally within a catchment divide, as illustrated in **Figure 7.1: Appendix 7A, Volume 3**. Regionally, the northern and western portions of the CSA fall within the River Roe catchment which outflows into Lough Foyle approximately 18km northwest of the site. The southern portion of the CSA falls within the regional River Bann catchment, which outflows into the Atlantic through the Barmouth approximately 22km northeast of the CSA.

7.55. Locally, the Core Study Area forms a catchment divide for three catchment areas. The northern catchment forms part of the headwaters to the Castle River catchment. The Castle River eventually forms a tributary to the River Ro approximately 12km to the northwest of the site before outflowing into Lough Foyle. Small areas of land within the western portion of the Core Study Area fall within the Gelvin River catchment, which forms a tributary to the River

Roe approximately 6km west of the site. However, no part of the Development will drain into this catchment.

7.56. The remaining lands occupying the central and southern portions of the CSA fall within the easterly flowing Brackagh Water catchment, and form the largest catchment area within the site extending to approximately 65 hectares. The Brackagh Water forms a tributary to the Agivey River approximately 9km to the east of the site, and eventually forms a tributary to the River Bann approximately 16km northeast of the CSA.

7.57. In terms of onsite drainage, man-made drainage channels were identified throughout much of the CSA, and typically represent hand-dug ditches used to improve land drainage for agricultural purposes. However, it would appear that most of these drainage channels are isolated and poorly networked thus limiting their overall effectiveness, and tend to be very shallow / narrow channels.

7.58. A series of channels have been installed along the roadside periphery of the site, particularly along the northern site boundary, and collect surface water runoff into a series of under-road culverts before allowing freely uncontrolled discharge of waters to flow into the Castle River catchment and associated wet-flush areas.

7.59. In terms of watercourses within the CSA, a number of small semi-natural watercourses were found to drain the eastern and southern portions of the CSA, typically draining into the Brackagh Water towards the southeast. No open or active watercourses were identified within the northern or western portions of the CSA.

7.60. Desk studies have indicated that watercourses within the catchment of Agivey River are suitable for supporting populations of salmon and Brown Trout. Run-off would drain in accordance with the existing surface run-off regimes on site, predominantly towards the southeast of the Development and into the wider Agivey catchment.

7.61. Table 7-12 shows the WFD results for both watercourses which the Development is within the catchment of.

Table 7-12: Brockagh River Waterbody Classification

	WFD Status (Brockagh River)	WFD Status (Castle River)
WFD2018 Invert River Waterbody Class	GOOD OR BETTER	GOOD OR BETTER
Macrophyte River Waterbody Class WFD2018	HIGH	HIGH
Fish River Waterbody Class WFD2018	NO DATA	NO DATA

Diatoms River Waterbody Class WFD2018	GOOD	GOOD
Final Biology River Waterbody Class WFD2018	GOOD	GOOD
DO% Sat River Waterbody Class WFD2018	HIGH	HIGH
SRP River Waterbody Class WFD2018	HIGH	GOOD
pH WFD2018 river waterbody class	HIGH	HIGH
Physico-chem River Waterbody Class WFD2018	HIGH	GOOD
Total Ammonia River Waterbody Class WFD2018	HIGH	HIGH
Other Specific Pollutants River Waterbody class WFD2018	HIGH	HIGH
Final Specific Pollutant River Waterbody Class WFD2018	HIGH	HIGH
Morphology Class WFD2018	NO DATA	NO DATA
Hydrology class WFD2018	HIGH	HIGH
Hydromorphology Class WFD2018	HIGH	HIGH
Ecological Status WFD2018	GOOD	GOOD
Priority Substances (Chemical status) River waterbody Class WFD2018	HIGH	HIGH
Surface Water Status WFD2018	GOOD	GOOD
Surface Water Status + HWMB Ecological Potential WFD2018	GOOD	GOOD

Flooding

7.62. Flood Maps (NI) show that the CSA is located outside floodplains for river and coastal flooding.

Water Supplies

7.63. DAERA drinking water inspectorate mapping was used to identify private water supplies within 5km of the Development, of which there are only two active. They are:

- CG002R – 4.6km North West of nearest wind turbine and in the catchment of the Tower River; and
- CG022 – 3.2km of nearest wind turbine to the south and in the catchment of the Formill River.

Overall Evaluation

7.64. The sensitivity is considered to be **High** as the CSA is within the catchment of two watercourses that are classed as 'Good' overall, as part of the WFD. Also, the Agivey River, which most of the CSA will drain to, is suitable for supporting populations of Salmon and brown trout.

Hydrogeology

Groundwater Body

7.65. The Core Study Area is predominately situated within the Coleraine-Kilrea Groundwater Body area (UKGBNI4NB001). This groundwater body is defined by surface water catchments and the coastline to the north. It is an area of central lowland comprising of predominantly agricultural land with some larger population centres. Depth to water is variable but generally shallow; approximately under 10m.

7.66. Some small northern parts of the Core Study Area are located within the Magilligan Groundwater Body area (UKGBNI4NW001). This groundwater body is defined to the west and south mostly by the geological contact between older Carboniferous and Triassic (Sherwood Sandstone Group) rocks of the adjacent body with younger Triassic (Mercia Mudstone Group) and Palaeogene (basalts) rocks which comprise the majority of the body. The eastern boundaries are defined by the surface water catchment with the northern boundary formed by the coastline. The land rises to the east towards an escarpment and higher ground formed by the basalt. Mainly minor population centres with a dominantly agricultural land use. Depth to water is variable but generally shallow; approximately under 10m.

Bedrock Aquifers

7.67. The site forms an upland recharge zone, particularly where the bedrock is at or near the surface, although groundwater recharge can become impeded as a result of overlying less permeable drift deposits. Overlying glacial till (boulder clay) would generally be considered an aquitard, incapable of transmitting significant quantities of groundwater therefore causing

much of the precipitation falling directly over the site to drain as surface water runoff rather than infiltrating to ground.

7.68. Areas comprising of stoney gravel tend to exhibit shallow immature groundwaters with typically high transmissivity, however groundwater quantities tend to be dependent on the overall size and thickness of these gravel bodies.

7.69. Where overlying peat deposits are present then the groundwater / surface water interactions become more significant. Peat typically has an inherently high-water retention capacity although generally exhibits poor hydraulic conductivity. During high rainfall events the interface between basal saturated peat deposits and less permeable underlying substrates can result in significant groundwater throughflow developing along this boundary.

7.70. The underlying Lower Basalt Formation is considered as a locally important aquifer, although generally highly variable in terms of yield due to inherently poor primary porosity. These aquifers tend to rely on secondary porosity structures such as fractures, faults and joints to transmit groundwater. Therefore, given the nature of groundwater throughflow mechanisms operating within these aquifers then hydraulic conductivity and transmissivity becomes essentially a function of the connectivity of fractures and joint surface networks. Where extensive fracture networks have developed, then significantly higher yields of groundwater can be observed.

7.71. Groundwater yields tend to be higher in the relatively unconfined weathered basalt bedrock surfaces comprising the upper few metres of bedrock. Historically these shallow groundwater systems were exploited by shallow hand dug well excavations for potable supply, however groundwater quality within these shallow systems tends to be variable given the relatively immature nature of the groundwater and the potential pollution from overlying soil profiles as a result of shallow throughflow mechanisms.

7.72. Deeper groundwater systems tend to be confined within these aquifers, and borehole records indicate that these aquifers typically yield only modest quantities of groundwater.

Groundwater Vulnerability

7.73. Given the nature of the thin / discontinuous till deposits and peat formations within the Core Study Area, bedrock tends to be at or near the surface thus exposing groundwater systems to a higher degree of vulnerability. As the underlying bedrock aquifer essentially operates under a fracture-flow regime, any pollutants entering the aquifer can become quickly distributed throughout the local bedrock aquifer area, however the typically confined nature of the aquifer may somewhat limit the downward migration of contaminants. Therefore, aquifer vulnerability classifications vary throughout the Core Study Area, typically ranging from Class 5 (highest vulnerability) to Class 3, all of which classify the bedrock aquifer as high vulnerability. A small area of low vulnerability Class 2 bedrock aquifer is recorded within the northern portion of the Core Study Area.

Groundwater Wells

7.74. A search of the 5km buffer zone from the site was conducted and this showed that there were no groundwater monitoring points or abstraction points within this area. NI Water confirmed that no clean water abstraction points would be affected by the Development.

Overall Evaluation

7.75. The sensitivity is considered to be **High** as the aquifer is locally important and is likely to provide a large proportion of resource to the local river system.

POTENTIAL EFFECTS

7.76. The following section identifies the potential impacts of the Proposed Development upon the geology, hydrology and hydrogeology environment of the CSA and surrounding area.

Do Nothing Scenario

7.77. In the absence of the Development it is likely that the future baseline hydrochemistry conditions for all watercourses within the study will remain relatively constant, and that agricultural practices will continue to contribute to nitrates and phosphates entering the hydrological environment. As well as this, the current vegetation cover will continue to grow in its current manner. In reality though, the Consented Development will likely be constructed which was similar to the Development with a slightly smaller footprint.

Construction Phase

7.78. The construction phase of the Proposed Development will occur over an eight-month period and will include the installation of the access tracks, construction compound, turbine foundations, foundations for the associated buildings and the installation of the wind turbines as well as associated grid connection works.

Geology, Soils & Hydrogeology

7.79. Potential impacts during the construction phase in relation to soil, geology and hydrogeology include:

- Compaction;
- Erosion;
- Excavation; and
- Contamination from spillages and leaks.

7.80. The movement of construction traffic throughout the site has the potential to cause soil compaction, which in turn may impact upon hydrology. Compaction occurs when soil particles are pressed together, reducing pore space. Therefore, this has the potential to result in a reduction in soil permeability and rainfall infiltration, increasing the potential for surface water runoff and erosion. The geology underlying the Development is generally of low permeability and the site has gently sloping topography, therefore the effects of compaction would not result in a significant increase in runoff. The potential for compaction of the soil is considered to be Short Term with a Small Adverse magnitude of impact. Therefore, the potential effect is considered to be Moderate. Mitigation measures will be adopted throughout the construction phase to reduce the occurrence of compaction although it

should be noted that the majority of the construction work and vehicles will take place on the new tracks and crane hardstanding's.

7.81. The drying out of peaty soil can result from alterations to the natural drainage regime. Measures such as the rewetting of peat through controlled irrigation techniques, are considered sufficient, and sufficiently reliable, to avoid substantial alterations to the natural drainage regime, particularly given the shallow nature of soils and absence of peat at turbine locations. As a result, peat is not expected to dry out, beyond what would be the case in the baseline scenario. No substantial impediments to near-surface water flow will be created as the detailed site drainage design will take into account any severance of saturated areas to ensure hydrological connectivity is maintained, in accordance with SEPA / SNH 'Good practice during wind farm construction' in the absence of equivalent NIEA guidance.

7.82. Consequently, effects on soil are considered to be **long term** with a **Negligible** magnitude of impact. Therefore, the potential effect is considered to be **Negligible**.

7.83. Excavations for the Consented Development will be required for the construction of the access tracks, temporary construction compound, substation compounds and cable trenches. The Proposed Development seeks to amend the turbine foundations and carne pad excavation only (as well as the turbine type), which will also be required. Any excavated soil which has been stockpiled within the CSA could be at risk from erosion. There will likely be a large amount of spoil created from the Overall Development which will be used in the regrading of the site, particularly along access tracks and to level off uneven areas, as required.

7.84. The potential for impacts associated with the excavation of the soil is considered to be **Short Term** with a **Small Adverse** magnitude of impact. Therefore, the potential effect is considered to be **Moderate**. Mitigation measures will be adopted throughout the construction phase to reduce the overall impact and these are outlined in the mitigation section of this Chapter. All soil which is stockpiled on site will be managed in order to reduce the risk of erosion.

7.85. Due to the current agricultural land use, it is not anticipated that any contaminated soil will be uncovered during the excavation process. Should any contaminated soil be encountered it will be dealt with as outlined within the Construction Environmental Management Plan, which will be submitted to the council for review, prior to the construction phase of the Development. During the construction phase there is a risk of localised accidental pollution as a result of spillages or leaks of chemicals stored on site or from construction machinery. These accidental spillages may result in localised contamination of soils underlying the site. Should the contaminants migrate through the subsoils, the groundwater vulnerability which differs significantly across the proposed Application Site, has the potential to be impacted.

7.86. The potential impact upon hydrogeology during the construction phase is considered to be **Short Term.** The magnitude of impact is considered to be **Small,** therefore effect significance is considered to be **Slight** prior to the implementation of mitigation measures.

Hydrology

7.87. Potential impacts during the construction phase in relation to hydrology include the following:

- Contamination of surface water from chemical stored and used onsite (including concrete);
- Modification to surface water runoff;
- Impediments to flow;
- Erosion and sedimentation; and
- In water works (culvert construction)

7.88. A number of chemicals will be stored and used onsite throughout the construction phase of the Overall Development, including concrete, fuel and oil. Should these contaminants enter the water environment they have the potential to adversely impact upon water quality.

7.89. Spillages of concrete may occur during the laying of foundations required for the substation and inverter/transformer units. Contamination of surface water may also occur as a result of spillages from routine plant maintenance, improper storage or accidental spillages as outlined above. Should a contamination event occur, there is potential for surface water runoff with pollutant loads to enter the drainage ditches identified within the vicinity of the Application Site.

7.90. In relation to the contamination of local watercourses, the potential impact is considered to be **Short Term** with a **Small Adverse** magnitude of change. Therefore, prior to the implementation of mitigation measures the potential effect is considered to be **Moderate.**

7.91. During the construction phase of the Original Development and the proposed changes there is potential for a slight increase in runoff due to the construction compound. This will reduce the infiltration capacity of the Application Site and will lead to a slight increase in surface water runoff. This will be considered in more detail at the detailed design stage of the Development and surface water storage will be implemented so the greenfield run of rates is maintained.

7.92. There is potential for the release of suspended soils into watercourses throughout the site which could result in an increase in suspended sediment load, resulting in increased turbidity which in turn could affect water quality and fish stocks of downstream surface water bodies.

7.93. In relation to the surface water runoff and sedimentation of local watercourses, the duration of the impact is considered to be **Short Term** and the magnitude of the impact is considered to be **Small Adverse**, prior to the implementation of mitigation measures. The potential effect is therefore considered to be **Moderate.** The construction compound will be reinstated at the end of the construction period. It's important to note that the construction compound was

consented as part of the original application and no changes to this have been made in this application, however it is being included in the impact assessment for completeness.

7.94. During the in-river works for the water crossing, the following pollution risks have been identified:

- Water level rising and overflowing so construction area is inundated.
- Excess silt being washed into the watercourse.
- Oil and fuel entering the watercourse.
- Chemicals entering the watercourse.

7.95. In relation to the these works, the duration of the impact is considered to be **Short Term** and the magnitude of the impact is considered to be **Moderate Adverse**, prior to the implementation of mitigation measures. The potential effect is therefore considered to be **Significant.** Again, it's important to note that the water crossing was consented as part of the original application and no changes to this have been made in this application, however it is being included in the impact assessment for completeness.

7.96. A small part of the CSA has potential hydraulic connectivity to the Smulgedon ASSI to the north of the Core Study Area. It was noted on the site visit that any drainage which flows into the ASSI form the Core Study Area was blocked, however it can't be ruled out that this won't be remediated in the future and therefore the site is considered to have hydraulic connection. Any spillages or contamination from the construction period could therefore potentially impact on this ASSI if the incident takes place within the catchment area for the Castle River.

7.97. The potential impact upon the ASSI during the construction phase is considered to be **Short Term.** The magnitude of impact is considered to be **Moderate,** therefore effect significance is considered to be **Significant** prior to the implementation of mitigation measures.

Operational Period

7.98. The operational phase of the Development will be circa 30 years. During this time, the Development will be generally unmanned and will be monitored remotely. Occasional access will be required for maintenance of the infrastructure.

7.99. The nature of these effects has been discussed in relation to the construction phase. As there would be substantially less activity during operation, and as there is unlikely to be any significant ground disturbance during operation, the magnitude of these effects is similarly reduced.

7.100. Whilst alterations to natural flow pathways will not be introduced during the operational phase, any changes during construction will continue through operation, as the majority of infrastructure will remain in place. Alterations to natural flow pathways will be reduced through adopting good practice design and construction. as set out in the Construction

Environmental Management Plan, which will be submitted to the council for review, prior to the construction phase of the Development.

Geology, Soils & Hydrogeology

7.101. Potential impacts upon geology, soils and hydrogeology during the operational phase are considered to be limited. There will only be occasional visits to the site for maintenance, whereby staff will access the site utilising 4X4 vehicles. Accidental leakages from these vehicles could occur along the access tracks, however this is considered to be insignificant.

7.102. Due to the limited activities onsite during the operational phase of the Development it is considered that the potential impact upon geology, soils and hydrogeology is **Long Term** with a **Negligible** magnitude **and therefore effects are deemed as being of imperceptible significance.**

Hydrology

7.103. The site will be visited occasionally throughout the year for the purpose of infrastructure and ground maintenance, this will include the use of a 4X4 vehicle to gain access to the site and maintenance activities such as cleaning the solar panels. The solar panels will be cleaned by hand with deionised water brought to the site, therefore no potentially harmful contaminants will be discharged to surface water.

7.104. Due to the limited activities onsite during the operational phase of the proposed Development it is considered that the potential duration of impact is **Long Term,** with a **Negligible** magnitude**.** Therefore, the potential effect is considered to be **Imperceptible.**

7.105. During the operational phase of the Development there will be a slight increase in runoff due to the introduction of the foundations, access tracks, hardstanding areas, and substations. This will reduce the infiltration capacity of the Application Site and will lead to a slight increase in surface water runoff. This will be considered in more detail at the detailed design stage of the Development and surface water storage will be implemented so the greenfield run off rates is maintained.

7.106. In relation to the surface water runoff and sedimentation of local watercourses, the duration of the impact is considered to be **Long Term** and the magnitude of the impact is considered to be **Moderate Adverse**, prior to the implementation of mitigation measures. The potential effect is therefore considered to be **Significant.** This application only includes minor changes to the foundations and crane pads and therefore the conclusions of the previous application, which was consented, remain valid.

Decommissioning Phase

7.107. Potential effects of decommissioning the Original Development and the proposed changes are similar in nature to those during construction, as some ground-work would be required

to remove the foundations, access tracks, hardstanding areas, and substations. These effects would be similar to those during construction stage, and would be controlled by an CEMP.

MITIGATION MEASURES

GEOLOGY, HYDROLOGY & HYDROGEOLOGY

7.108. A number of the potential geological, hydrological and hydrogeological impacts identified as a result of the Original Development and the proposed changes are considered to be significant, and therefore the following measures will be required. These best practice pollution prevention and mitigation measures will be outlined in detailed within the CEMP, which will be submitted to the council prior to the construction stage of the Development. Its important to note that the changes to the footprint of the development are minor compared to the original application which was consented. The main purpose of this application is to increase the blade diameter of the wind turbines, which will have no geological, hydrological and hydrogeological impacts.

Waste Management

Storage of Fuels and Chemicals

7.109. As per Best Practice Guidance (BPGCS005),[21] all fuels, oils and chemicals on site will have a secondary containment system of 110% capacity and will be located more than 20m from any watercourse (i.e. outside of the watercourse buffer).

7.110. A bunded diesel bowser will be located inside a fenced off area within the temporary construction compound. Any other chemicals will be stored within a storage container with an accompanying Control of Substances Hazardous to Health ("COSHH") Datasheet in accordance with health and safety regulations. If generators are used on site, these shall be bunded (the bund shall be capable of containing 110% of the fuel tank's capacity). The bund shall be kept empty of water.

7.111. Where chemicals are required on site, they must be placed in an appropriate bund to prevent ground contamination. All chemicals must be stored in a correctly marked container clearly identifying the contents. Where labels are worn off, they must have a new label placed on them or the contents transferred to a correctly marked container. All safety data sheets for all chemicals should be filed on site as part of the Construction Environmental Management Plan (CEMP).

7.112. Spill kits will be on site and, for ease of access, located in the site office. Contingency plans will be in place for dealing with a spillage should a spillage occur.

21 Best Practice Guide BPGCS005 - Oil Storage Guidelines. Available at:

http://www.envirocentre.ie/includes/documents/OilStorageBPG.pdf;

Refuelling

7.113. During construction, fuel and oil deliveries shall take place within the designated refuelling area within the Temporary Construction Compound only, the location of this area will fall outside the watercourse buffers (discussed subsequently). The Contractor shall supervise site deliveries to ensure that the correct amount of material is delivered to the correct tank and the level is checked prior to refilling to avoid spillage.

7.114. Where refuelling of vehicles on site is necessary, the following guidelines will be strictly adhered to:

- Mobile plant will be filled in a designated area, on an impermeable surface well away from any drains or watercourses;
- A spill kit will be stored (and clearly marked) near refuelling areas;
- A bunded tank / bowser will be used with capacity of the bund to be 110% of the fuel storage capacity;
- Vehicles will never be left unattended during refuelling and drip trays should be located under all static plant vehicles;
- Hoses and valves will be checked regularly for signs of wear, and will be turned off and securely locked when not in use;
- Vehicles will not be left running unnecessarily and low emission fuels will be used where possible; and
- Diesel pumps and similar equipment will be checked regularly and any accumulated oil removed for appropriate disposal.

Excavation and Earthworks

7.115. All excavation and earthworks will be carried out in accordance with BS6031:2009 Code of Practice for Earthworks.[22] Soil handling, extraction and management will be undertaken with regard to best practice guidelines such as Guidance on the Waste Management (Management of Waste from the Extractive Industries) Regulations 2012.[23]

7.116. The following practices will be followed in relation to the excavation of cable trenches, topsoil stripping and any other earthworks:

22 British Standards Institute (BSI), 2009. BS 6031:2009 Code of Practice for Earthworks

23 Environmental Protection Agency (EPA) 2012. Guidance on the Waste Management (Management of Waste from the Extractive Industries) Regulations 2012. Available at www.epa.ie

- Any excavated material will be stored and re-used to infill excavations. Where the soil is to be re-used, this will be side casted. All side casted soil to be kept a minimum of 20m from and watercourse.
- Install silt traps at the toe of a slope where excavation or road construction crosses existing drainage. This will reduce silt transportation and to filter out suspended solids in the water caused by excavation works.
- Although unlikely, if any contaminated earth is uncovered, this will be stored separately and disposed of accordingly once the contaminant has been identified.
- Efforts will be made to ensure that water does not accumulate in excavated areas.
- All topsoil and subsoil will be stored separately, and care will be given to ensure the structure and quality of the soil is not damaged.
- The amount of exposed ground and soil stockpiles will be kept to a minimum and any stockpiles in place for an extended period of time will be allowed to re-vegetate naturally.
- Earthworks shall not occur during unsuitable weather conditions, including when soils are waterlogged or very dry.
- The Proposed Development does not propose to change ground levels and only small sections of land are to be regraded around the buildings and possibly at the access track edges; however, this will only be over a few metres.
- Any excavated soil which is not re-used or dispersed across the site and shall be stored on the impermeable surface at the construction compound and covered to prevent silt runoff and dust creation.

Concrete

7.117. Concrete will not be allowed to enter watercourses under any circumstances, and drainage from excavations in which concrete is being poured will not be discharged into existing watercourses without appropriate treatment and consent from the relevant authority. The construction compound will be lined by an impermeable geomembrane and will have a concrete storage location. will be a small pit so that no wet concrete can flow out.

7.118. No washing out of plant associated with concrete delivery operations will be allowed on site.

7.119. Buffers from the site drainage ditches of 50m to the turbines have been incorporated into the design of the Proposed Development and therefore there will be no concrete used within the immediate vicinity of a watercourse.

Pollution Prevention

7.120. Suitable protection for watercourses potentially affected by the works will be installed prior to relevant works proceeding. These measures will be in-line with NIEA Pollution Prevention Guidelines. Protection measures will include:

- Plant and equipment will be stored on dedicated hard standing within the construction compound. This will minimise the risk of pollution caused by leakages occurring out of hours. Drip trays will be used where appropriate;
- All plant and equipment will utilise biodegradable hydraulic oil;
- Spill kits will be readily available to all personnel. The spill kits will be of an appropriate size and type for the materials held on site;
- Diesel fuel will be stored in a bunded diesel bowser which will be located within a fenced off area in the construction compound;
- Refuelling and maintenance of vehicles and plant will take place in designated areas of hardstanding;
- All other chemicals will be stored within a storage contained with an accompanying COSHH Datasheet;
- Wastewater from the temporary staff toilets and washing facilities will be discharged to sealed containment systems and disposed via licensed contractors; and
- Early seeding of embankments near watercourses would be undertaken to reduce the potential for sediment runoff.

7.121. All staff on site will be made aware of the pollution prevention measures being implemented throughout the construction and decommissioning phases using appropriate toolbox talks and the site induction.

Culvert Construction / Existing Culverts

7.122. Runoff from site roads and river crossings can contain high levels of silt, especially during the construction phase. Road drains typically drain to the local water environment so are a pathway for pollution. At all the stages of culvert construction, the contractor will be

contractually bound to follow the relevant pollution prevention guidelines which will include the following mitigation measures:

- Track culvert will be pre cast and not poured in situ, where possible;
- brushing or scraping roads to reduce dust and mud deposits, appropriately disposing of material collected;
- Excavated material should be kept well away from watercourses;
- Putting small dams or silt fencing in artificial roadside ditches to retain silt;
- Working from the bank where possible (taking steps to stabilise the bank during and after works), avoiding working in the river;
- Divert runoff to settlement lagoons; and
- Designed for the 1 in 100-year storm event.

Flood Risk

7.123. Although every effort has been made to design the Proposed Development effectively in relation to possible flood risk, a number of mitigation measures have been proposed which include:

- To alleviate the effects of any limited compaction during the construction process, it is recommended any affected areas will be harrowed prior to being reseeded;
- The long-term management and maintenance for the SUDS scheme, which will be designed at the detailed design stage, will be the responsibility of the site owner and/or operators. These responsibilities will include:

  – Litter/debris removal
  – Grass cutting and removal of cuttings
  – Clearing of inlets, culverts and outlets from debris and sediment
  – Repair of eroded or damaged areas.

Development Drainage

7.124. Development of a detailed Surface Water Management Plan (SWMP) to be implemented prior to the construction phase in order to effectively manage and treat all affected site runoff prior to discharging to local watercourses. The SWMP should consider all phases of the

development and should be designed to remain effective under extreme rainfall conditions and storm event. The SWMP should also provide a maintenance strategy to ensure the integrity of treatment systems.

7.125. It is intended to treat all surface water runoff within the site area prior to discharge into the local drainage network, therefore no impact should occur within any potential receptors such as Smulgedon ASSI. In line with government requirements it will be necessary to submit an application for discharge consent to NIEA and seek approval before any commencement of discharge begins.

7.126. Discharge waters should routinely be monitored for water quality, in line with recommendations and instruction from NIEA, and all results submitted to NIEA for review. Provided that a detailed Surface Water Management Plan is implemented, then all site runoff waters should remain similar in quality to baseline conditions and should be suitable for discharge.

Specific Mitigation Measures for the ASSI

7.127. The following mitigation measures will be implemented to prevent potential hydrological impacts upon SAC and ASSI:

- Handling of hydrocarbons and any potentially polluting chemical will be conducted in a bunded compound with an impermeable ground membrane layer. The compound will be located outwith the catchment of Castle River that converges with the SAC and ASSI;
- Drainage ditches and balancing ponds will be implemented around any excavation works associated with the site entrance and access tracks to reduce the possibility of sediment laden runoff entering the Curley River. The balancing pond at the site entrance will be actively managed to control water levels and ensure that any runoff is contained, especially during times of rainfall;
- Active management of runoff from the access tracks leading to turbines 1 and 2 will reduce the potential of sediment entering Castle River that drains through the River Roe SAC. Measures will include placing semi-permeable obstructions (e.g. straw bales) on the upslope of the tracks and drainage ditches on the downslope. Outfall pipes will drain into a bunded section of the drainage ditch to allow suspended solids to settle. Further measures may include the use of organic flocculent to further facilitate the settlement of suspended solids; and

- Excavation works will not be conducted during heavy or prolonged rain events. This will reduce the possibility of sediment entering groundwater or Castle River, which discharges into the SAC.

7.128. These specific measures, along with best practice and embedded mitigation, will hydrologically disconnect the River Roe SAC and ASSI from the potentially polluting processes of the Development.

RESIDUAL EFFECTS

7.129. The mitigation measures identified throughout this Chapter have been summarised in **Table 7-13** below.

Table 7-13: OCEMP Mitigation Measures

Potential Receptor	Significance	Recommended Mitigation	Residual effects
Construction / Decommissioning Phase			
Compaction and erosion of Soils	Moderate	To alleviate the effects of any limited compaction during the construction process, it is recommended any affected areas will be harrowed prior to being reseeded. Implementation of waste management measures detailed within the mitigation section.	Imperceptible
Drying out of peat	Negligible	Standard peat handling techniques.	Negligible
Erosion of Soils	Moderate	Implementation of waste management measures detailed within the mitigation section.	Imperceptible
Excavation	Slight	Implementation of waste management measures detailed within the mitigation section.	Imperceptible
Contamination from spillages and leaks	Moderate	Implementation of pollution prevention measures detailed within the mitigation section.	Imperceptible

Contamination of surface water from chemical stored and used onsite (including concrete)	Moderate	Implementation of pollution prevention measures detailed within the mitigation section. Construction compound to be impermeable and runoff directed to swale for treatment. Concrete pit within compound. Buffer zones from watercourses.	Imperceptible
Modification to surface water runoff; Impediments to flow; Erosion and sedimentation;	Moderate	Implementation of waste management measures detailed within the mitigation section. Implementation of a Surface Water Management Plan which will be submitted prior to the construction stage. Follow waste management mitigation measures.	Slight
In water works (culvert construction)	Moderate	Implementation of mitigation measures for culvert construction within the mitigation section.	Slight
Impact on adjacent ASSI	Moderate	The Original Development and the proposed changes are to be hydrologically cut off from the ASSI. The construction compound is located	Imperceptible

		out with the catchment of the ASSI.	
Operational			
Contamination from spillages and leaks	Imperceptible	Spill kits to be located within the site during the operational stage	Imperceptible
Increase surface water runoff	Moderate	Implementation of a Surface Water Management Plan which will be submitted prior to the construction stage.	Slight

CUMULATIVE EFFECTS

7.130. It is considered that there will not be any cumulative hydrological effects resulting from the construction of the development with surrounding developments that are either in the planning system, or consented but not constructed, and therefore do not form part of the current baseline.

SUMMARY & CONCLUSION

7.131. The hydrology, geology and hydrogeology assessment has analysed the conditions of the Application Site and surrounding area, assessed the potential impacts of the Proposed Development and recommended mitigation measures where appropriate. The Application Site only covers the wind turbines and their revised crane pads and foundations; however, this statement mostly considers the consented development along with these changes.

7.132. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines.

7.133. An CEMP and Surface Water Management Plan will be submitted prior to the construction stage of the Proposed Development.

7.134. It is considered that due to the nature of the Original Development, the proposed changes and the geology, hydrology and hydrogeology assets located within the Application Site and within close proximity, potential effects will be **slight to imperceptible.**

Chapter 8: Archaeological and Cultural Heritage

8. CULTURAL HERITAGE

INTRODUCTION

Background

8.1. Neo Environmental Ltd has been appointed by Smulgedon Wind Farm Ltd (the "Applicant") to undertake the Cultural Heritage chapter of an Environmental Statement for a proposed amendment (the "Proposed Development") to a consented wind farm (**Planning Reference B/2009/0070/F**) on lands at Smulgedon Hill, BT49 OPY (the "Application Site"). The original consented development ("Original Consent") consists of seven wind turbines of 120.5m to tip. Please see **Figure 8.1: Appendix 8A, Volume 3,** for the layout of the Proposed Development.

8.2. For the purposes of this Environmental Statement (ES) the larger consented development area that constitutes the original wind farm and all associated infrastructure will be referred to as "the Original Application Area".

Development Description

8.3. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all seven turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

8.4. For a full description of the Proposed Development and the various elements, please see **Chapter 1: Introduction** of this Environmental Statement.

8.5. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Site Description & Receiving Environment

8.6. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

8.7. The area that encompass the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

8.8. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

Scope of Assessment

8.9. This Cultural Heritage chapter has been produced to evaluate the cultural heritage assets and archaeological remains relevant to the site, and assess potential impacts that may occur on these resources as a result of the Proposed Development. A previous cultural heritage impact assessment was produced for the proposed wind farm in 2009[1] and was consulted as a basis to produce this updated assessment, including the aforementioned amendments.

8.10. The assessment has been undertaken for the red line boundaries visible on **Figures 8.1 – 8.7: Appendix 8A, Volume 3**, as these areas cover all the proposed amendments to the Original Consent obtained for the Proposed Development. The baseline and impact assessments within this chapter have been done in full for the elements of the Proposed Development within these red line boundaries in order to ensure that the baseline is up-to-date and impacts assessed are comprehensive.

[1] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

8.11. A search of high-grade heritage assets such as World Heritage Sites, Scheduled Monuments (SMs) and Parks, Gardens and Demesnes of Special Historic Interest (PGDSHIs) has been carried out within a 5km study zone around the outer boundary of the Proposed Development, in line with the previous Cultural Heritage Impact Assessment undertaken for the consented wind farm. This study zone allows assets of national significance to be appropriately considered for indirect effects, both on the assets themselves and their settings.

8.12. Architectural heritage assets such as Listed Buildings and Conservation Areas have been assessed within a 2km study zone, as well as non-designated sites such as those within the Northern Ireland Sites and Monuments Record (NISMR), Industrial Heritage Record (IHR), defence heritage and marine heritage. This study zone is in line with previous wind farm assessments produced by Neo Environmental and is considered to be appropriate for assets of regional and local significance. These features are potentially sensitive to visual impacts but not to the same extent as those of national significance.

8.13. Where appropriate, sites of exceptional value or sensitivity outside the 5km and 2km study zones have also been assessed. The aims of the assessment are as follows:

- To identify all known heritage assets within the study zone based on all available public resources;
- To identify the archaeological potential of the Application Site;
- To determine what if any level of recording will be required for any extant remains;
- To assess the significance of any direct or indirect effect of the Proposed Development on cultural heritage assets and their settings and potential archaeological remains within the study zone, from construction through to decommissioning;
- To identify mitigation measures where possible and aid in the design process to reduce the potential effects of the proposed scheme;
- To provide recommendations for any further archaeological/heritage assessment work that should be undertaken as part of the Proposed Development.

8.14. The statement is supported by the following Figures and Technical Appendices:

- Appendix 8A: Figures (Volume 3)
    - Figure 8.1 – Site Location Plan
    - Figure 8.2 – Designated Sites within 5km
    - Figure 8.3 – NISMR within 2km
    - Figure 8.4 – OSNI Historical First Edition Map (1832 – 1846)

- Figure 8.5 – OSNI Historical Second Edition Map (1846 – 1862)
- Figure 8.6 – OSNI Historical Third Edition Map (1900 – 1907)
- Figure 8.7 – Aerial View

- Appendix 8B: Table of Heritage Assets (Volume 4)

Statement of Authority

8.15. The assessment has been conducted in accordance with the appropriate professional guidance outlined in the Codes of Professional Conduct, Institute of Archaeologists of Ireland (adopted April 2006)[2].

8.16. Michael Briggs BSc (Hons) MSc ACIfA MIAI has approximately seven years' experience undertaking a large number of cultural heritage and archaeological impact assessments for developments across the UK and Ireland, with a particular focus on renewable projects, including numerous wind farms and solar farms throughout the Republic of Ireland and Northern Ireland. This experience has included the initial stages of feasibility and heritage impacts through to any final mitigation measures required for each site, such as geophysical surveys and trial trenching. Michael is the sole author of this statement.

8.17. Paul Neary BA H.Dip MA MSc MIEnvSc MIAI ACIFA CEnv was the primary editor of this statement and is dual qualified as a Chartered Environmentalist and Archaeologist. Paul has over 14 years of archaeology and heritage experience, the majority of which relates to Ireland. Paul has worked on large road projects, EIA developments and energy projects across Ireland and the UK. He is licensed to direct archaeology work in the Republic of Ireland and has also held archaeology director licenses in Northern Ireland.

Consultation

8.18. Consultation with the Department for Communities: Historic Environment Division was requested in relation to the methodology for the Cultural Heritage Impact Assessment. The scope and methodology, including the size of study zones, were agreed in principal verbally and no specific issues were raised, but no written response was received. In addition, no particular issues were raised regarding heritage during the pre-application meeting undertaken on the 28th June 2019.

[2] IAI (2006) *IAI Code of Professional Conduct*. IAI

LEGISLATION AND PLANNING POLICY CONTEXT

8.19. This Cultural Heritage Impact Assessment has been considered with regard to all relevant national, regional and local planning policy and guidance:

- Planning Policy Statement 6: Planning, Archaeology and the Built Heritage (1999)[3]
- Strategic Planning Policy Statement for Northern Ireland (SPPS)[4]
- The Planning (Northern Ireland) Order 1991, Part V[5]
- Planning Act (Northern Ireland) 2011, Part 4[6]
- Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995[7]
- The Planning (Listed Buildings) Regulations (Northern Ireland) 2015 (draft version)[8]
- Development and Archaeology: Guidance on Archaeological Works in the Planning Process (2019)[9]
- The Regional Development Strategy for Northern Ireland (2010)[10]
- Northern Area Plan 2016[11]

8.20. The most relevant policy documents to this impact assessment are discussed in more detail below.

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[3] NI Government (1999) Planning Policy Statement 6: Planning, Archaeology and the Built Heritage (revised 2011). NI Government: Belfast.

[4] NI Government (2015) Strategic Planning Policy Statement for Northern Ireland: Planning for Sustainable Development. NI Government: Belfast.

[5] NI Government (1991) The Planning (Northern Ireland) Order 1991. NI Government: Belfast.

[6] NI Government (2011) Planning Act (Northern Ireland). NI Government: Belfast.

[7] NI Government (1995) Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995. NI Government: Belfast.

[8] NI Government (2015) The Planning (Listed Buildings) Regulations (Northern Ireland) 2015 (draft version). NI Government: Belfast.

[9] DfC: HED (2019) *Development and Archaeology: Guidance on Archaeological Works in the Planning Process*. DfC: HED.

[10] Department for Regional Development (2010) *Regional Development Strategy (RDS 2035): Building a Better Future.* NI Government: Belfast.

[11] Department of the Environment (DoE) (2016) *Northern Area Plan 2016: Plan Strategy and Framework*. DoE: Belfast.

Planning Policy Statement 6: Planning, Archaeology and the Built Heritage (1999)

8.21. Planning Policy Statement 6 (PPS 6) is part of a collection of policy statements that have been published at various times that make up the national planning framework for Northern Ireland. PPS 6 was first published in March 1999 and is the current Government policy on the management of change to the historic environment in Northern Ireland, superseding the previous policies SP 15, CON 4, CON 5, CON 6 and CON 7 on archaeology and heritage issues within the Planning Strategy for Rural Northern Ireland (1993). PPS 6 itself is due to be partly superseded by an overall Strategic Planning Policy Statement (SPPS) document which is currently under construction.

8.22. The PPS 6 framework classifies the historic environment as:

"an irreplaceable record which contributes, through formal education and in many other ways, to our understanding of both the present and the past. Their present adds to the quality of our lives, by enhancing the familiar and cherished local scene and sustaining the sense of local distinctiveness which is such an important aspect of the character and appearance of our cities, towns, villages and countryside."

8.23. This document considers heritage assets to be archaeological sites, Listed Buildings, PGDSHIs, Conservation Areas, Battlefields or other aspects of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest. These heritage assets include both designated sites and non-designated sites identified by the Local Planning Authorities and must be a consideration in the planning process due to their heritage interest.

8.24. PPS 6 also clearly states that: *"The function of the planning system is to regulate the development and use of land in the public interest. It has to take account of the Government's objective of promoting sustainable economic growth, and make provision for development to meet the needs of the community."*

8.25. Policies outlined in the document consider both the treatment of the assets themselves and their setting in the landscape, which are the primary material considerations for heritage assets involved in the development planning process. The relevant policies are detailed below.

Policy BH 1 – The Preservation of Archaeological Remains of Regional Importance and their Settings

"The Department will operate a presumption in favour of the physical preservation in situ of archaeological remains of regional importance and their settings. These comprise monuments in State Care, scheduled monuments and other important sites and monuments which would merit scheduling. Development which would adversely affect such sites of regional importance or the integrity of their settings will not be permitted unless there are exceptional circumstances."

Policy BH 2 – The Protection of Archaeological Remains of Local Importance and their Settings

"Development proposals which would adversely affect archaeological sites or monuments which are of local importance or their settings will only be permitted where the Department considers the importance of the Proposed Development or other material considerations outweigh the value of the remains in question."

Policy BH 3 – Archaeological Assessment and Evaluation

"Where the impact of a development proposal on important archaeological remains is unclear, or the relative importance of such remains is uncertain, the Department will normally require developers to provide further information in the form of an archaeological assessment or an archaeological evaluation. Where such information is requested but not made available the Department will normally refuse planning permission."

Policy BH 4 – Archaeological Mitigation

"Where it is decided to grant planning permission for development which will affect sites known to contain archaeological remains, the Department will impose conditions to ensure that appropriate measures are taken for the identification and mitigation of the archaeological impacts of the development, including where appropriate the completion of a licensed excavation and recording of remains before development commences."

Policy BH 5 – The Protection of World Heritage Sites

"The Department will operate a presumption in favour of the preservation of World Heritage Sites. Development which would adversely affect such sites or the integrity of their settings will not be permitted unless there are exceptional circumstances."

Policy BH 6 – The Protection of Parks, Gardens and Demesnes of Special Historic Interest

"The Department will not normally permit development which would lead to the loss of, or cause harm to, the character, principal components or setting or parks, gardens and demesnes of special historic interest. Where planning permission is granted this will normally be conditional on the recording of any features of interest which will be lost before development commences."

Policy BH 11 – Development Affecting the Setting of a Listed Building

"The Department will not normally permit development which would adversely affect the setting of a listed building. Development proposals will normally only be considered appropriate where all the following criteria are met:

(a) the detailed design respects the listed building in terms of scale, height, massing and alignment;

(b) the works proposed make use of traditional or sympathetic building materials and techniques which respect those found on the building; and

(c) the nature of the use proposed respects the character of the setting of the building."

Policy BH 12 – New Development in a Conservation Area

"The Department will normally only permit development proposals for new buildings, alterations, extensions and changes of use in, or which impact on the setting of, a conservation area where all the following criteria are met:

(a) the development preserves or enhances the character and appearance of the area;

(b) the development is in sympathy with the characteristic built form of the area;

(c) the scale, form, materials and detailing of the development respects the characteristics of adjoining buildings in the area;

(d) the development does not result in environmental problems such as noise, nuisance or disturbance which would be detrimental to the particular character of the area;

(e) important views within, into and out of the area are protected;

(f) trees and other landscape features contributing to the character or appearance of the area are protected; and

(g) the development conforms with the guidance set out in conservation area documents."

Strategic Planning Policy Statement for Northern Ireland (SPPS)

8.26. The final SPPS document was published in 2015 in order to facilitate sustainable development across Northern Ireland. The document states that the policy provisions of PPS 6 are retained, and as such the information and objectives within SPPS are supplementary to PPS 6. Of particular note is Section 6.12 within the document, which has been directly referred to within consultation with HED and is part of the reason for this assessment. Section 6.12 states:

"Listed Buildings of special architectural or historic interest are key elements of our built heritage and are often important for their intrinsic value and for their contribution to the character and quality of settlements and the countryside. It is important therefore that development proposals impacting upon such buildings and their settings are assessed, paying due regard to these considerations, as well as the rarity of the type of structure and any features of special architectural or historic interest which it possesses."

The Regional Development Strategy for Northern Ireland (2010)

8.27. The Regional Development Strategy for Northern Ireland deals with the policy strategies for Northern Ireland up to 2035. There are no specific policies regarding heritage within the document but the section relevant to historic environments is *"RG11: Conserve, protect and, where possible, enhance our built heritage and our natural heritage"*, which states that their aim for built heritage is to:

8.28. *"• Identify, protect and conserve the built heritage, including archaeological sites and monuments and historic buildings. Northern Ireland's archaeological sites and monuments provide a tangible link to the distant past, as well as more modern remains. For example, the suite of historic monuments in State Care in the Region ranges from the earliest known dwelling-sites and burial monuments through to twentieth-century fortifications. New discoveries are made every year that contribute to our understanding of the past and its place in the future landscape. Continuing work to identify these built heritage assets, on land, along the coast and within coastal waters helps inform future decisions about development and land-use change.*

8.29. • *Identify, protect and conserve the character and built heritage assets within cities towns and villages. Historic buildings and monuments are key elements of our historic townscape, Conservation Areas, key civic and publicly-accessible buildings, as well as everyday dwellings and shops. If these assets are recognised and managed they can make a positive contribution to regeneration. This will allow the maintenance of craft skills, and the development of a sense of place that can be respected by future development.*

• *Maintain the integrity of built heritage assets, including historic landscapes. Historic sites, buildings and landscapes do not exist in isolation. Their appropriate management and wider integration with their surroundings will help contribute to local character, and ensure that these assets continue to make a valuable contribution to our tourism economy."*

Northern Area Plan 2016

8.30. The Northern Area Plan 2016 was adopted on the 22nd of September 2015 to cover Causeway Coast and Glens Borough Council, Coleraine Borough Council, Limavady Borough Council and Moyle District Council. Within the plan there are two specific policies related to cultural heritage.

Policy ENV 5 – Area of Significant Archaeological Interest

"Within the designated Area of Significant Archaeological Interest, planning permission will not be granted for proposals for large scale development, unless it can be demonstrated that there will be no significant impact on the character and appearance of this distinctive historic landscape. Particular attention will be given to the impact of proposals when viewed from the monuments and other critical viewpoints within the ASAI and on the character of the area experienced while moving in and around its various monuments."

8.31. This policy refers to the area surrounding the Dunluce Castle c. 7.6km to the east of the application site. As the policy refers exclusively to this asset, the large distance it is from the designated area indicates that the Proposed Development will not directly impact upon the asset. Views and intervisibility between the development site and the Area of Significant Archaeological Interest are not likely to be noticeable due to the considerable distance. This policy will therefore not need to be considered further.

Policy COU 2 – The Giant's Causeway and Causeway Coast World Heritage Site

"No development will be approved within the World Heritage Site unless there are very exceptional circumstances directly related to the provision of essential facilities for visitors and which would not be detrimental to the landscape or scientific interest of the Site."

The Giant's Causeway World Heritage Site is located c. 13km to the east-northeast of the application site. As such, the Proposed Development will not impact upon the site and will not need to be considered further. Policies COU 3 and COU 4 are related to this and designate a 'Distinctive Landscape Setting' for the World Heritage Site, within which development is tightly controlled. However, the development site is located many kilometres from this designated setting.

ASSESSMENT METHODOLOGY

Assessment Criteria

8.32. This CHIA has been undertaken in compliance with the aforementioned policy, legislation and guidance. All assessments of significance and impacts have been undertaken in line with the following tables and terminology:

Table 8-1: Grading of the Significance of Cultural Heritage Resources Based on DMRB 2009[12]

Significance	Assessment Considerations		
	Archaeological Remains	Historic Buildings	Historic Landscapes
Very High	• World Heritage Sites • Assets inscribed as of universal importance • Assets that can contribute substantial knowledge to international research	• World Heritage Sites • Structures of recognised international importance	• World Heritage Sites • Historic landscapes of international historic value
High	• Scheduled Monuments/Zones of national importance • Undesignated structures of clear national importance • Designated or undesignated assets that contribute to national research objectives	• Scheduled Monuments/Zones which incorporate standing remains • Grade A Listed Buildings • Some Grade B+ Listed Buildings that have exceptional historic or architectural qualities or associations not adequately reflected in their listing • Some Conservation Areas containing very important buildings • Undesignated assets of clear national importance	• Designated or undesignated historic landscapes of outstanding interest • Historic landscapes of demonstrable national value

[12] Highways Agency (2009) *Design Manual for Roads and Bridges*. Highways Agency.

Medium	• Undesignated assets that contribute to regional research objectives • Scheduled Monuments/Zones compromised by poor preservation or poor survival of contextual associations	• Grade B+ and some Grade B1/B2 Listed Buildings of regional importance • Unlisted buildings containing exceptional qualities in their fabric or historical associations • Conservation Areas containing buildings important to its historic character • Historic townscapes with important historic integrity in their buildings or settings	• Designated historic landscapes • Undesignated historic landscapes showing quality justifying designation
Low	• Undesignated assets of local importance • Assets compromised by very poor preservation or survival of contextual associations • Assets with potential to contribute to local research objectives	• Grade B1/B2 Listed Buildings of local importance • Undesignated structures of modest fabric or historical association • Historic townscapes of limited integrity features within urban areas	• Undesignated historic landscapes of local interest • Historic landscapes whose value is limited by poor preservation or survival of contextual associations
Negligible	• Assets with little or no surviving evidence	• Buildings of no architectural or historical note	• Landscapes with little or no historic interest

Table 8-2: Significance of Direct Effects (Construction Effects)

Magnitude of Impact	Importance of the Heritage Asset			
	High	Medium	Low	Negligible
High	Very Significant	Significant	Moderate	Imperceptible
Medium	Significant	Moderate	Slight	Imperceptible
Low	Slight	Slight	Slight	Imperceptible

Negligible	Not Significant	Not Significant	Imperceptible	Imperceptible

Table 8-3: Significance of Indirect Effects (Operational Effects)

Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Very Significant	Significant	Moderate	Negligible
Medium	Significant	Moderate	Slight	Negligible
Low	Slight	Slight	Slight	Negligible
Negligible	Not Significant	Not Significant	Imperceptible	Negligible

Desk Based Assessment

8.33. The desk-based assessment was conducted to ascertain all historical and archaeological information relevant to the Application Site and the local area. The assessment has been undertaken for the red line boundaries visible on Figures 8.1 – 8.7: Appendix 8A, Volume 3, as these areas cover all the proposed amendments to the Original Consent obtained for the Proposed Development. The baseline and impact assessments within this chapter have been done in full for the elements of the Proposed Development within these red line boundaries in order to ensure that the baseline is up-to-date and impacts assessed are comprehensive.

8.34. Scheduled Monuments, Historic Parks, Gardens and Demesnes (also known as Parks, Gardens and Demesnes of Special Historic Interest), World Heritage Sites and Historic Battlefield Sites were assessed within a 5km study zone, while Listed Buildings, Conservation Areas and sites within the Northern Ireland Sites and Monuments Record (NISMR) were assessed within a 2km study zone. Scheduled Monuments (SMs) in this assessment refer to both Scheduled Historic Monuments (in private ownership) and Monuments in State Care (in public ownership). The size of the study areas ensure that comprehensive and informative data can be collated to characterise the direct and indirect impacts that the Proposed Development may have on historical and archaeological assets within the local area. Due to the nature of the records, some degree of overlap was possible and some assets may have been repeated.

8.35. Historical databases and various archives were consulted to identify the designated assets and undertake the DBA. The main sources which were consulted include the:

- Historic Environment Record of Northern Ireland (previously the Monuments and Buildings Record);
- The Northern Ireland Buildings Database (NIBD);

- The Northern Ireland Sites and Monuments Record (NISMR);
- Register of Parks, Gardens and Demesnes of Special Historic Interest,
- Industrial Heritage Records (IHR);
- Battlesites;
- Defence Heritage;
- GIS Datasets from DfC: HED;
- Ordnance Survey Northern Ireland Historic Maps;
- Public Record Office of Northern Ireland (PRONI);
- Database of Irish Excavation Reports[13];
- Placenames NI; and
- Placenames Database of Ireland.

Map Regression Analysis

8.36. Analysis of historic maps can reveal the changes in landuse and field boundaries in the area and can highlight potential areas of archaeological interest that may have been lost in the subsequent years. Relevant maps were consulted to undertake this analysis as part of the desk-based assessment and site walkover survey.

Aerial Photography and Placename Assessments

8.37. To identify potential archaeological features within the Application Site that are not recorded within the relevant databases, aerial photography of the land was examined in order to identify any cropmarks or markings within the Application Site that may be indicative of previously unknown features.

8.38. Similarly, a placename analysis of the baronies, townlands and parishes containing the land was undertaken, where appropriate, as this can often determine the historical landuse associated with the Application Site even when other evidence of this usage has been lost.

[13] *http://www.excavations.ie/*

Site Visit

8.39. A site visit and walkover survey were conducted at the Application Site in September 2008[14] as part of the original planning application. The aims of the survey were to validate and record the baseline data gathered by the desk-based assessment and identify any potential archaeological or historical features within the Application Site that are not recorded. The results of this survey were considered alongside available information on the known designated and non-designated sites within and close to the Application Site.

Assessment of Construction Phase Effects

8.40. Potential effects during the construction phase are primarily considered as physical disturbance of known or associated archaeological remains. These direct impacts can be caused through the construction processes within the footprint of the Development, including ancillary works such as access tracks. Direct impacts can affect both above ground and subsurface remains, which will both be considered within this assessment.

8.41. The presence and character of any existing archaeological features will be identified within the site boundary, and the archaeological potential of the site assessed through a desk-based assessment of the surrounding archaeological resource and landscape. Direct impacts resulting from the Proposed Development will be considered for all construction elements within the red line boundaries of the application, including the additional ground disturbance resulting from the proposed amendments.

8.42. The significance of any impacts is determined in line with the criteria presented in Tables 8-2 & 8-3 above, by considering the construction methodology within the Application Site and to what extent this would disturb any sub-surface remains.

8.43. The potential for indirect effects during the construction phase will also be considered within this assessment, although they will be temporary in nature.

8.44. A do-nothing scenario will also be considered, involving the appraisal of potential future impacts upon the existing baseline archaeology and heritage in the event of the Proposed Development not progressing and current landuse continuing.

Assessment of Operational Phase Effects

8.45. Potential effects during the operational phase are considered to be primarily derived from visual impacts on heritage assets as a result of the Proposed Development. Assets identified through the sources previously listed were assessed for their significance and magnitude of impacts using the criteria presented in Tables 8-2 & 8-4 above. Visual impacts upon these assets are determined by the views and intervisibility shared with the Proposed Development,

[14] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

as well as the nature, character, date, extent, setting and surviving remains of the feature where relevant. The original Gahan and Long 2009 assessment will be consulted for information purposes, but indirect effects will be assessed in full in order to ascertain that the baseline information is up to date and the amended turbine dimensions are considered.

8.46. Indirect effects of 'moderate' or above are considered significant and appropriate mitigation measures have been recommended where appropriate in order to lower the potential impact.

8.47. The potential for direct effects during the operational phase will also be considered within this assessment, although additional construction activities or ground disturbance are not likely to occur during this phase.

8.48. A do-nothing scenario will also be considered, involving the appraisal of potential future impacts upon the existing baseline archaeology and heritage in the event of the amended wind farm not being constructed and current landuse continuing. Current landuse is considered to be the existing grazing upland area, with heath, unmanaged grasslands and semi-improved grassland present.

Assessment of Decommissioning Phase Effects

8.49. Potential effects during the decommissioning phase will be considered within this assessment. This includes the potential for direct effects via removing infrastructure and reinstating areas, as well as the potential for indirect effects similar to that during the construction phase.

Mitigation Measures

8.50. Mitigation measures will be considered for the reduction or management of any direct or indirect impacts that are assessed as being Moderate Adverse or above. This applies to all stages of the Proposed Development. Mitigation measures for the reduction of indirect effects may include such methods as additional screening through planting vegetation, while mitigation measures for the reduction of direct effects may include a programme of archaeological works in order to safeguard existing or hitherto unknown archaeology or heritage assets.

8.51. Following the implementation of any recommended mitigation measures, resultant impacts may be reduced. This is considered within the residual effects section which follows the proposed mitigation measures.

Cumulative Effects

8.52. Cumulative effects may occur where the combination of separate impacts resulting from different developments build up to be potentially significant. As such, where individual impacts may be minor, they may contribute to a more significant collective impact. Such impacts can be direct or indirect. Cumulative indirect impacts are primarily considered to be visual in

nature and may occur on heritage assets where they act as receptors to more than one development with which they have visibility.

8.53. Heritage assets identified within the CHIA are considered in combination with the Landscape and Visual Impact Assessment (LVIA) within **Chapter 4: Landscape and Visual Impact Assessment** in order to determine any cumulative impacts upon archaeology and heritage assets.

Zone of Theoretical Visibility

8.54. A Zone of Theoretical Visibility (ZTV) was produced to identify sites with a greater potential for being indirectly impacted by the Proposed Development. The ZTV has been overlaid on the heritage assets within the study zones, to identify those that will potentially be visually impacted by the Proposed Development during the operational phase.

8.55. Digital Terrain Modelling sourced from digital height data derived from Ordnance Survey Northern Ireland, with the viewer height set at 2m high was used to calculate the ZTV. The produced ZTV did not account for any elements in the landscape such as trees, hedgerows, walls or buildings that may help screen views, nor account for the influences of the weather upon any views.

Assessment Limitations

8.56. The consulted sources contain records of known archaeological and historic features. The record is not an exhaustive record of all surviving historic environment features and does not preclude the possible existence of archaeological remains of significance within the study zone, which are at present unknown or have been added to the records recently. It was assumed that official data provided by public bodies was accurate and up-to-date.

The Importance of Setting

8.57. Setting can be important to the way in which historic assets or places are understood, appreciated and experienced.

8.58. Where development is proposed it is important to identify and define the setting of the heritage asset and to assess how development might impact upon this resource. Setting often extends beyond the property boundary, or 'curtilage', of an individual historic asset into a broader landscape context. Less tangible elements can also be important in understanding the setting. These may include function, sensory perceptions or the historical, artistic, literary and scenic associations of places or landscapes. In the light of this guidance, development proposals should seek to avoid or mitigate detrimental impacts on the settings of historic assets.

BASELINE CONDITIONS

8.59. The following section outlines the historical and archaeological background within the extent of the study zones and the local area. This provides a clear depiction of the context and significance of the heritage assets that could potentially be impacted by the Proposed Development. The statement outlines an assessment of the direct and indirect effects of the Proposed Development and proposed mitigation measures. The potential for disturbing any remains within the footprint of the Proposed Development has been assessed and recommendations produced for any further investigative work.

Archaeological Period Classifications

8.60. The primary period classifications below provide chronological context for the archaeological assets which are discussed as part of this statement.

- Prehistoric (8000BC – AD400)
- Early Christian (AD400 – AD800)
- Medieval (AD800 - AD1535)
- Post Medieval & Modern (AD1535 onwards)

Archaeological and Cultural Heritage Assets

8.61. The full list of assets identified within their respective study zones is presented within **Appendix 8B, Volume 4**. No recorded assets lie inside the boundary of the Application Site. A total of nine SMs and nine Listed Buildings were identified within the 5km study zone (**Figure 8.2: Appendix 8A, Volume 3**), while 12 sites within the NISMR and four Industrial Heritage Records (IHRs) were identified within the 2km study zone (**Figure 8.3: Appendix 8A, Volume 3**). An assessment of the potential effects upon these assets is contained within this assessment. However, no PGDSHIs, Conservation Areas or World Heritage Sites were identified within their respective study zones.

8.62. The assets identified within the study zones were considered along with the results of previous archaeological work, the site visit and map regression analysis, in order to assess the archaeological potential within the Application Site. These results informed part of the direct effects assessment.

Placenames Assessment

8.63. The Application Site lies within the area known as Smulgedon, which is assumed to be derived from the Irish word smiolgadán which means 'throat' or 'gullet'. No further information could

be discerned regarding the origins of the name, but it is possible that the term was in reference to the significant glacial meltwater feature known as "Legavannon Pot", situated within Smulgedon and directly adjacent to the northeast extent of the Application Site boundary. Assuming the name of Smulgedon is associated with this natural feature, it does not indicate any heightened potential for currently unknown remains within the Application Site.

Map Regression Analysis

8.64. Map regression analysis undertaken in 2008[15] concluded that there were *"no pre-Ordnance Survey maps for the area of the Proposed Development"* and *"no archaeological features are shown in the development area of the Proposed Development on any editions"* of Ordnance Survey historic mapping. These conclusions are considered to remain relevant and accurate to this impact assessment but have been included within a more in-depth analysis below.

8.65. **Figure 8.4** (**Appendix 8A, Volume 3**) contains the OSNI First Edition map of the site (1832 – 1846), while **Figure 8.5** (**Appendix 8A, Volume 3**) shows the OSNI Second Edition map (1846 – 1862) and **Figure 8.6** (**Appendix 8A, Volume 3**) shows the OSNI Third Edition map (1900 – 1907). These maps show the change in landuse and field boundaries in the area and can highlight potential areas of archaeological interest.

8.66. The OSNI First Edition map shows that land within and around the Application Site predominately comprised rough, undeveloped pasture. No features of archaeological significance are discernible within its boundary, although a structure and associated gardens or enclosures are depicted in the area between the two northeastern wind turbines proposed, but outside the Application Site itself. In addition, the Legavannon Pot glacial meltwater feature is clearly discernible to the north of the Application Site.

8.67. The OSNI Second Edition map shows that land within and around the Application Site remained largely undeveloped and uncultivated, primarily due to its upland hilly terrain. However, several field boundaries were constructed which ran through the Application Site. A possible small building and associated field enclosure are also depicted to the southeast of the northwestern proposed turbine. The only other feature of note is the construction of Legavallon Road between the two northeastern wind turbines proposed in an approximate northwest to southeast direction. The structure and associated enclosed areas visible on the First Edition map are also still clearly discernible, now adjacent to Legavallon Road, although no archaeological features of significance can be identified.

8.68. The OSNI Third Edition map shows that land within and around the Application Site remained largely undeveloped. However, there was some degree of development discernible on this map, specifically to the southeast of the Application Site, where a farmstead had been constructed, as well as within the centre of the site where a footpath is depicted connecting Legavallon Road to the small structure to the southeast of the northwestern proposed turbine.

[15] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

Fields surrounding the farmstead to the southeast of the site have had a considerable number of new field boundaries constructed in order to facilitate a more intensive method of farming at this location. No archaeological features of significance are present on the map.

8.69. Since its depiction on the historic maps, the Application Site and its surrounding area have remained largely unchanged. Land use still predominately comprises undeveloped, uncultivated terrain with the exception of the southeast corner which has a series of small fields in agricultural usage. The farmstead in this corner is also intact although it is not known if the original building visible here on the Third Edition map still stands. The structure and associated gardens or enclosures in the area between the two northeastern proposed turbines still appears present as an unroofed ruin, although the structure to the southeast of the northwestern turbine does not appear to have any standing remains.

Site Visit

8.70. A site visit and walkover survey were conducted at the area containing the Application Site in September 2008[16]. The aims of the survey were to validate and record the baseline data gathered by the desk-based assessment and identify any potential archaeological or historical features within the Application Site that are not recorded. The archaeological baseline conditions within the Application Site are not considered to have changed since this survey and as such these results remain relevant. Below is the full entry for the site inspection as per the original statement:

"The site inspection was conducted in September 2008. Weather conditions at the time of the inspection were overcast with light rain. The entire area of the Proposed Development was inspected by a fully qualified archaeologist.

The Proposed Development site is located in an upland area approximately 5miles NE of Dungiven. The site consists primarily of upland grazing with some areas of bog. An inspection of each individual turbine location was conducted. No features of archaeological importance were identified within the areas of the turbine bases.

A general inspection of the remainder of the development area was also conducted. This identified no previously unknown archaeological features within the development area. A substantial, circular dry stone cattle pen was located in the area between turbines 4 and 5 and a derelict cottage was noted to the W of turbine 10.

The known archaeological site LDY 17:03 was inspected and was found to survive as per the description in the SMR."

8.71. It is likely from the above descriptions that these features partially correlate with those mentioned within the map regression analysis above. From the description of its location, it can be confirmed that the derelict cottage refers to the structure in the area between the two

[16] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

northeastern proposed turbines, pre-dating its depiction on the First Edition Map (1832 – 1846). The cattle pen mentioned within the site visit report is likely to refer to the structure/enclosure visible within the centre of the site on the Second and Third Edition maps.

Previous Excavations

8.72. A search of the Database of Irish Excavation Reports[17] identified no previous archaeological fieldwork having been undertaken within or near to the Application Site. The two nearest recorded events are a 2009 programme of monitoring (2009:187) c. 2.5km to northwest of the Application Site[18] and a 2009 programme of test trenching (2009:190) c. 3.3km to the southeast[19]. Neither event encountered any archaeological deposits. As such, the local record of excavations does not indicate any heightened archaeological potential within the Application Site.

[17] https://excavations.ie

[18] https://excavations.ie/report/2009/Derry/0020522/ last accessed 22/10/19

[19] https://excavations.ie/report/2009/Derry/0020525/ last accessed 22/10/19

ASSESSMENT OF EFFECTS

Do Nothing Scenario

8.73. Additional direct or indirect effects on archaeological, architectural or cultural heritage assets are not anticipated to be significant in a "Do Nothing Scenario". Standing remains associated with the derelict cottage and sheep-pen lie outside the confirmed Application Site, while hitherto-unknown sub-surface remains may be impacted over time by natural processes.

Construction Phase

Ground Disturbance and Direct Effects from Construction Methods

8.74. Different levels of intrusion and disturbance are anticipated for different construction elements. As such, the potential for impacting upon sub-surface remains is dependent on the type and scale of each construction element. Construction involving topsoil stripping has, in general, a lower potential for impacting upon sub-surface remains below the archaeological horizon, but retains a similar potential for encountering archaeological remains as construction involving deeper excavation work.

8.75. The main effects during the construction phase would be direct impacts resulting from groundworks required by the proposal, including the excavation for turbine foundations, cable trenches and topsoil stripping required for on-site access tracks and crane pads which fall inside the red line boundary being assessed. The increase in area from turbine foundations and crane pads, relative to the Original Consent, are expected to be insignificant within the context of the overall scale of the consented wind farm development. As such, the additional ground disturbance is considered to be low and will not alter the conclusions made within the Gahan and Long archaeological assessment[20] associated with the Original Consent.

Direct Effects on Known Archaeological and Heritage Assets

8.76. There are no recorded sites within or adjacent to the Application Site that could be physically impacted by the Proposed Development. In addition, no currently unrecorded features of archaeological significance were identified during the baseline analysis. The nearest assets identified are the unrecorded derelict cottage and sheep-pen, which will not be directly impacted from the Proposed Development. As such, **no direct effects upon known archaeological and heritage assets** are anticipated.

[20] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

Archaeological Potential

8.77. Due to the absence of any recorded archaeological or architectural features within the Application Site, the site is considered to have limited potential for features of archaeological significance. The nearest assets identified were the unrecorded derelict cottage and sheep-pen identified during the map regression analysis and site walkover survey. Associated sub-surface remains are considered to be unlikely within the Application Site and any such remains would be expected to be of low significance. No other specific archaeological potential is present within the Application Site. However, the absence of development and cultivation within the Application Site indicates that the land is not likely to have been subjected to significant ground disturbance. Any sub-surface remains present within the site therefore have a potential for good preservation.

8.78. Based on the ground disturbance expected and the predominately low archaeological potential of the Application Site, the potential for the Proposed Development to directly affect hitherto unknown sub-surface archaeology within the red line boundary is anticipated to be **Low**, with the highest potential for impacting upon archaeology occurring during groundworks for the turbine foundations and crane pads.

8.79. As previously mentioned, the increase in area from turbine foundations and crane pads, relative to the Original Consent, are expected to be insignificant within the context of the overall scale of the consented wind farm development. As such, the additional ground disturbance is considered to be low and will not alter the conclusions made within the Gahan and Long archaeological assessment[21] associated with the Original Consent. Nonetheless, the presence of sub-surface remains within the Application Site is currently unknown, specific direct impacts upon the archaeological resource in the absence of any mitigation measures cannot be accurately ascertained but would be expected to be **permanent and irreversible**.

Indirect Effects

8.80. Indirect effects during the construction phase are anticipated to be limited to visual and noise disturbances resulting from the operations of machinery and various construction activities. Impacts arising from this are considered to be **temporary**, lasting only for the duration of the construction schedule, and will occur primarily within the specified daily working hours. Indirect effects upon heritage assets during this phase are therefore not considered to be a concern.

[21] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

Operational Phase

Direct Effects

8.81. As no additional construction or ground disturbance activities are anticipated during the operational phase of the development, **no direct effects** are expected to occur.

Indirect Effects

8.82. The ZTV was overlain onto the heritage assets map in order to identify those which have a greater potential to be visually impacted by the Proposed Development. The ZTV does not account for intervening hedgerows, trees or built structures, which will limit the intervisibility between the building/monument and the Proposed Development.

8.83. Within their respective study zones, a total of nine SMs, eight Listed Buildings (including one B+, three B1, two B2 and two 'record only'), 12 NISMR sites and four IHR sites are located within the ZTV. These assets are therefore assessed for indirect impacts below. Due to the nature and length of the Proposed Development, **all indirect effects assessed upon heritage assets are considered to be adverse/neutral, long-term and reversible**. Individual indirect effects upon each heritage asset have been quantified below.

Scheduled Monuments

Wedge Tomb (NA01)

8.84. This wedge tomb is located c. 1.05km to the north-northwest of the Application Site and is described within the NISMR as:

> *"A cairn 42ft x 30ft, orientated E-W, with a 2-chambered gallery & a large capstone E of the cairn. The 2 chambers are separated by a septal stone & have a backstone. The site now sits in a crater formed by quarry spoil, leaving it 4m below the surrounding quarry. The tomb was excavated in 1937 & finds included sherds of Late Neolithic pottery, worked flints including scrapers, hollow scarpers, knives, a Bronze Age barbed-&-tanged arrowhead (under the septal slab separating the 2 chambers), a leaf shaped arrowhead & small fragments of human bones scattered through the chambers, representing at least 2 skeletons, one male & the other probably female."*[22]

8.85. As a result of the surrounding quarry activity, the visibility and setting of the monument has been considerably compromised. Its heritage value is therefore primarily derived from its sub-surface potential, which previous excavations have revealed to include substantial prehistoric remains. Views and intervisibility with the turbines are expected to be largely restricted by the surrounding quarry spoil, while its sensitivity to visual impacts is somewhat reduced by these significant alterations to its setting. As such, the sensitivity of the wedge tomb to visual impacts

[22] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12012

is considered to be medium while the magnitude of impact is negligible. Indirect effects upon the wedge tomb are therefore anticipated to be **Not Significant**.

Bivallate Rath (NA02)

8.86. The bivallate rath is located c. 1.4km to the southeast of the Application Site. The feature does not have many details recorded for it within the NISMR, but it is described as an Early Christian rath having substantial definable remains and is clearly discernible on modern aerial imagery. The monument is located on an elevated area of rough grazing land and is likely to possess clear views of the surrounding area, particularly to the east where the land drops considerably. These views, combined with the relatively undeveloped surroundings, benefit the heritage value of the rath and its setting. The rath is presumably scheduled due to its surviving earthwork remains and it is considered to be of medium sensitivity to visual impacts. Views and intervisibility with the Proposed Development are expected to be partially screened by forestry along an intervening ridge, but partial views of the blades are likely. At this distance, impacts from such views would be expected to be low in magnitude. Indirect effects upon the rath are therefore anticipated to be **Slight**.

Killeen, Possible Souterrain (NA03)

8.87. This possible Killeen/souterrain is located c. 1.55km to the northwest of the Application Site and is described within the NISMR as:

> *"this site may have been an Early Christian monument, most probably a cashel, which was re-used as a killeen - a burial ground for unbaptised people, particularly infants. It is still regarded by locals as a burial ground even though it has not been used in living memory. The site is presently very over grown with very restricted views in all directions except to the W, as it is set near the bottom of a little valley..."*[23]

8.88. The monument sits within a well-defined local setting which benefits its heritage value. Combined with its historical use, it is considered to be of medium sensitivity to visual impacts. However, the entry notes that views from the asset are very restricted except for to the west. As the Proposed Development is located to the southeast, views and intervisibility between the two area are expected to be very limited. The magnitude of impact is therefore anticipated to be negligible and indirect effects upon the killeen/souterrain will be **Not Significant**.

Rath; King's Fort (NA04)

8.89. The King's Fort, or Ring's Fort, rath is located c. 1.9km to the northwest of the Application Site and is described within the NISMR as:

> *"In a very defensive position on a terrace with extensive views E, S & W. The rath consists of a fairly circular, level interior, 28m x 32m, surrounded by a steep bank running SW-N-NE. There is an impressive ditch following the line of the inner bank & a portion of an outer bank at SE.*

[23] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12010

The bank is 2m high internally, 6m externally & 3m wide, while the ditch is 3-4m wide & 2m. Along the S side there is no bank where the natural slope of the hill falls away steeply."[24]

8.90. As the asset is positioned on the south-facing slope of a hill, it possesses clear views of the landscape to the south. Such views include a series of modern residential and agricultural buildings located along its southern setting c. 200 – 500m away. As such, the local setting of the rath remains undeveloped and contributes considerably to its heritage value. However, the wider setting has been somewhat compromised by the inclusion of modern buildings within its views. Its sensitivity to visual impacts from the Proposed Development at this distance is therefore considered to be low. Nonetheless, clear views and intervisibility with the turbines are expected due to its position on the hillside. The intervening distance will temper the magnitude of impact slightly but this is still expected to be medium. As such, indirect effects upon the rath are anticipated to be **Slight**.

Large Enclosure; Cashel (NA05)

8.91. This large enclosure is located c. 3.35km to the northeast of the Application Site and is described within the NISMR as:

"On a rocky outcrop on the 900ft contour on the edge of Sperrin Plateau. The land drops on E & slopes away gently elsewhere. There are magnificent views N, E & S. The site consists of a large oval enclosure, 69m N-S x 74.7m E-W, defined by a ring of stones approx. 2m wide. Only the base of the wall survives. It is composed of large, loose stones set upright with smaller stones used for packing."[25]

8.92. The views and natural setting of the asset contribute significantly to its heritage value. While the remains of the feature are largely disturbed, the extant stones are set within an upland area with the aforementioned 'magnificent views'. However, views southwest towards the Proposed Development are notably less clear and direct views may be partially restricted by the immediate upland topography. Intervisibility will be possible from many other points within the local area. The asset is considered to be of medium sensitivity to visual impacts resulting from the Proposed Development, while the magnitude of impact is expected to be low due to the intervening distance and the low chance of unrestricted direct views from the asset location. Indirect effects are therefore anticipated to be **Slight**.

Inauguration Stone: Giant's Track, Shane's Leap or St Adamnan's Footprints (NA06)

8.93. This inauguration stone is located c. 3.80km to the east of the Application Site and is described within the NISMR as:

"This stone is marked on the OS 6"maps as "Giant's Track or Shane's Leap". It is set on the edge of an E-facing scarp with good views over Errigal Old Church to E & S, within an area of

[24] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=11998

[25] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=11995

coniferous forest. A path & steps lead to the stone. The stone is a flattish area of natural outcrop 1m wide x 1.6m long, set in the scarp c.3.2m above the ground level to E. A pair of footprints 0.31m long (roughly size 8!), up to 0.04m deep & 0.2m apart are visible, as well as 3 adjacent roughly circular hollows, one of which may represent the "print of the giant's staff" recorded in the OS memoirs. The foot prints are said to be St.Adamnan's & the local king or chief stood in them as part of his inauguration."[26]

8.94. The heritage value of the asset is therefore derived from its physical remains and historical/social importance. Its setting benefits from its proximity to the Errigal Old Church and its aforementioned views thereof, but the wider setting outside this context does not contribute to the asset. In addition, as it is located within an area of forestry, no views or intervisibility are expected to be possible with the Proposed Development. As a result, the sensitivity of the asset to visual impacts from the Proposed Development is low, while the magnitude of impact is negligible. Indirect effects upon the inauguration stone are therefore anticipated to be **Imperceptible**.

Brockaghboy Raths (NA07 – 09)

8.95. The group of three raths at Brockaghboy is located c. 4.15 – 4.6km to the east-southeast of the Application Site and are described as follows within the NISMR:

NA07: "In an excellent position with ground falling to Glen Ullin to N/NW. This is a circular rath, 30m x 32m, enclosed by a revetted bank & an outer ditch, which is at least partially rock-cut & also stone revetted. A gap at N where a field boundary runs upto the bank is probably original as a causeway crosses the ditch here. The bank is flat topped, 5.75m wide, 1.5m high internally & 2m above the ditch, which is 4.1m wide & 0.9m deep."[27]

NA08: "Set approx. 50m NE of another rath, Ldy 026:049, on relatively level ground with fair views. The rath consists of a levellish interior, 25.5m x s 26.7m across, enclosed by a roughly circular bank & ditch with an outer lip/bank. The bank is revetted in places & is 3.1m wide, 0.65m high internally & 1.3m above the ditch, which is 2m wide & 0.7m below the outer lip/bank."[28]

NA09: "In a relatively flat area with higher ground to SE. The site consits of a circular earthern bank enclosing an interior 39.5m x 27.75m. The bank is stone revetted in places. A stone field boundary wall runs across the site close to its W edge."[29]

8.96. The three sites together represent a well-preserved series of Early Christian raths within a shared wider setting. Each asset, including where they offer intervisibility with one another, therefore contributes to each other's heritage value via a group setting. Views of the

[26] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12086

[27] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12359

[28] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12357

[29] https://apps.communities-ni.gov.uk/NISMR-public/Details.aspx?MonID=12358

surrounding landscape are not particularly possible for NA08 and NA09 due to their flatter land and surrounding field boundaries and buildings, but are more possible for NA07. As such, these views contribute somewhat to the setting of NA07 but less so for NA08 and NA09. In addition, each asset is situated within agricultural fields adjacent to modern residential and agricultural buildings within Brockaghboy. The settings of the assets therefore are not considered to be particularly sensitive to visual impacts resulting from development within their wider landscapes, particularly at the distance that the Application Site is located. Nonetheless, the monuments are scheduled for their considerable surviving standing remains and therefore have regional importance. As such, the sensitivity to visual impacts is considered to be medium for NA07 and low for NA08 and NA09, while the magnitude of impact is expected to be low for NA07 and negligible for NA08 and NA09, as views and intervisibility are likely to be screened. Indirect effects upon the raths are therefore anticipated to be **Slight** for NA07 and **Imperceptible** for NA08 and NA09.

Listed Buildings

St Matthew's R C Church (NA10)

8.97. St Matthew's Roman Catholic Church was a listed building located c. 2.65km to the northwest of the Application Site. However, this asset is now described as 'record only' in the database after being de-listed in 2001 due to the lack of original surviving architecture. As a result, the asset is not considered to be sensitive to visual impacts resulting from the Proposed Development. As the turbines will be partially visible from the setting of this asset, the magnitude of impact will be low at this distance, while the sensitivity of the receptor is negligible. Indirect effects are therefore anticipated to be **Negligible**.

Lisnascreghog School (NA11)

8.98. Lisnacreghog School was a listed building located c. 3.05km to the southeast of the Application Site. However, as with St Matthew's Roman Catholic Church, the asset was de-listed in 2015 and is now described as 'record only' in the database due to the building being demolished in the late 1970s and replaced by a modern two-storey dwelling. As such, the asset is no longer present and indirect effects will therefore be **Negligible**.

Listed Buildings within Brockaghboy (NA12, NA17 & NA18)

8.99. The listed buildings within Brockaghboy are located c. 4.3 – 4.55km to the east-southeast of the Application Site. These include the Grade B1 listed 40 Glen Road (NA12), Grade B1 listed St Joseph's Roman Catholic Church and the Grade B1 listed 36 Glen Road (NA18). All three assets are listed for their architectural merit, but NA17 and NA18 also benefit from a group setting with associated features within their curtilage, primarily their graveyard area and outbuildings respectively.

8.100. Views and intervisibility for NA12 and NA17 are expected to be heavily screened by their surrounding built environment and vegetative features. Only very limited intervisibility is likely to be obtainable from points along Glen Road. Views and intervisibility will be similarly

restricted for NA18, although views of the turbine blades may be more possible due to its position set back from Glen Road and on slightly elevated land. The buildings are all Grade B1 listed but their location in proximity to significant modern development indicates that they are not particularly sensitive to visual impacts resulting from development 4.3 – 4.55km away. The sensitivity to visual impacts is considered to be low for NA12 and medium for NA17 and NA18, while the magnitude of impact is expected to be negligible for NA12 and NA17, and low for NA18. Indirect effects upon the listed buildings are therefore anticipated to be **Imperceptible** for NA12, **Not Significant** for NA17 and **Slight** for NA18.

Errigal Bridge (NA13/NA14)

8.101. Errigal Bridge is a Grade B2 listed building located c. 4.35km to the east of the Application Site. It is recorded twice within the database, but this is likely to be a duplication. The bridge is a road bridge of late 18th or early 19th century over the Agivey River. It benefits from its local setting shared with the river, which is well-defined by woodland along its banks. The bridge is therefore somewhat sensitive to visual impacts, but not at the distance that the Application Site lies at. In addition, views and intervisibility with the bridge are expected to be almost entirely screened by the adjacent woodland and its setting will not be affected as a result. Its sensitivity is considered to be low while the magnitude of impact will be negligible. As such, indirect effects upon Errigal Bridge will be **Imperceptible**.

Ballintemple House (NA16)

8.102. Ballintemple House is a B+ listed building located c. 4.45km to the east of the Application Site. It is a two-storey detached house constructed c. 1840 and incorporating an earlier single-storey dwelling (c. 1795). The house is set within its own grounds, which comprises a well-defined setting of associated outbuildings, walls and woodland. This immediate setting is therefore significantly beneficial to the group setting and heritage value of the listing. However, the wider landscape does not contribute to this setting and there is a substantial amount of modern agricultural development located directly across the road, c. 15 – 100m away, which indicates that views beyond its own grounds are not integral to its heritage value.

8.103. Views and intervisibility with the Proposed Development are expected to be heavily screened by its surrounding woodland, and to a lesser extent intervening buildings and forestry to its west. Only limited intervisibility from points on Churchtown Road are expected to be possible with the turbine blade tips, but such intervisibility will not be at all harmful to the setting of the asset at this distance. As such, the sensitivity of the asset to visual impacts from the Proposed Development is low and the magnitude of impact is negligible. Indirect effects upon Ballintemple House are therefore anticipated to be **Imperceptible**.

Northern Ireland Sites and Monuments Record (NISMR)

8.104. There is a total of 12 sites within the NISMR that are within the 2km study zone. These sites can be used to evaluate the potential for archaeological remains within the Application Site, but can also themselves be vulnerable to visual impacts upon their settings in some cases. All

12 sites lie within the calculated ZTV and unscheduled sites are mostly considered to be of local significance and therefore less sensitive to possible visual impacts than those that are scheduled. However, four of these sites are scheduled and have been previously assessed within the relevant section above (NA01/NA21, NA02/NA25, NA03/NA27 and NA04/NA28). As such, these sites are duplicates and do not require reassessment here.

8.105. The enclosure (or cashel) NA19 is located c. 300m to the west-northwest of the nearest turbine. This feature is largely destroyed, containing only trace elements, and is described within the NISMR as:

"This would appear to be the remains of a much destroyed cashel. Set in a very elevated position, on top of a hill with excellent views all round. Little survives of the site at present & no definite limits to the enclosure can be seen."

8.106. The magnitude of impact is expected to be high due to its close proximity to the nearest proposed turbine and its unrestricted views of the Proposed Development in general. However, as the unscheduled feature has been substantially demolished and very little remains of its original composition, it is considered to be of negligible sensitivity to visual impacts. As such, indirect effects upon NA19 are anticipated to be **Negligible**.

8.107. Of the remaining NISMR sites, NA22 – NA24 are considered to be of low sensitivity to visual impacts from the Proposed Development, with a maximum magnitude of impact of medium. As such, indirect effects on NA22 – NA24 are anticipated to be **Slight**. Site NA26 has no confirmed remains at this location and so indirect effects on this feature will be **None**. Sites NA29 and NA30 are considered to be of negligible sensitivity to visual impacts from the Proposed Development at this distance but the magnitude of impact will be medium due to their location on the hillside next to NA04/NA28. Indirect effects upon NA29 and NA30 are therefore anticipated to be **Negligible**.

Industrial Heritage Records (IHR)

8.108. No IHR sites are located within the Application Site, while four sites are located within 2km. These are the two Bridges (NA31 & NA33) and a series of Limekilns by the Limestone Quarries (NA32 & NA34). These sites are of heritage interest due to their contributions to the industrial history of the area and are considered to be of negligible sensitivity to the Proposed Development. As such, while the magnitude of impact is likely to range from high to low, indirect effects are anticipated to be **Negligible**.

Decommissioning Phase

8.109. The potential decommissioning effects that may have an effect upon heritage assets within the study zone include vehicle movements, soil and overburden storage and landscaping. However, as there are no heritage assets identified within the site, it is anticipated that decommissioning effects, both direct and indirect, will be **Imperceptible** upon the heritage

resource. As no additional ground disturbance or visual impacts will occur as a result of the removal of this element, there will be no additional impacts.

MITIGATION MEASURES

Mitigation prior to and during Construction

8.110. There are no recorded sites within or adjacent to the Application Site that could be physically impacted by the Proposed Development. In addition, no currently unrecorded features of archaeological significance were identified during the baseline analysis. The nearest assets identified are the unrecorded derelict cottage and sheep-pen, which will not be directly impacted from the Proposed Development. As such, **no direct effects upon known archaeological and heritage assets** are anticipated and therefore no mitigation measures are considered to be necessary in relation to this.

8.111. Due to the absence of any recorded archaeological or architectural features within the Application Site, the potential for the Proposed Development to directly affect hitherto unknown sub-surface archaeology across the site is anticipated to be **Low**, with the highest potential for impacting upon archaeology occurring during groundworks for the access tracks and turbine foundations. However, as the presence of sub-surface remains within the Application Site is currently unknown, specific direct impacts upon the archaeological resource in the absence of any mitigation measures cannot be accurately ascertained but would be expected to be **permanent and irreversible**.

8.112. The implementation of an archaeological programme of works will ensure that any hitherto unknown sub-surface remains are sufficiently recorded and, if necessary, protected *in-situ*. Such an archaeological programme of works could include the monitoring of topsoil stripping required for access tracks and excavations required for the turbine foundations, as these are the construction elements with the highest potential for ground disturbance. Any archaeological work required will be at the discretion of Causeway Coast and Glens Borough Council and the Department for Communities: Historic Environment Division (DfC: HED).

Mitigation by Design

8.113. Operational impacts upon the surrounding heritage assets have been assessed as overall **Slight Adverse** or below. Due to the nature of the Proposed Development it is not possible to mitigate all potential visual impacts but the design has endeavoured to choose a location that avoids known archaeological remains and reduce visual impacts.

8.114. Although visibility of the surrounding landscape is relatively restricted, some mitigation measures have been proposed within the Landscape and Visual Impact Assessment (see **Chapter 4: LVIA**) for the overall proposed wind farm. This includes the replacement of any hedgerow, trees or scrub planting that may be lost to accommodate the required site works, as well as additional mitigation planting and the maintenance and rotational cutting of new planting in order to help thicken them out and retain their height. These measures will also

ensure that the potential for the Proposed Development to impact upon surrounding heritage assets is kept minimal.

RESIDUAL EFFECTS

Construction Phase

8.115. No direct effects upon known archaeological and heritage assets are anticipated as a result of the Proposed Development and so residual direct impacts upon known assets will also be **None**.

8.116. The potential for the Proposed Development to directly affect hitherto unknown sub-surface archaeology across the site is anticipated to be Low. Specific direct impacts upon the archaeological resource in the absence of any mitigation measures cannot be accurately ascertained but would be expected to be **permanent and irreversible**.

8.117. Following the implementation of an appropriate archaeological programme of works, including monitoring of topsoil stripping required for access tracks and excavations required for the turbine foundations, measures will be in place for the full recording or preservation of any sub-surface remains of significance that are identified within the Application Site. This would ensure that residual direct impacts upon hitherto-unknown sub-surface archaeology would be **Not Significant** or **Imperceptible**. In addition, the changes in ground disturbance resulting from the proposed amendments to the Original Consent are not considered to be significant enough to invalidate the conclusions from the archaeological assessment[30] associated with the Original Consent.

Operational Phase

8.118. During the operational lifetime of the Proposed Development it is anticipated that maintaining the hedgerow screening effects present at the Application Site will ensure indirect effects upon the settings and views of the surrounding heritage assets remain at **Slight Adverse and Reversible**. This requires the maintenance of the existing vegetative screening, as well as additional mitigation planting proposed as part of the LVIA.

Decommissioning Phase

8.119. The potential decommissioning effects that may have an effect upon heritage assets within the study zone include vehicle movements, soil and overburden storage and landscaping. However, as there are no recorded heritage assets identified within the site and no additional groundworks on previously-undisturbed land is expected during this stage, it is anticipated that decommissioning effects will result in **Imperceptible** effects upon the heritage resource.

[30] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

CUMULATIVE EFFECTS

8.120. Cumulative effects may occur where the combination of separate impacts resulting from different developments build up to be potentially significant. As such, where individual impacts may be minor, they may contribute to a more significant collective impact. Such impacts can be direct or indirect; however, as no recorded assets are present within the Application Site, **no cumulative direct effects** are anticipated upon known assets. In addition, cumulative impacts upon hitherto-unknown archaeological remains within the site will be sufficiently mitigated by the implementation of the aforementioned mitigation measures.

8.121. Cumulative indirect impacts are primarily considered to be visual in nature and may occur on heritage assets where they act as receptors to more than one development with which they have visibility. Wind farm developments within 10km of the Proposed Development and single turbine developments within 5km of the Proposed Development are summarised **in Tables 8-4 & 8-5** below.

Table 8-4: Wind farm developments within 10km of the Proposed Development

PLANNING REFERENCE	PLANNING STATUS	DESCRIPTION	DISTANCE
LA01/2018/0200/F	Under Consideration	Construction of a wind farm comprising 9 no wind turbines (maximum 149.9mto blade tip) and associated infrastructure.	9.97km
LA01/2017/1654/F	Under Consideration	Construction of a wind farm comprising 6 no. wind turbines (maximum 149.9 metres to blade tip), an electrical substation / control building, energy storage area, construction compound, junction improvements.	6.31km

LA01/2017/1124/F	Pending	Proposed amendment to the overall tip height of the consented Craiggore Wind Farm (B/2012/0268/F)	0.98km
LA01/2016/0315/F	Withdrawn	Amendments to consented Brockaghboy No 2 Wind farm (H/2014/0241/F)	4.77km
LA01/2016/0061/F	Permission Granted	Construct a three turbine extension to the operational Dunbeg Wind Farm (consented under PAC REF. 2009/A0363 to planning reference B/2007/0560/F)	4.02km

Table 8-5: Single turbine developments within 5km of the Proposed Development

Planning Reference	Planning Status	Description	Distance
LA01/2015/1005/F	Application Withdrawn.	640m NE of 27 Peters Road, Limavady. Proposed single wind turbine on a 60m hub with 50m blade diameter, giving 85m tip height.	
LA01/2015/0670/F	Permission Granted	697m NE of 31 Drumhappy Road, Dungiven. Relocation of wind turbine previously approved under planning ref: B/2011/0063/F. Turbine to have a	

		40m hub height and a 39m rotor diameter.	
LA01/2015/0271/F	Application Withdrawn	lands 265m North East of 15 Peters Road, Dungiven. Erection of single wind turbine – 40m hub height with 27m blade length, associated access and 2 no electricity cabinets.	
B/2014/0252/F	Application Withdrawn	697m NE of 31 Drumhappy Road, Dungiven. Change of wind turbine previously approved under planning ref: B/2011/0063/F to EWT with 50m hub height and 54m rotor diameter	
B/2013/0232/F	Permission Granted	Approx 200m south east of 197 Legavallon Road, Dungiven. Erection of a 225kW wind turbine with a tower height of 31 metres.	
B/2012/0291/F	Application Withdrawn	240m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind turbine with hub height of 40m on site of existing quarry.	
B/2012/0290/F	Permission Granted	340m North 60 Kilhoyle Road, Limavady. Erection of 1 No. 250kW wind	

		turbine with hub height of 40m on site of existing quarry.	
C/2013/0402/F	Permission Granted	461m South/South East of 49 Gortnamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a max output not exceeding 250kW.	
C/2012/0477/F	Application Withdrawn	517m south south east 49 Gornamoyagh Road, Garvagh. Proposed erection of a wind turbine with a 40m hub height and a 30m rotor diameter with a maximum output not exceeding 250kW.	
C/2010/0442/F	Permission Refused	292m North East of 247 Legavallon Road, Garvagh. Proposed A29 225kW wind turbine, with 30m hub	

8.122. Cumulative visual effects have been assessed in detail within **Chapter 4: Landscape and Visual Impact Assessment**. The assessment states:

"There are a significant number of other wind farms within the study area and also in adjacent areas, particularly Inishowen, near Derry and to the east. Altahullion and Rigged Hill are long-standing developments and wind farms have become common and recognisable landscape features in this study area and the wider landscape. The Development only increases this perception over a relatively small part of the study area and is unlikely to alter the overall perception of wind farms in relation to landscape and visual character."

8.123. As cumulative landscape and visual effects are expected to be limited as a result of the Proposed Development, cumulative indirect effects upon the surrounding heritage assets previously identified are also anticipated to be **Slight adverse** and **short-term reversible** in nature.

SUMMARY & CONCLUSION

8.124. All potential direct and indirect effects upon designated and non-designated heritage assets within the study zones have been assessed through appropriate methods.

8.125. It is anticipated that during the construction phase the Proposed Development will have **no direct effects** on known assets. In addition, the potential for the Proposed Development to directly affect hitherto unknown sub-surface archaeology across the site is anticipated to be **Low**, with the highest potential for impacting upon archaeology occurring during groundworks for the turbine foundations and crane pads. However, as the presence of sub-surface remains within the Application Site is currently unknown, specific direct impacts upon the archaeological resource in the absence of any mitigation measures cannot be accurately ascertained but would be expected to be **permanent and irreversible**. With the implementation of an archaeological programme of works, including monitoring of topsoil stripping required for access tracks and excavations required for the turbine foundations, residual direct impacts upon hitherto-unknown archaeology would be anticipated to be **Not Significant** or **Imperceptible** as any sub-surface remains encountered would be sufficiently recorded and, if necessary, protected *in-situ*. In addition, the changes in ground disturbance resulting from the proposed amendments to the Original Consent are not considered to be significant enough to invalidate the conclusions from the Gahan and Long archaeological assessment[31] associated with the Original Consent.

8.126. During the operational phase, no further ground disturbance or direct effects on heritage and archaeology will occur, while the Proposed Development is anticipated to have overall **Slight Adverse** indirect effects on designated and non-designated heritage assets and their settings within the study areas. These effects would be **long-term and reversible** in nature and, as they will not result in substantial harm to any heritage assets, no mitigation measures are considered to be necessary for indirect effects.

8.127. During the decommissioning phase, as there are no heritage assets identified within the site, it is anticipated that decommissioning effects, both direct and indirect, will be **Imperceptible** upon the heritage resource. As no additional ground disturbance or visual impacts will occur as a result of the removal of this element, there will be no additional impacts.

Compliance with Relevant Policies

8.128. The Proposed Development has been considered in relation to national and LPA policies throughout the design process by consulting with the LPA. The development has been assessed in compliance with guidance set out in PPS 6 (1999) insofar as possible. Project design has been undertaken with sustainability at its core and seeks to limit the impact on the built heritage and archaeological remains in the area.

[31] Gahan and Long (2009) Technical Appendix A10: Cultural Heritage, Annex 1: Archaeological Impact Assessment Report, in *Smulgedon Wind Farm Environmental Statement.*

8.129. The proposed changes to the Consented Project are not anticipated to substantially impact any heritage assets, known or unknown, or their settings. Therefore, it will not significantly affect the assets or their settings and complies with the policies and guidance set out within the PPS 6 and the Northern Area Plan 2016.

8.130. This assessment has been conducted to meet the criteria set out in PPS 6 (1999), the DfC: HED and the IAI, and has been conducted to the relevant standards and taken appropriate consideration of the setting of the heritage assets.

Chapter 9: Noise and Vibration

9. NOISE & VIBRATION

INTRODUCTION

9.1. A noise and vibration assessment was completed to identify and describe any likely significant noise and vibration effects on key receptors during the operational, construction, and decommissioning phases of the proposed wind farm development approximately 9km to the north east of Dungiven and 8km west of Garvagh in County Londonderry, Northern Ireland

9.2. The nature of works and distances involved in the construction of a wind farm are such that the risk of significant effects relating to ground borne vibration are very low. Occasional vibration effects relating to the construction period and heavy vehicles manoeuvring at short distances to receptors can arise, but again this is not sufficient to constitute a risk of significant effects in this instance and should be considered as negligible.

9.3. In order to assess the potential noise effects of the Proposed Development, this report identifies the current baseline characteristics of the Application Site and the surrounding area, as well as the predicted impacts. This allows for the identification of potential noise effects and a recommendation of mitigation measures where appropriate.

9.4. This chapter of the Environmental Statement is supported by the following Figures and Technical Appendices:

- Appendix 9A – Figures (Volume 3)
  - Figure 9.1: Noise Assessment Map
- Appendix 9B: Wind Turbine Noise Document (Volume 4)
- Appendix 9C: Construction Noise (Volume 4)

Project Description

9.5. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as

they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

9.6. For a full description of the Proposed Development and the various elements, please see **Chapter 1: Introduction** of this Environmental Statement.

9.7. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Statement of Authority

9.8. This Chapter has been produced by Michael McGhee of Neo Environmental. Having completed a civil engineering degree in 2012, Michael became a technician member of the Institute of Acoustics is 2013 and has since worked on over 100 noise impact assessments, ranging from solar and wind farms to large scale residential developments across the UK and Ireland.

Consultation

9.9. Please refer to **Table 9-1** for all consultee responses received in relation to the noise and vibration effects of the Proposed Development.

Table 9 - 1: Consultees

Consultee & Date	Summary of Response	Addressed within ES
Cathy McKeary (Senior Executive Planner, Meath County Council); 18th June 2019	Need to outline full cumulative noise impact of the development with adjacent turbines and wind farms. Agreed that existing baseline noise levels could be used.	These matters have been fully addressed within this Chapter

LEGISLATION, POLICY & GUIDANCE

9.10. The development has been assessed against existing national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance:

National Policies & Guidance

- The Planning Service of Northern Ireland, Renewable Energy: Wind Farm Developments, Information Leaflet[1];
- Strategic Planning Policy Statement for Northern Ireland[2]
- Planning Policy Statement (PPS) 18: Renewable Energy[3]
- Noise Policy Statement for Northern Ireland[4]
- ETSU-R-97 (ETSU)[5]
- Institute of Acoustics Bulletin Vol.34[6]
- A Good Practice Guide to the Application of ETSU-R-97 for Wind Turbine Noise Assessment (GPG)[7]
- ISO9613-2 Method for Rating Industrial noise affecting mixed residential and industrial areas[8];

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[1] The Planning Service of Northern Ireland, Information Leaflet, Renewable Energy: Wind Farm Developments, 2008

2 Department of the Environment, Strategic Planning Policy Statement for Northern Ireland (September 2015). Available at: http://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf

3 Department of the Environment, Planning Policy Statement 18: Renewable Energy (August 2009). Available at https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18_renewable_energy-2.htm

4 Department of the Environment, Noise Policy Statement for Northern Ireland (2013). Available at: https://www.daera-ni.gov.uk/sites/default/files/consultations/doe/corporate-consultation-noise-policy-statement-for-northern-ireland-2013.pdf

5 DTI ETSU-R-97 The Assessment and Rating of Noise from Wind Farms, September 1996

6 Institute of Acoustics 2009 Acoustics Bulletin Vol 34, March/April 2009

7 Institute of Acoustics (2013) A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise, May 2013.

8 ISO9613-2 Method for Rating Industrial noise affecting mixed residential and industrial areas

- BS5228 Code of practice for noise and vibration control on construction and open sites[9].

Assessment of Relevant Policies, Guidance & Legislation

Strategic Planning Policy Statement for Northern Ireland

9.11. The Strategic Planning Policy Statement for Northern Ireland (SPPS) is a statement of "the Department's policy on important planning matters that should be addressed across Northern Ireland."

9.12. Section 4 of the SPPS outlines Core Planning Principles, one of which is to Safeguard Residential and Work Environs. Paragraph 4.11 states that there are a range of environmental and amenity considerations which need to be taken into account by planning authorities when proposing policies or managing development, including potential noise impacts. The planning system has a key role to play in minimising adverse potential impacts in relation to noise on sensitive receptors by means of its influence on the location, layout and design of new developments.

9.13. Annex A of the SPPS sets out guidance on 'Managing Noise and Improving Air Quality'. It describes that in managing development, planning authorities should treat noise as a material consideration in the determination of planning applications likely to give rise to significant levels of noise. Planning authorities should seek to reach balanced decisions that consider noise issues alongside other relevant material considerations, including the wider benefits of the particular proposal. As outlined within Annex A, "*planning authorities should pay due regard to the Noise Policy Statement for Northern Ireland, as it seeks to set clear policy aims to enable decisions to be made and will ensure appropriate inter-relationships between the planning system and what is an acceptable noise burden to place on society*."

PPS 18: Renewable Energy

9.14. PPS 18 was published as a consultation paper in November 2007, and provides guidance to local authorities on policy matters relating to renewable energy developments. In terms of noise, it states:

"Well designed wind farms should be located so that increases in ambient noise levels around noise-sensitive developments are kept to acceptable levels with relation to existing background noise. This will normally be achieved through good design of the turbines and through allowing sufficient distance between the turbines and any existing noise-sensitive development so that noise from the turbines will not normally be significant. Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be completely masked by wind-generated background noise."

9 British Standards Institute (2014) Code of practice for noise and vibration control on construction and open sites Part one, British Standard 5228, Feb 2014

9.15. In terms of noise from wind turbines, it describes its character and sources, and states that ETSU-R-97 should be used in the assessment process. It also states that there is no evidence that ground transmitted low frequency noise from wind turbines is at a sufficient level to be harmful to human health.

9.16. The supplementary guidance for PPS 18 states:

"Well designed wind farms should be located so that increases in ambient noise levels around noise-sensitive developments are kept to acceptable levels with relation to existing background noise. This will normally be achieved through good design of the turbines and through allowing sufficient distance between the turbines and any existing noise-sensitive development so that noise from the turbines will not normally be significant. As a matter of best practice for wind farm development, the Department will generally apply a separation distance of 10 times rotor diameter to occupied property (with a minimum distance of not less than 500m). In applying this separation distance, any significant impact on sensitive noise receptors should be minimised, particularly with the increasing number of proposals for turbines in excess of 100 metres in height. Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be masked by wind-generated background noise. "

Noise Policy Statement for Northern Ireland

9.17. The Noise Policy Statement (NPSNI) provides advice and information of the effective management and control of environment, neighbour and neighbourhood noise. The objectives of the NPSNI should be interpreted by having regard to the set of shared principles that underpin the Executive's Sustainable Development Strategy.

9.18. Furthermore, the broad aim of noise management has been to separate noise sources from sensitive noise receptors and to 'minimise' noise. Taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise 'as far as reasonably practical'.

9.19. NPSNI sets out three key policy aims. These are:

- *Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise.*
- *Mitigate and minimise adverse impacts on heath and quality of life from environmental, neighbour and neighbourhood noise.*
- *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise.*

9.20. The application of the NPSNI should mean that noise is properly taken into account at the appropriate time. In addition, the application of the NPSNI should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In determining applications, the planning system aims to reach balanced decisions and controls must avoid placing unreasonable restrictions on development or adding unduly to the cost and administrative burdens of businesses. This will often result in conditions being applied to planning consents for new development or change of use proposals in order to mitigate excessive noise impacts.

9.21. In addition, the NPSNI should be referred to in situations where there is no guidance or standards on the particular noise situation.

ETSU-R-97

9.22. ETSU-R-97 provides a framework for the assessment and rating of noise from wind energy developments. It has become the accepted standard for wind farm developments in the UK, and the methodology has therefore been adopted for the present assessment.

9.23. ETSU-R-97 recommends the application of noise limits at the nearest noise-sensitive properties, to protect outside amenity and prevent sleep disturbance inside dwellings. Noise from wind turbines and background noise both typically vary with wind speed. According to ETSU-R-97, wind farm noise assessments should therefore consider the site-specific relationship between wind speed and background noise, along with the particular noise emission characteristics of the proposed wind turbines.

METHODOLOGY

Study Area

9.24. The receptors were taken from the Residential Receptor Map, submitted as part of the Further Environmental Information (FEI) documents as part of the original application. This map has been updated taking into account all new receptors which have been build or submitted to planning since the original application. A map showing all the receptors assessed can be viewed on **Figure 9.1: Appendix 9A, Volume 3**.

Field Surveys and Baseline

9.25. A site visit was undertaken on the 27th January 2020 to help the identification process for the receptors. A number of the receptors weren't visible form the public roads, however most of them were confirmed during this site visit.

9.26. Baseline noise levels from the original submission have been used in the assessment, as agreed with the council in the pre application meeting. However, they have been updated to take into account the difference in wind shear from the turbines being located on smaller towers. The guidance in the Good Practice guide has been followed, with the mean wind shear being determined from three years of wind speed data measured at multiple heights by a mast with the wind farm site area.

9.27. The Good Practice Guide recommends measuring wind speeds at two heights, H1 and H2, H1 being not less than 60% of the proposed turbine hub height and H2 being between 40% and 50% of proposed hub height. For each ten-minute period the mean wind speed measured at height H1 should be corrected to hub height using a specified procedure, which takes account of the wind shear conditions occurring during that 10-minute period. The calculated hub height wind speed is then corrected to 10m height using the procedure specified in BS EN 61400- 11:20033 Section 8.1, which applies a standardised wind shear profile. This allows for the effects of variations in the wind shear characteristics between the site of the proposed turbines and the site on which noise emissions were measured to be eliminated.

9.28. Using this methodology **Tables 9.2 and 9.3** show the baseline noise levels deduced from the baseline survey for both the quiet day time and the night time periods, at each of the baseline noise monitoring locations. The locations of the baseline monitoring locations can be found on **Figure 9.1: Appendix 9A, Volume 3**.

Table 9 - 2: Quiet Day Time Noise Limits

MONITORING LOCATION	QUIET DAY TIME HOURS AT MEASURED 10M HEIGHT (WIND SPEED = M/S)									
	3	4	5	6	7	8	9	10	11	12

A	26.0	27.3	28.8	30.5	32.3	34.3	36.5	38.7	41.0	43.2
B	27.9	28.9	30.2	31.9	33.9	36.2	38.8	41.5	44.2	46.6
C	29.1	30.2	31.8	33.6	35.7	37.8	40.1	42.3	44.4	46.2
D	29.9	30.7	31.7	32.9	34.3	35.8	37.4	39.1	40.7	42.2
E	37.5	37.5	37.5	37.5	38.9	40.7	42.9	45.2	47.7	50.3
F	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9

Table 9 - 3: Night Time Noise Limits

Monitoring Location	Night Time Hours at Measured 10m height (Wind speed = m/s)									
	3	4	5	6	7	8	9	10	11	12
A	22.7	24.0	25.5	27.0	28.5	30.3	32.4	35.2	38.6	42.2
B	26.1	27.7	29.2	30.2	31.1	32.4	34.3	37.4	41.6	46.3
C	23.7	24.8	26.6	28.9	31.4	34.2	37.0	39.7	42.3	44.4
D	27.3	28.0	29.0	30.2	31.6	33.2	34.9	36.7	38.6	40.4
E	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
F	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5

Evaluation Methods

Construction Stage

9.29. BS 5228:2009: A1:2014 ("BS 5228") refers to the need for the protection against noise and vibration of persons living and working in the vicinity of and those working on construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations.

9.30. The standard stresses the importance of community relations, and states that early establishment and maintenance of these relations throughout site operations will aid in allaying people's concerns. In terms of neighbourhood nuisance, the following factors are likely to affect the acceptability of construction noise:

- Site location, relative to the noise sensitive premises;
- Existing ambient noise levels;
- Duration of site operations;

- Hours of work;
- The attitude of local residents to the site operator; and
- The characteristics of the noise produced.

9.31. The Applicant has provided details of the numbers and types of plant likely to be employed during construction of various phases of the development, together with the likely noise emissions of the plant (as stated in BS 5228-2009), and their 'on-time' and minimum distances from each stage of construction to the closest noise-sensitive receptors. These factors have been used to calculate worst-case levels of construction noise for each stage of construction, following the procedure described in BS5228-2009.

Operational Stage

9.32. As the Proposed Development is not yet constructed, it was not possible to complete an onsite survey to measure the actual source noise levels on site. Therefore, the predicted impacts were calculated using source noise data from the manufacturer of the noise emitting equipment.

Modelling Noise Propagation

9.33. ETSU-R-97 does not demonstrate a method to predict the immission levels at the nearest residential properties, although demonstration of this is required as part of any planning application. The recommended standard for wind turbine noise propagation highlighted in the Good Practice Guide is ISO 9613-2. This method can be used to obtain realistic and even conservative predictions of noise from a wind turbine during favourable propagation conditions (i.e. downwind or temperature inversions). This is only the case if the appropriate choice of input parameters and limited corrections are made: in particular, avoiding the use of 'soft ground' factor and avoiding the effects of terrain screening.

9.34. The ISO 9613-2 algorithms take their acoustic input data from the octave band sound power output of the turbines. This allows for the calculation - on an octave band basis - of the attenuation due to geometric divergence, atmospheric absorption and ground effects.

9.35. Note that 2dB(A) is then subtracted to account for the use of LA90,10min rather than LAeq,10min.

Turbine Source Noise Data

9.36. The Applicants chosen turbine (Enercon E-92) has been considered within this report, with a copy of the manufacturer's noise emission data sheet for this turbine included in **Appendix 9B, Volume 4**.

9.37. When using a ground factor of G = 0.5 as in this assessment, sound power levels should incorporate an allowance for measurement uncertainty. The following outlines data types which can be used, with guidance on accounting for uncertainties in turbine noise emission data.

- Declared sound power (in accordance with TS IEC 61400-14[10], on the basis of two or more tests): this can be used directly.
- Warranted or specified manufacturer data can be used, provided that a margin to account for uncertainty has been included. This is more likely to be the case for warranted data than for specifications. If not, a correction factor to allow for uncertainty needs to be added to the values provided, and this should clearly be explained in the assessment. The presence of such an uncertainty margin can be established through comparison with at least one measurement report.
  - When comparing warranted/specified data with results of a representative test report, obtained in accordance with the IEC 61400-11[11] standard, with a reported test uncertainty σ, a margin of 1.645 σ (between 1 and 2dB(A)) between the tested and stated values over the majority of wind speeds represents a clear indication that suitable uncertainties have been incorporated.
  - If the document prescribes a value of uncertainty or a correction factor applicable to the data then this can be added to the values stated, unless the above test is already satisfied.
  - If no data on uncertainty or test reports are available for the turbine then a factor of +2dB should be added.
- Tested sound power: in the absence of the above, the results of a test made in accordance with the IEC 61400-11 standard, including a reported test uncertainty σ, can be referenced. The reported sound power with the addition of a margin equal to 1.645 σ can be used. In the absence of test uncertainty being stated in the report, then 2dB(A) should be used.

9.38. For the purposes of this assessment the specified manufacturers data was used.

[10] IEC Wind Turbines – Part 14: Declaration of apparent sound power level and tonality values, March 2005

[11] IEC Wind Turbines – Part 11: Acoustic measurement techniques, November 2011

Tonality

9.39. The procedure outlined in ETSU recommends that a tonal penalty is added to the measured noise levels, if the tonal audibility of the candidate turbine is above a certain level, this has been followed. The GPG also suggests that due to the lack of information on tonality at receptor distances, the potential presence of tones should be controlled through the use of suitable planning conditions. Therefore, although the method prescribed in ETSU will be followed in this assessment it is also recommended that a suitable condition be drafted in any subsequent planning decision to further protect receptors from tonality.

Infrasound

9.40. Infrasound is a term used to describe sound at very low frequencies generally below 20 Hz. The potential for this to impact upon residences and individuals is of particular concern to some people living in the environs of wind turbine installations. However, based on all current available information as well as guidance from the Institute of Acoustics, there is no concern in relation to the levels of infrasound likely to be produced by the proposed wind turbine generator at the separation distances involved.

9.41. The Institute of Acoustics Technical Note "Prediction and assessment of wind turbine noise"[12] states:

"We conclude that there is no robust evidence that low frequency sound (including 'infrasound') or ground-borne vibration from wind farms, generally has adverse effects on wind farm neighbours".

9.42. Based on this statement, a detailed assessment of the infrasound impacts has not been undertaken, as it is assumed that there will be no cause for concern relating to infrasound from the Proposed Development.

Decommissioning Stage

9.43. Potential effects of decommissioning the Proposed Development are similar in nature to those during construction.

Impact Assessment Methods

Construction Stage

9.44. BS 5228-1:20014provides several example criteria for the assessment of the significance of noise effects from construction activities. Of those available "Example Method 2 – 5 dB(A) Change" has been selected for the current assessment as it offers a slightly less complex

[12] Institute of Acoustics 2009 Acoustics Bulletin Vol 34, March/April 2009

procedure than Example Method 1. Using this method, noise levels generated by construction activities are deemed to be significant if:

- The $L_{Aeq,period}$ level of construction noise exceeds lower threshold values of 65dB during daytime, 55dB during evenings and weekends or 45 dB at night; and
- The total noise level (pre-construction ambient noise plus construction noise) exceeds the pre-construction ambient noise level by 5dB or more for a period of one month or more.

9.45. However, in low background noise environments, such as the area around the Development, it is likely that the existing ambient noise level would be significantly lower than the lower thresholds. It has therefore been conservatively assumed that construction noise levels in excess of the lower threshold will also result in total noise levels of more than 5dB above the existing ambient noise level and that any such noise levels would be significant for the purposes of BS 5228-1:20014

Operational Stage

9.46. In accordance with the recommendations of ETSU-R-97, the acceptance of the proposed wind farm is established by comparing the noise levels produced by the combined operation of the wind turbines with appropriate noise limits at nearby residential properties.

9.47. Whilst ETSU-R-97 presents a comprehensive and detailed assessment methodology for wind farm noise, it also states a simplified methodology:

"if the noise is limited to an LA90,10min of 35dB(A) up to wind speeds of 10m/s at 10m height, then these conditions alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary."

9.48. In the detailed methodology, ETSU-R-97 states that different limits should be applied during quiet waking and night-time hours. The quiet waking hour's limits are intended to preserve outdoor amenity, while the night-time limits are intended to prevent sleep disturbance. The general principle is that the noise limits should be based on existing background noise levels, except for very low background noise levels, in which case a fixed limit may be applied. Noise from the wind turbine should be limited to 5dB(A) above the background (LA90,10min) for both day and night time with the exception of the lower fixed limits which are:

- Day time: The level of wind farm noise should be limited to an absolute level within the range of 35-40dB(A). For the purposes of this assessment, the limit will be set to 37.5dB(A) as agreed with the councils Environmental Health Department as part of the original application. The Original Consent includes a condition for this noise level.

- Night time: The level of wind farm noise should be fixed to 43dB(A). This is derived from the 35dB(A) sleep disturbance criteria with an allowance for 10dB(A) for attenuation through an open window plus a 2dB(A) subtraction for the use of LA90,10min rather than LAeq,10min.

9.49. The exception to the setting of both the day time and night time lower limits on the criterion curves occurs where a property occupier has a financial involvement in the wind farm development. Where this is the case then, if the derived criterion curve based on 5dB(A) above the measured background noise level falls below 45dB(A), the lower noise limit at that property may be set to 45dB(A) during both the day time and the night time periods alike.

9.50. The wind speeds at which the acoustic impact is considered are less than or equal to 12m/s at a height of 10m and are likely to be the acoustically critical wind speeds. Above these wind speeds, as stated in ETSU-R-97, reliable measurements of background and turbine noise are difficult to make. However, if a wind farm meets the noise criteria at wind speeds lower than that presented, it is highly unlikely that it will cause any greater loss of amenity at higher wind speed values.

Significance of Effects

9.51. Noise from the operation of wind turbines is considered to be a long-term, reversible negative effect on a local scale.

9.52. ETSU-R-97 does not define criteria for defining significance, but rather defines the levels of wind farm noise that should be considered to be acceptable. It provides guidance on managing wind turbine noise through appropriate planning conditions. Therefore, no assessment of significance has been made; the assessment instead determines whether the predicted levels of operational noise would comply with the requirements of ETSU-R-97 and the associated Good Practice Guide.

Assessment Limitations

9.53. The wind turbine noise effects have been estimated based on manufacturers data rather than onsite data, however uncertainty has been factored in and the noise levels are warranted by the manufacturer.

9.54. No detailed modelling of vibration impacts has been undertaken. Due to the large distances between the receptors and the vibration generating activities assumptions on the low impact from these activities.

BASELINE CONDITIONS

Noise Sensitive Receptors in the Study Area

9.55. The co-ordinates of the NSRs can be found in **Table 9-4** and a map of all receptors is found on **Figure 9.1 in Appendix 9A, Volume 3**. Note that the co-ordinates are taken from the façade of each property closest to the Application Site boundary, which were identified from available mapping sources including Google Earth.

Table 9 - 4: Noise Sensitive Receptors in Study Area

Name	Easting	Northing	DISTANCE TO NEAREST TURBINE (M)	Financial Interest
Receptor 1	274905	415348	845	No
Receptor 2	274696	413477	1,356	No
Receptor 3	274773	415055	753	No
Receptor 4	274719	415013	777	No
Receptor 5	274726	414998	764	No
Receptor 6	275910	415729	734	No
Receptor 7	276977	414299	748	No
Receptor 8	277067	414158	887	No
Receptor 9	277249	414037	1,104	No
Receptor 10	274800	413613	1,186	No
Receptor 11	274618	413201	1,635	No
Receptor 12	274752	413838	1,028	No
Receptor 13	274618	414192	899	No
Receptor 14	274501	414455	916	No
Receptor 15	274492	414488	919	No
Receptor 16	275811	415983	1,006	No
Receptor 17	274700	413887	1,025	No
Receptor 18	274671	413908	1,030	No
Receptor 19	274681	413933	1,006	No

Receptor 20	274528	414111	1,018	No
Receptor 21	274576	414209	927	No
Receptor 22	274501	415260	1,093	No
Receptor 23	275258	415744	903	No
Receptor 24	274352	414782	1,057	No
Receptor 25	274778	413910	956	No
Receptor 26	274559	414871	872	No
Receptor 27	275249	416101	1,239	No
Receptor 28	275181	416096	1,257	No
Receptor 29	274999	416151	1,382	No
Receptor 30	274900	416187	1,462	No
Receptor 31	274150	415252	1,392	No
Receptor 32	274109	415278	1,440	No
Receptor 33	274025	414481	1,383	Yes
Receptor 34	275316	416106	1,225	No
Receptor 35	274226	413765	1,462	No
Receptor 36	274502	413237	1,663	No
Receptor 37	274582	413284	1,581	No
Receptor 38	277080	414207	878	No
Receptor 39	275522	416082	1,164	No
Receptor 40	275895	415731	741	No
Receptor 41	276011	415743	728	No
Receptor 42	275811	415673	716	No
Receptor 43	275046	413943	779	No
Receptor 44	274812	413209	1,544	No
Receptor 45	274325	414688	1,075	No
Receptor 46	274306	414759	1,100	No
Receptor 47	274277	415078	1,206	No

Receptor 48	275225	416088	1,234	No
Receptor 49	275789	416050	1,077	No
Receptor 50	274655	413990	986	No

9.56. Receptor 33 is financially involved in the project and owns the land which is being leased by the Applicant.

POTENTIAL EFFECTS

Do Nothing Scenario

9.57. In the absence of the Proposed Development the existing Consented Development will be constructed, with works already commenced. The difference in noise from the Proposed Development to the consented is minimal and both applications will maximise the noise budget in the area, along with the cumulative applications.

Construction Stage

9.58. **Table 9-5** shows the distances between the nearest houses to the Development and key stages of construction.

Table 9 - 5: Distances from Houses to Construction Activities

Receptor	Construction Activity			
	Access Tracks and Hardstanding's	Excavate Bases	Concrete Bases	Cranes
	Distance from Construction Activity			
Receptor 1	663	825	825	825
Receptor 3	519	733	733	733
Receptor 4	540	757	757	757
Receptor 5	527	744	744	744
Receptor 7	705	728	728	728
Receptor 41	693	708	708	708
Receptor 42	673	696	696	696
Receptor 43	773	759	759	759

9.59. The calculation details are listed in **Appendix 9C, Volume 4** and the results are shown in **Table 9-6**.

Table 9 - 6: Predicted Construction Noise Levels

Receptor	Construction Activity			
	Access Tracks and Hardstanding's	Excavate Bases	Concrete Bases	Cranes
	Predicted Construction Noise Level, dB, LAeq,12hr			
Receptor 1	45	37	31	33
Receptor 3	48	38	32	35
Receptor 4	48	38	32	34
Receptor 5	48	38	32	35
Receptor 7	45	38	32	35
Receptor 41	45	39	32	35
Receptor 42	45	39	32	35
Receptor 43	44	38	31	34

9.60. As can be seen from **Table 9-6**, the predicted construction noise levels are lower than the lower thresholds for daytime, evenings and weekends in all cases. Predicted noise levels are lower than the night-time lower threshold for all sources of construction noise apart from those for access track construction, which are predicted to exceed this threshold.

9.61. It is likely that a planning condition will be imposed, limiting times of construction, which are likely to correspond to the 'daytime' hours defined in BS5228:2009, i.e. 0700-1900 weekdays, 0700-1300 Saturdays. This mirrors Condition 17 of the original consent.

9.62. In general night-time working will not take place, although in some circumstances there may be a requirement for night-time working, for example, during the erection of turbines, which sometimes take place at night to take advantage of lower wind speeds, or there may be a requirement for pumps to run overnight, dewatering excavations or for generators to power night-time security lighting. Based on the calculations above, it is very unlikely that such activities would give rise to noise levels in excess of the night-time lower threshold. The original consent stated '*Outwith these hours, work at the site shall be limited to turbine erection, testing and commissioning works, or construction work that is not audible at any noise sensitive property*'.

9.63. It is concluded that the effects of noise during the construction of the Development would be **low** and therefore **not significant**. The construction noise will remain as per the Original Consent and therefore are considered acceptable.

9.64. Notwithstanding this, it is considered good practice to employ measures to manage noise during construction, such as those outlined in the mitigation section of this report.

Operational Stage

Turbine Locations and Type

9.65. The location of the proposed wind turbines is given in **Table 1.5 in Chapter 1 'Introduction'** and are shown on **Figure 9.1: Appendix 9A, Volume 3**.

9.66. The candidate wind turbine specifications for the project are outlined in **Table 9-7**.

Table 9 - 7: Turbine Specifications

Turbine Type	Enercon E92
Hub Centre Height (m)	68.9
Rotor Diameter (m)	92
Height to Blade Tip (m)	114.9
Generating Capacity (MW)	2.3

Noise Measurement Test Results

9.67. Measurements of the noise emissions of the E92-2.3MW wind turbine are summarised in **Tables 9.8 and 9.9** and the manufacturers document can be found in **Appendix 9B, Volume 4**.

Table 9 - 8: Summary of 1/3 Octave Band Centres at 10m/s Winds

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
Sound Power Level, LWa (dB(A))	88.0	93.9	96.1	97.8	99.2	99.2	92.6	76.7	105.0

9.68. ETSU-R-97 recommends the addition of penalties, where tonal noise of audibility 2dB or more are present, ranging from 1.5dB at a tonal audibility of 2dB to 5dB at audibility of 6.5dB or more. No tonal penalty is applicable to this turbine type.

9.69. With regards to uncertainty, the manufacturer's warranty document outlined a standard uncertainty across all windspeeds of 1dB.

Table 9 - 9: Tonal Penalties and Effective Sound Power Levels

Standardised 10 m Integer Wind Speed (m/s)	3	4	5	6	7	8	9	10	11	12
Apparent Sound Power Level, LWA (dB)	91.0	96.3	99.1	101.6	103.1	104.1	104.7	105.0	105.0	105.0
Uncertainty (dB)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Applicable Tonal Penalty (dB)	-	-	-	-	-	-	-	-	-	-
Effective Sound Power Level, LWA (dB)	92.0	97.3	100.1	102.6	104.1	105.1	105.7	106.0	106.0	106.0

Results

9.70. Table 9-10 shows the predicted noise levels at the noise sensitive receptors within the study zone.

Table 9 - 10: Predicted Noise Levels at Noise Sensitive Receptor

Receptor Name	Reference Wind Speed (Standardised to 10m Height) (m/s)									
	3	4	5	6	7	8	9	10	11	12
Receptor 1	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Receptor 2	18.9	24.2	27.0	29.5	31.0	32.0	32.6	32.9	32.9	32.9
Receptor 3	24.4	29.7	32.5	35.0	36.5	37.5	38.1	38.4	38.4	38.4
Receptor 4	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Receptor 5	24.1	29.4	32.2	34.7	36.2	37.2	37.8	38.1	38.1	38.1
Receptor 6	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Receptor 7	24.8	30.1	32.9	35.4	36.9	37.9	38.5	38.8	38.8	38.8

Receptor 8	23.2	28.5	31.3	33.8	35.3	36.3	36.9	37.2	37.2	37.2
Receptor 9	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Receptor 10	20.2	25.5	28.3	30.8	32.3	33.3	33.9	34.2	34.2	34.2
Receptor 11	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
Receptor 12	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Receptor 13	22.0	27.3	30.1	32.6	34.1	35.1	35.7	36.0	36.0	36.0
Receptor 14	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Receptor 15	22.8	28.1	30.9	33.4	34.9	35.9	36.5	36.8	36.8	36.8
Receptor 16	21.2	26.5	29.3	31.8	33.3	34.3	34.9	35.2	35.2	35.2
Receptor 17	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Receptor 18	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
Receptor 19	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Receptor 20	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Receptor 21	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Receptor 22	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Receptor 23	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Receptor 24	20.8	26.1	28.9	31.4	32.9	33.9	34.5	34.8	34.8	34.8
Receptor 25	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Receptor 26	22.7	28.0	30.8	33.3	34.8	35.8	36.4	36.7	36.7	36.7
Receptor 27	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Receptor 28	20.3	25.6	28.4	30.9	32.4	33.4	34.0	34.3	34.3	34.3
Receptor 29	19.3	24.6	27.4	29.9	31.4	32.4	33.0	33.3	33.3	33.3
Receptor 30	18.7	24.0	26.8	29.3	30.8	31.8	32.4	32.7	32.7	32.7
Receptor 31	18.6	23.9	26.7	29.2	30.7	31.7	32.3	32.6	32.6	32.6
Receptor 32	18.3	23.6	26.4	28.9	30.4	31.4	32.0	32.3	32.3	32.3
Receptor 33	18.2	23.5	26.3	28.8	30.3	31.3	31.9	32.2	32.2	32.2
Receptor 34	20.7	26.0	28.8	31.3	32.8	33.8	34.4	34.7	34.7	34.7
Receptor 35	17.8	23.1	25.9	28.4	29.9	30.9	31.5	31.8	31.8	31.8

Receptor 36	16.9	22.2	25.0	27.5	29.0	30.0	30.6	30.9	30.9	30.9
Receptor 37	17.4	22.7	25.5	28.0	29.5	30.5	31.1	31.4	31.4	31.4
Receptor 38	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Receptor 39	21.4	26.7	29.5	32.0	33.5	34.5	35.1	35.4	35.4	35.4
Receptor 40	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Receptor 41	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Receptor 42	26.0	31.3	34.1	36.6	38.1	39.1	39.7	40.0	40.0	40.0
Receptor 43	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Receptor 44	17.9	23.2	26.0	28.5	30.0	31.0	31.6	31.9	31.9	31.9
Receptor 45	20.6	25.9	28.7	31.2	32.7	33.7	34.3	34.6	34.6	34.6
Receptor 46	20.4	25.7	28.5	31.0	32.5	33.5	34.1	34.4	34.4	34.4
Receptor 47	19.9	25.2	28.0	30.5	32.0	33.0	33.6	33.9	33.9	33.9
Receptor 48	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Receptor 49	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Receptor 50	21.5	26.8	29.6	32.1	33.6	34.6	35.2	35.5	35.5	35.5

Calculation of Noise Limit from Baseline Conditions

9.71. Using the methodology outlined earlier in the report, **Tables 9-11 and 9-12** show the noise limit deduced from the baseline survey for both the quiet day time and the night time periods, at each of the baseline noise monitoring locations.

Table 9 - 11: Quiet Day Time Noise Limits

Monitoring Location	Quiet Day Time Hours at Measured 10m height (Wind speed = m/s)									
	3	4	5	6	7	8	9	10	11	12
A	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
B	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
C	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
D	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2

E	37.5	37.5	37.5	37.5	38.9	40.7	42.9	45.2	47.7	50.3
F	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9

Table 9 - 12: Night Time Noise Limits

Monitoring Location	Night Time Hours at Measured 10m height (Wind speed = m/s)									
	3	4	5	6	7	8	9	10	11	12
A	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
B	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
C	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
D	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
E	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
F	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5

Acoustic Assessment

9.72. **Tables 9-13 and 9-14** show a comparison of the predicted noise levels with the recommended quiet day time hours and the night time noise limits, respectively, for each receptor, where the full assessment procedure is being applied. The term 'exceedance' is used to denote the difference between the predicted wind farm noise level and the recommended limit. A negative value indicates that the predicted noise level is within the limit.

9.73. Noise levels at all locations are within both the quiet day time hours and night-time noise limits, at all wind speeds considered.

Table 9 - 13: Comparison of Quiet Day Time Predicted Against Noise Limits

Receptor	Reference Wind Speed standardised to 10m height (m/s) (LA90)									
	3	4	5	6	7	8	9	10	11	12
Receptor 1	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.5)	(8.2)	(5.4)	(4.0)	(4.6)	(5.7)	(7.4)	(9.3)	(11.4)	(13.2)
Receptor 2	18.9	24.2	27.0	29.5	31.0	32.0	32.6	32.9	32.9	32.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6

Exceedance	(18.6)	(13.3)	(10.5)	(8.0)	(7.9)	(9.2)	(11.2)	(13.7)	(16.4)	(18.7)
Receptor 3	24.4	29.7	32.5	35.0	36.5	37.5	38.1	38.4	38.4	38.4
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.1)	(7.8)	(5.0)	(3.6)	(4.2)	(5.3)	(7.0)	(8.9)	(11.0)	(12.8)
Receptor 4	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.5)	(8.2)	(5.4)	(4.0)	(4.6)	(5.7)	(7.4)	(9.3)	(11.4)	(13.2)
Receptor 5	24.1	29.4	32.2	34.7	36.2	37.2	37.8	38.1	38.1	38.1
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.4)	(8.1)	(5.3)	(3.9)	(4.5)	(5.6)	(7.3)	(9.2)	(11.3)	(13.1)
Receptor 6	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(12.0)	(6.7)	(3.9)	(1.8)	(1.7)	(2.2)	(3.2)	(4.6)	(6.2)	(7.7)
Receptor 7	24.8	30.1	32.9	35.4	36.9	37.9	38.5	38.8	38.8	38.8
Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
Exceedance	(12.7)	(7.4)	(4.6)	(2.1)	(0.6)	(1.4)	(3.0)	(4.9)	(7.2)	(9.4)
Receptor 8	23.2	28.5	31.3	33.8	35.3	36.3	36.9	37.2	37.2	37.2
Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
Exceedance	(14.3)	(9.0)	(6.2)	(3.7)	(2.2)	(3.0)	(4.6)	(6.5)	(8.8)	(11.0)
Receptor 9	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
Exceedance	(16.4)	(11.1)	(8.3)	(5.8)	(4.3)	(5.1)	(6.7)	(8.6)	(10.9)	(13.1)
Receptor 10	20.2	25.5	28.3	30.8	32.3	33.3	33.9	34.2	34.2	34.2
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(17.3)	(12.0)	(9.2)	(6.7)	(6.6)	(7.9)	(9.9)	(12.3)	(15.0)	(17.4)
Receptor 11	17.2	22.5	25.3	27.8	29.3	30.3	30.9	31.2	31.2	31.2
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(20.3)	(15.0)	(12.2)	(9.7)	(9.6)	(10.9)	(12.9)	(15.3)	(18.0)	(20.4)

Receptor 12	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.3)	(10.0)	(7.2)	(4.7)	(4.6)	(5.9)	(7.9)	(10.3)	(13.0)	(15.4)
Receptor 13	22.0	27.3	30.1	32.6	34.1	35.1	35.7	36.0	36.0	36.0
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.5)	(10.2)	(7.4)	(4.9)	(4.8)	(6.1)	(8.1)	(10.5)	(13.2)	(15.6)
Receptor 14	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.6)	(10.3)	(7.5)	(5.0)	(4.9)	(6.2)	(8.2)	(10.6)	(13.3)	(15.7)
Receptor 15	22.8	28.1	30.9	33.4	34.9	35.9	36.5	36.8	36.8	36.8
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(14.7)	(9.4)	(6.6)	(4.1)	(4.0)	(5.3)	(7.3)	(9.7)	(12.4)	(14.8)
Receptor 16	21.2	26.5	29.3	31.8	33.3	34.3	34.9	35.2	35.2	35.2
Criteria	37.5	37.5	37.5	37.5	38.9	40.7	42.9	45.2	47.7	50.3
Exceedance	(16.3)	(11.0)	(8.2)	(5.7)	(5.6)	(6.4)	(8.0)	(10.0)	(12.5)	(15.1)
Receptor 17	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(16.4)	(11.1)	(8.3)	(5.8)	(5.7)	(7.0)	(9.0)	(11.4)	(14.1)	(16.5)
Receptor 18	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(16.2)	(10.9)	(8.1)	(5.6)	(5.5)	(6.8)	(8.8)	(11.2)	(13.9)	(16.3)
Receptor 19	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(16.4)	(11.1)	(8.3)	(5.8)	(5.7)	(7.0)	(9.0)	(11.4)	(14.1)	(16.5)
Receptor 20	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.6)	(10.3)	(7.5)	(5.0)	(4.9)	(6.2)	(8.2)	(10.6)	(13.3)	(15.7)
Receptor 21	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9

Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.6)	(10.3)	(7.5)	(5.0)	(4.9)	(6.2)	(8.2)	(10.6)	(13.3)	(15.7)
Receptor 22	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(16.4)	(11.1)	(8.3)	(6.9)	(7.5)	(8.6)	(10.3)	(12.2)	(14.3)	(16.1)
Receptor 23	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(14.2)	(8.9)	(6.1)	(4.0)	(3.9)	(4.4)	(5.4)	(6.8)	(8.4)	(9.9)
Receptor 24	20.8	26.1	28.9	31.4	32.9	33.9	34.5	34.8	34.8	34.8
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(16.7)	(11.4)	(8.6)	(6.5)	(6.4)	(6.9)	(7.9)	(9.3)	(10.9)	(12.4)
Receptor 25	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(15.6)	(10.3)	(7.5)	(5.0)	(4.9)	(6.2)	(8.2)	(10.6)	(13.3)	(15.7)
Receptor 26	22.7	28.0	30.8	33.3	34.8	35.8	36.4	36.7	36.7	36.7
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(14.8)	(9.5)	(6.7)	(5.3)	(5.9)	(7.0)	(8.7)	(10.6)	(12.7)	(14.5)
Receptor 27	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
Exceedance	(17.4)	(12.1)	(9.7)	(8.3)	(8.3)	(9.2)	(10.8)	(13.0)	(15.7)	(18.4)
Receptor 28	20.3	25.6	28.4	30.9	32.4	33.4	34.0	34.3	34.3	34.3
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
Exceedance	(17.6)	(12.3)	(9.9)	(8.5)	(8.5)	(9.4)	(11.0)	(13.2)	(15.9)	(18.6)
Receptor 29	19.3	24.6	27.4	29.9	31.4	32.4	33.0	33.3	33.3	33.3
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
Exceedance	(18.6)	(13.3)	(10.9)	(9.5)	(9.5)	(10.4)	(12.0)	(14.2)	(16.9)	(19.6)
Receptor 30	18.7	24.0	26.8	29.3	30.8	31.8	32.4	32.7	32.7	32.7
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9

Exceedance	(19.2)	(13.9)	(11.5)	(10.1)	(10.1)	(11.0)	(12.6)	(14.8)	(17.5)	(20.2)
Receptor 31	18.6	23.9	26.7	29.2	30.7	31.7	32.3	32.6	32.6	32.6
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(18.9)	(13.6)	(10.8)	(9.4)	(10.0)	(11.1)	(12.8)	(14.7)	(16.8)	(18.6)
Receptor 32	18.3	23.6	26.4	28.9	30.4	31.4	32.0	32.3	32.3	32.3
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(19.2)	(13.9)	(11.1)	(9.7)	(10.3)	(11.5)	(13.1)	(15.1)	(17.2)	(19.0)
Receptor 33	18.2	23.5	26.3	28.8	30.3	31.3	31.9	32.2	32.2	32.2
Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.1	47.3	49.4	51.2
Exceedance	(26.8)	(21.5)	(18.7)	(16.2)	(14.7)	(13.7)	(13.2)	(15.1)	(17.2)	(19.0)
Receptor 34	20.7	26.0	28.8	31.3	32.8	33.8	34.4	34.7	34.7	34.7
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
Exceedance	(17.2)	(11.9)	(9.5)	(8.1)	(8.1)	(9.0)	(10.6)	(12.8)	(15.5)	(18.2)
Receptor 35	17.8	23.1	25.9	28.4	29.9	30.9	31.5	31.8	31.8	31.8
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(19.7)	(14.4)	(11.6)	(9.1)	(9.0)	(10.3)	(12.3)	(14.7)	(17.4)	(19.8)
Receptor 36	16.9	22.2	25.0	27.5	29.0	30.0	30.6	30.9	30.9	30.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(20.6)	(15.3)	(12.5)	(10.0)	(9.9)	(11.2)	(13.2)	(15.6)	(18.3)	(20.7)
Receptor 37	17.4	22.7	25.5	28.0	29.5	30.5	31.1	31.4	31.4	31.4
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(20.1)	(14.8)	(12.0)	(9.5)	(9.4)	(10.7)	(12.7)	(15.1)	(17.8)	(20.2)
Receptor 38	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
Exceedance	(14.2)	(8.9)	(6.1)	(3.6)	(2.1)	(2.9)	(4.4)	(6.4)	(8.7)	(10.9)
Receptor 39	21.4	26.7	29.5	32.0	33.5	34.5	35.1	35.4	35.4	35.4
Criteria	37.5	37.5	37.5	38.1	38.9	40.7	42.9	45.2	47.7	50.3
Exceedance	(16.1)	(10.8)	(8.0)	(6.1)	(5.4)	(6.2)	(7.8)	(9.8)	(12.3)	(14.9)

Receptor 40	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(12.0)	(6.7)	(3.9)	(1.8)	(1.7)	(2.2)	(3.2)	(4.5)	(6.2)	(7.7)
Receptor 41	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(12.0)	(6.7)	(3.9)	(1.9)	(1.7)	(2.2)	(3.2)	(4.6)	(6.2)	(7.8)
Receptor 42	26.0	31.3	34.1	36.6	38.1	39.1	39.7	40.0	40.0	40.0
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(11.5)	(6.2)	(3.4)	(1.3)	(1.2)	(1.7)	(2.7)	(4.0)	(5.7)	(7.2)
Receptor 43	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(13.5)	(8.2)	(5.4)	(2.9)	(2.8)	(4.1)	(6.1)	(8.6)	(11.3)	(13.6)
Receptor 44	17.9	23.2	26.0	28.5	30.0	31.0	31.6	31.9	31.9	31.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(19.6)	(14.3)	(11.5)	(9.0)	(8.9)	(10.3)	(12.2)	(14.7)	(17.4)	(19.7)
Receptor 45	20.6	25.9	28.7	31.2	32.7	33.7	34.3	34.6	34.6	34.6
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(16.9)	(11.6)	(8.8)	(7.4)	(7.9)	(9.1)	(10.8)	(12.7)	(14.8)	(16.6)
Receptor 46	20.4	25.7	28.5	31.0	32.5	33.5	34.1	34.4	34.4	34.4
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(17.1)	(11.8)	(9.0)	(7.6)	(8.1)	(9.3)	(10.9)	(12.9)	(15.0)	(16.8)
Receptor 47	19.9	25.2	28.0	30.5	32.0	33.0	33.6	33.9	33.9	33.9
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(17.6)	(12.3)	(9.5)	(8.2)	(8.7)	(9.9)	(11.5)	(13.5)	(15.6)	(17.4)
Receptor 48	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
Exceedance	(17.4)	(12.1)	(9.7)	(8.3)	(8.3)	(9.2)	(10.8)	(13.0)	(15.7)	(18.4)
Receptor 49	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2

Criteria	37.5	37.5	37.5	38.1	38.9	40.7	42.9	45.2	47.7	50.3
Exceedance	(15.3)	(10.0)	(7.2)	(5.3)	(4.6)	(5.4)	(7.0)	(9.0)	(11.5)	(14.1)
Receptor 50	21.5	26.8	29.6	32.1	33.6	34.6	35.2	35.5	35.5	35.5
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(16.0)	(10.7)	(7.9)	(5.4)	(5.3)	(6.7)	(8.6)	(11.1)	(13.8)	(16.1)

Table 9 - 14: Comparison of Night Time Predicted Against Noise Limits

Receptor	Reference Wind Speed standardised to 10m height (m/s) (LA90)									
	3	4	5	6	7	8	9	10	11	12
Receptor 1	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.1	47.3	49.4	51.2
Exceedance	(21.0)	(15.7)	(12.9)	(10.4)	(8.9)	(7.9)	(7.4)	(9.3)	(11.4)	(13.2)
Receptor 2	18.9	24.2	27.0	29.5	31.0	32.0	32.6	32.9	32.9	32.9
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(18.6)	(13.3)	(10.5)	(8.0)	(7.9)	(9.2)	(11.2)	(13.7)	(16.4)	(18.7)
Receptor 3	24.4	29.7	32.5	35.0	36.5	37.5	38.1	38.4	38.4	38.4
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.1)	(7.8)	(5.0)	(3.6)	(4.2)	(5.3)	(7.0)	(8.9)	(11.0)	(12.8)
Receptor 4	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.5)	(8.2)	(5.4)	(4.0)	(4.6)	(5.7)	(7.4)	(9.3)	(11.4)	(13.2)
Receptor 5	24.1	29.4	32.2	34.7	36.2	37.2	37.8	38.1	38.1	38.1
Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
Exceedance	(13.4)	(8.1)	(5.3)	(3.9)	(4.5)	(5.6)	(7.3)	(9.2)	(11.3)	(13.1)
Receptor 6	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
Exceedance	(12.0)	(6.7)	(3.9)	(1.8)	(1.7)	(2.2)	(3.2)	(4.6)	(6.2)	(7.7)
Receptor 7	24.8	30.1	32.9	35.4	36.9	37.9	38.5	38.8	38.8	38.8

Criteria	37.5	37.5	37.5	37.5	37.3	39.3	41.5	43.7	46.0	48.2
Exceedance	(12.7)	(7.4)	(4.6)	(2.1)	(0.4)	(1.4)	(3.0)	(4.9)	(7.2)	(9.4)
Receptor 8	23.2	28.5	31.3	33.8	35.3	36.3	36.9	37.2	37.2	37.2
Criteria	37.5	37.5	37.5	37.5	37.3	39.3	41.5	43.7	46.0	48.2
Exceedance	(14.3)	(9.0)	(6.2)	(3.7)	(2.0)	(3.0)	(4.6)	(6.5)	(8.8)	(11.0)
Receptor 9	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
Exceedance	(21.9)	(16.6)	(13.8)	(11.3)	(9.8)	(8.8)	(8.2)	(7.9)	(8.5)	(12.1)
Receptor 10	20.2	25.5	28.3	30.8	32.3	33.3	33.9	34.2	34.2	34.2
Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
Exceedance	(17.3)	(12.0)	(9.2)	(6.7)	(6.6)	(7.9)	(9.9)	(12.3)	(15.0)	(17.4)
Receptor 11	17.2	22.5	25.3	27.8	29.3	30.3	30.9	31.2	31.2	31.2
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(25.8)	(20.5)	(17.7)	(15.2)	(13.7)	(12.7)	(12.1)	(11.8)	(15.5)	(20.2)
Receptor 12	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(20.8)	(15.5)	(12.7)	(10.2)	(8.7)	(7.7)	(7.1)	(6.8)	(10.5)	(15.1)
Receptor 13	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(20.8)	(15.5)	(12.7)	(10.2)	(8.7)	(7.7)	(7.1)	(6.8)	(10.5)	(15.1)
Receptor 14	22.0	27.3	30.1	32.6	34.1	35.1	35.7	36.0	36.0	36.0
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.0)	(15.7)	(12.9)	(10.4)	(8.9)	(7.9)	(7.3)	(7.0)	(10.7)	(15.4)
Receptor 15	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.1)	(15.8)	(13.0)	(10.5)	(9.0)	(8.0)	(7.4)	(7.1)	(10.7)	(15.4)
Receptor 16	22.8	28.1	30.9	33.4	34.9	35.9	36.5	36.8	36.8	36.8
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6

Exceedance	(20.2)	(14.9)	(12.1)	(9.6)	(8.1)	(7.1)	(6.5)	(7.7)	(10.7)	(13.8)
Receptor 17	21.2	26.5	29.3	31.8	33.3	34.3	34.9	35.2	35.2	35.2
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.8)	(16.5)	(13.7)	(11.2)	(9.7)	(8.7)	(8.1)	(7.8)	(11.4)	(16.1)
Receptor 18	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.9)	(16.6)	(13.8)	(11.3)	(9.8)	(8.8)	(8.2)	(7.9)	(11.5)	(16.2)
Receptor 19	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.7)	(16.4)	(13.6)	(11.1)	(9.6)	(8.6)	(8.0)	(7.7)	(11.3)	(16.0)
Receptor 20	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.9)	(16.6)	(13.8)	(11.3)	(9.8)	(8.8)	(8.2)	(7.9)	(11.6)	(16.2)
Receptor 21	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.1)	(15.8)	(13.0)	(10.5)	(9.0)	(8.0)	(7.4)	(7.1)	(10.8)	(15.4)
Receptor 22	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(21.9)	(16.6)	(13.8)	(11.3)	(9.8)	(8.8)	(8.2)	(9.7)	(12.2)	(14.3)
Receptor 23	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
Exceedance	(19.7)	(14.4)	(11.6)	(9.1)	(7.6)	(6.6)	(6.0)	(5.7)	(6.3)	(8.1)
Receptor 24	20.8	26.1	28.9	31.4	32.9	33.9	34.5	34.8	34.8	34.8
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(22.2)	(16.9)	(14.1)	(11.6)	(10.1)	(9.1)	(8.5)	(9.9)	(12.5)	(14.5)
Receptor 25	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.1)	(15.8)	(13.0)	(10.5)	(9.0)	(8.0)	(7.4)	(7.1)	(10.8)	(15.4)

Receptor 26	22.7	28.0	30.8	33.3	34.8	35.8	36.4	36.7	36.7	36.7
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(20.3)	(15.0)	(12.2)	(9.7)	(8.2)	(7.2)	(6.6)	(8.1)	(10.6)	(12.7)
Receptor 27	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(22.5)	(17.2)	(14.4)	(11.9)	(10.4)	(9.4)	(10.2)	(13.0)	(16.0)	(19.0)
Receptor 28	20.3	25.6	28.4	30.9	32.4	33.4	34.0	34.3	34.3	34.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(22.7)	(17.4)	(14.6)	(12.1)	(10.6)	(9.6)	(10.4)	(13.2)	(16.2)	(19.2)
Receptor 29	19.3	24.6	27.4	29.9	31.4	32.4	33.0	33.3	33.3	33.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(23.7)	(18.4)	(15.6)	(13.1)	(11.6)	(10.6)	(11.4)	(14.2)	(17.2)	(20.2)
Receptor 30	18.7	24.0	26.8	29.3	30.8	31.8	32.4	32.7	32.7	32.7
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(24.3)	(19.0)	(16.2)	(13.7)	(12.2)	(11.2)	(12.0)	(14.8)	(17.8)	(20.8)
Receptor 31	18.6	23.9	26.7	29.2	30.7	31.7	32.3	32.6	32.6	32.6
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(24.4)	(19.1)	(16.3)	(13.8)	(12.3)	(11.3)	(10.7)	(12.1)	(14.7)	(16.8)
Receptor 32	18.3	23.6	26.4	28.9	30.4	31.4	32.0	32.3	32.3	32.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(24.7)	(19.4)	(16.6)	(14.1)	(12.6)	(11.6)	(11.0)	(12.5)	(15.0)	(17.1)
Receptor 33	18.2	23.5	26.3	28.8	30.3	31.3	31.9	32.2	32.2	32.2
Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.3	49.4
Exceedance	(26.8)	(21.5)	(18.7)	(16.2)	(14.7)	(13.7)	(13.1)	(12.8)	(15.1)	(17.1)
Receptor 34	20.7	26.0	28.8	31.3	32.8	33.8	34.4	34.7	34.7	34.7
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(22.3)	(17.0)	(14.2)	(11.7)	(10.2)	(9.2)	(10.0)	(12.8)	(15.8)	(18.8)
Receptor 35	17.8	23.1	25.9	28.4	29.9	30.9	31.5	31.8	31.8	31.8

Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(25.2)	(19.9)	(17.1)	(14.6)	(13.1)	(12.1)	(11.5)	(11.2)	(14.9)	(19.5)
Receptor 36	16.9	22.2	25.0	27.5	29.0	30.0	30.6	30.9	30.9	30.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(26.1)	(20.8)	(18.0)	(15.5)	(14.0)	(13.0)	(12.4)	(12.1)	(15.7)	(20.4)
Receptor 37	17.4	22.7	25.5	28.0	29.5	30.5	31.1	31.4	31.4	31.4
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(25.6)	(20.3)	(17.5)	(15.0)	(13.5)	(12.5)	(11.9)	(11.6)	(15.2)	(19.9)
Receptor 38	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
Exceedance	(19.7)	(14.4)	(11.6)	(9.1)	(7.6)	(6.6)	(6.0)	(5.7)	(6.3)	(9.9)
Receptor 39	21.4	26.7	29.5	32.0	33.5	34.5	35.1	35.4	35.4	35.4
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
Exceedance	(21.6)	(16.3)	(13.5)	(11.0)	(9.5)	(8.5)	(7.9)	(9.1)	(12.1)	(15.2)
Receptor 40	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
Exceedance	(17.5)	(12.2)	(9.4)	(6.9)	(5.4)	(4.4)	(3.8)	(3.5)	(4.1)	(5.9)
Receptor 41	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
Exceedance	(17.5)	(12.2)	(9.4)	(6.9)	(5.4)	(4.4)	(3.8)	(3.5)	(4.1)	(5.9)
Receptor 42	26.0	31.3	34.1	36.6	38.1	39.1	39.7	40.0	40.0	40.0
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
Exceedance	(17.0)	(11.7)	(8.9)	(6.4)	(4.9)	(3.9)	(3.3)	(3.0)	(3.5)	(5.4)
Receptor 43	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(19.0)	(13.7)	(10.9)	(8.4)	(6.9)	(5.9)	(5.3)	(5.0)	(8.7)	(13.3)
Receptor 44	17.9	23.2	26.0	28.5	30.0	31.0	31.6	31.9	31.9	31.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3

Exceedance	(25.1)	(19.8)	(17.0)	(14.5)	(13.0)	(12.0)	(11.4)	(11.1)	(14.8)	(19.4)
Receptor 45	20.6	25.9	28.7	31.2	32.7	33.7	34.3	34.6	34.6	34.6
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(22.4)	(17.1)	(14.3)	(11.8)	(10.3)	(9.3)	(8.7)	(10.1)	(12.7)	(14.7)
Receptor 46	20.4	25.7	28.5	31.0	32.5	33.5	34.1	34.4	34.4	34.4
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(22.6)	(17.3)	(14.5)	(12.0)	(10.5)	(9.5)	(8.9)	(10.3)	(12.8)	(14.9)
Receptor 47	19.9	25.2	28.0	30.5	32.0	33.0	33.6	33.9	33.9	33.9
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
Exceedance	(23.1)	(17.8)	(15.0)	(12.5)	(11.0)	(10.0)	(9.4)	(10.9)	(13.4)	(15.5)
Receptor 48	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
Exceedance	(22.5)	(17.2)	(14.4)	(11.9)	(10.4)	(9.4)	(10.2)	(13.0)	(16.0)	(19.0)
Receptor 49	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
Exceedance	(20.8)	(15.5)	(12.7)	(10.2)	(8.7)	(7.7)	(7.1)	(8.3)	(11.3)	(14.4)
Receptor 50	21.5	26.8	29.6	32.1	33.6	34.6	35.2	35.5	35.5	35.5
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
Exceedance	(21.5)	(16.2)	(13.4)	(10.9)	(9.4)	(8.4)	(7.8)	(7.5)	(11.2)	(15.8)

CUMULATIVE EFFECTS

BASELINE CONDITIONS

9.74. A cumulative noise assessment of a proposed wind energy development should consider the impacts of any other wind development in the locality. If the Proposed Development produces noise levels within or above 10dB of any existing wind development at the same receptor location, a cumulative noise impact assessment is necessary.

9.75. The cumulative assessment considers all wind energy developments which are operational, consented, or within the planning application system. Turbines and wind farms which met the criteria above are shown in Table 9-15.

Table 9 - 15: Wind turbines (existing/consented/currently the subject of an application) within 1km of noise sensitive receptors

APPLICATION NUMBER	PROJECT NAME	EASTING	NORTHING	TURBINE TYPE	HUB HEIGHT (M)
LA01/2018/1168	Craiggore Windfarm	Various, six Turbine Wind Farm		Nordex N90	80m
B/2012/0290/F	Kilhoyle Road Wind Turbine	275106	416533	WTN250	40m

Potential Effects

9.76. At each receptor location the effects of the wind turbine at Kilhoyle Road were predicted using the method set out in the GPG, as there were no conditioned levels associated within the decision notices.

9.77. The Craiggore Wind Farm had conditioned noise levels at various receptors within the study area. The conditioned noise levels were used at these receptors, whilst the noise levels at the other receptors have been calculated using the controlling receptor methodology as outlined in the GPG. The closest receptor to the development, with conditioned limits, is Receptor 49 This receptor will therefore be used as the controlling receptor, whilst the distance to the nearest wind turbine in both the Craiggore Wind Farm and the Proposed Development have been used in the controlling receptor calculations.

9.78. Measurements of the noise emissions of the wind turbines assessed are summarised in Tables 9-16 and 9-17.

Table 9 - 16: Summary of 1/3 Octave Band Centres (8m/s)

Application Name	Sound Power Level, LWa (dB(A)) at 1/3 octave centres (Fz)								
	63	125	250	500	1000	2000	4000	8000	Total
B/2012/0290/F	91.0	92.3	93.1	93.7	89.0	87.2	84.8	72.6	99.5

9.79. **Table 9-17** details the effective sound power levels including all uncertainties and tonal penalties.

Table 9 - 17: Effective Sound Power Levels

Application Name	Effective Sound Power Level, LWA (dB) at each m/s wind speed (DBA)									
	3	4	5	6	7	8	9	10	11	12
B/2012/0290/F	94.4	94.4	94.4	96.7	99.0	101.1	101.5	101.7	101.7	101.7

9.80. **Tables 9-18 and 9-19** shows a comparison of the predicted cumulative noise levels for both the day time and night time periods with the respective, recommended noise limits for each receptor. The term 'exceedance' is used to denote the difference between the predicted wind turbine noise level and the recommended limit. A negative value (in brackets) indicates that the predicted noise level is within the limit.

9.81. The data has been highlighted red shows where the cumulative noise levels exceed the defined limits.

Table 9 - 18: Comparison of Predicted Against Day Time Noise Limits

Receptor		Reference Wind Speed standardised to 10m height (m/s) (LA90)									
		3	4	5	6	7	8	9	10	11	12
1	Existing	23.5	26.4	29.1	30.2	31.7	33.5	33.9	34.0	34.0	34.0
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	26.7	31.1	33.9	35.9	37.4	38.7	39.2	39.4	39.4	39.4
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(10.8)	(6.4)	(3.6)	(2.7)	(3.3)	(4.1)	(5.9)	(7.9)	(10.0)	(11.8)
2	Existing	19.8	22.0	24.3	25.5	27.2	29.0	29.4	29.5	29.5	29.5
	Proposed	18.9	24.2	27.0	29.5	31.0	32.0	32.6	32.9	32.9	32.9

	Combined	22.4	26.2	28.8	30.9	32.5	33.7	34.3	34.5	34.5	34.5
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(15.1)	(11.3)	(8.7)	(6.6)	(6.4)	(7.5)	(9.5)	(12.0)	(14.7)	(17.1)
3	Existing	21.9	25.0	27.7	28.7	30.3	32.0	32.5	32.5	32.5	32.5
	Proposed	24.4	29.7	32.5	35.0	36.5	37.5	38.1	38.4	38.4	38.4
	Combined	26.3	30.9	33.7	35.9	37.4	38.6	39.1	39.4	39.4	39.4
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(11.2)	(6.6)	(3.8)	(2.7)	(3.3)	(4.2)	(6.0)	(7.9)	(10.0)	(11.8)
4	Existing	24.3	27.9	30.9	32.0	33.4	35.0	35.5	35.5	35.5	35.5
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	27.2	31.6	34.5	36.5	37.9	39.2	39.7	39.9	39.9	39.9
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(10.3)	(5.9)	(3.0)	(2.1)	(2.8)	(3.6)	(5.4)	(7.4)	(9.5)	(11.3)
5	Existing	21.6	24.7	27.4	28.5	30.0	31.7	32.2	32.2	32.2	32.2
	Proposed	24.1	29.4	32.2	34.7	36.2	37.2	37.8	38.1	38.1	38.1
	Combined	26.0	30.6	33.4	35.6	37.1	38.3	38.8	39.1	39.1	39.1
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(11.5)	(6.9)	(4.1)	(3.0)	(3.6)	(4.5)	(6.3)	(8.2)	(10.3)	(12.1)
6	Existing	26.8	30.7	33.7	34.7	36.1	37.9	38.4	38.4	36.6	38.4
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.3	33.8	36.7	38.5	40.0	41.3	41.8	42.0	41.3	42.0
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.2)	(3.7)	(0.8)	0.6	0.7	0.5	(0.6)	(2.1)	(4.4)	(5.2)
7	Existing	18.9	22.6	25.5	26.5	27.9	29.6	30.1	30.2	30.2	30.2
	Proposed	24.8	30.1	32.9	35.4	36.9	37.9	38.5	38.8	38.8	38.8
	Combined	25.8	30.8	33.6	35.9	37.4	38.5	39.1	39.3	39.3	39.3
	Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
	Exceedance	(11.7)	(6.7)	(3.9)	(1.6)	(0.1)	(0.8)	(2.4)	(4.4)	(6.7)	(8.9)
8	Existing	18.3	22.0	24.9	25.9	27.3	29.0	29.5	29.5	29.5	29.5
	Proposed	23.2	28.5	31.3	33.8	35.3	36.3	36.9	37.2	37.2	37.2
	Combined	24.4	29.3	32.2	34.4	35.9	37.0	37.6	37.8	37.8	37.8
	Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2

	Exceedance	(13.1)	(8.2)	(5.3)	(3.1)	(1.6)	(2.3)	(3.9)	(5.9)	(8.2)	(10.4)
9	Existing	17.8	21.4	24.4	25.3	26.8	28.5	29.0	29.0	29.0	29.0
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.8	27.6	30.5	32.6	34.1	35.3	35.8	36.1	36.1	36.1
	Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
	Exceedance	(14.7)	(9.9)	(7.0)	(4.9)	(3.4)	(4.0)	(5.7)	(7.6)	(9.9)	(12.1)
10	Existing	17.5	21.0	23.9	24.9	26.3	28.1	28.5	28.6	28.6	28.6
	Proposed	20.2	25.5	28.3	30.8	32.3	33.3	33.9	34.2	34.2	34.2
	Combined	22.0	26.8	29.6	31.7	33.2	34.4	35.0	35.2	35.2	35.2
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(15.5)	(10.7)	(7.9)	(5.8)	(5.7)	(6.8)	(8.8)	(11.3)	(14.0)	(16.4)
11	Existing	16.4	19.9	22.8	23.8	25.3	27.0	27.5	27.5	27.5	27.5
	Proposed	17.2	22.5	25.3	27.8	29.3	30.3	30.9	31.2	31.2	31.2
	Combined	19.8	24.4	27.2	29.2	30.7	31.9	32.5	32.7	32.7	32.7
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(17.7)	(13.1)	(10.3)	(8.3)	(8.2)	(9.3)	(11.3)	(13.8)	(16.5)	(18.9)
12	Existing	18.0	21.4	24.3	25.3	26.7	28.5	29.0	29.0	29.0	29.0
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	23.6	28.4	31.2	33.5	35.0	36.1	36.7	36.9	36.9	36.9
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(13.9)	(9.1)	(6.3)	(4.0)	(3.9)	(5.1)	(7.1)	(9.6)	(12.3)	(14.7)
13	Existing	18.7	22.1	24.9	25.9	27.4	29.1	29.6	29.6	29.6	29.6
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	23.8	28.6	31.4	33.6	35.1	36.2	36.8	37.0	37.0	37.0
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(13.7)	(8.9)	(6.1)	(3.9)	(3.8)	(5.0)	(7.0)	(9.5)	(12.2)	(14.6)
14	Existing	19.3	22.6	25.4	26.4	27.9	29.7	30.2	30.2	30.2	30.2
	Proposed	22.0	27.3	30.1	32.6	34.1	35.1	35.7	36.0	36.0	36.0
	Combined	23.8	28.5	31.3	33.5	35.0	36.2	36.7	37.0	37.0	37.0
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(13.7)	(9.0)	(6.2)	(4.0)	(3.9)	(5.0)	(7.1)	(9.5)	(12.2)	(14.6)
	Existing	19.4	22.7	25.5	26.5	28.0	29.7	30.2	30.3	30.3	30.3

15	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
	Combined	23.9	28.5	31.3	33.5	35.0	36.2	36.7	37.0	37.0	37.0
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(13.6)	(9.0)	(6.2)	(4.0)	(3.9)	(5.0)	(7.1)	(9.5)	(12.2)	(14.6)
16	Existing	27.5	31.2	34.0	35.0	36.4	38.2	38.8	38.8	38.8	38.8
	Proposed	22.8	28.1	30.9	33.4	34.9	35.9	36.5	36.8	36.8	36.8
	Combined	28.8	32.9	35.8	37.3	38.8	40.3	40.8	41.0	41.0	41.0
	Criteria	37.5	37.5	37.5	37.5	38.9	40.7	42.9	45.2	47.7	50.3
	Exceedance	(8.7)	(4.6)	(1.7)	(0.2)	(0.1)	(0.4)	(2.1)	(4.2)	(6.7)	(9.3)
17	Existing	18.0	21.4	24.3	25.3	26.7	28.5	29.0	29.0	29.0	29.0
	Proposed	21.2	26.5	29.3	31.8	33.3	34.3	34.9	35.2	35.2	35.2
	Combined	22.9	27.7	30.5	32.7	34.2	35.3	35.9	36.1	36.1	36.1
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.6)	(9.8)	(7.0)	(4.8)	(4.7)	(5.9)	(7.9)	(10.4)	(13.1)	(15.5)
18	Existing	18.0	21.4	24.3	25.3	26.7	28.5	29.0	29.0	29.0	29.0
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.9	27.6	30.4	32.6	34.1	35.3	35.8	36.1	36.1	36.1
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.6)	(9.9)	(7.1)	(4.9)	(4.8)	(5.9)	(8.0)	(10.4)	(13.1)	(15.5)
19	Existing	18.1	21.5	24.3	25.3	26.8	28.5	29.0	29.1	29.1	29.1
	Proposed	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
	Combined	23.0	27.8	30.6	32.8	34.3	35.4	36.0	36.3	36.3	36.3
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.5)	(9.7)	(6.9)	(4.7)	(4.6)	(5.8)	(7.8)	(10.2)	(12.9)	(15.3)
20	Existing	18.4	21.7	24.6	25.6	27.1	28.8	29.3	29.3	29.3	29.3
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.9	27.7	30.5	32.6	34.1	35.3	35.9	36.1	36.1	36.1
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.6)	(9.8)	(7.0)	(4.9)	(4.8)	(5.9)	(7.9)	(10.4)	(13.1)	(15.5)
21	Existing	18.5	21.8	24.6	25.6	27.1	28.8	29.3	29.4	29.4	29.4
	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
	Combined	23.5	28.3	31.1	33.3	34.8	35.9	36.5	36.8	36.8	36.8

	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.0)	(9.2)	(6.4)	(4.2)	(4.1)	(5.3)	(7.3)	(9.7)	(12.4)	(14.8)
22	Existing	21.9	24.8	27.4	28.5	30.0	31.8	32.3	32.3	32.3	32.3
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	24.5	28.7	31.4	33.4	34.9	36.2	36.7	36.9	36.9	36.9
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(13.0)	(8.8)	(6.1)	(5.2)	(5.8)	(6.6)	(8.4)	(10.4)	(12.5)	(14.3)
23	Existing	27.0	30.0	32.5	33.9	35.4	37.1	37.5	37.6	37.6	37.6
	Proposed	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
	Combined	28.6	32.3	35.0	36.9	38.4	39.8	40.3	40.5	40.5	40.5
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.9)	(5.2)	(2.5)	(1.0)	(0.9)	(1.0)	(2.1)	(3.6)	(5.2)	(6.7)
24	Existing	19.9	23.0	25.7	26.8	28.3	30.0	30.5	30.5	30.5	30.5
	Proposed	20.8	26.1	28.9	31.4	32.9	33.9	34.5	34.8	34.8	34.8
	Combined	23.4	27.8	30.6	32.7	34.2	35.4	36.0	36.2	36.2	36.2
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.1)	(9.7)	(6.9)	(5.9)	(6.4)	(7.4)	(9.1)	(11.1)	(13.2)	(15.0)
25	Existing	17.9	21.3	24.2	25.2	26.6	28.4	28.9	28.9	28.9	28.9
	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
	Combined	23.4	28.2	31.0	33.2	34.7	35.8	36.4	36.7	36.7	36.7
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.1)	(9.3)	(6.5)	(4.3)	(4.2)	(5.4)	(7.4)	(9.8)	(12.5)	(14.9)
26	Existing	20.6	23.7	26.4	27.4	29.0	30.7	31.2	31.2	31.2	31.2
	Proposed	22.7	28.0	30.8	33.3	34.8	35.8	36.4	36.7	36.7	36.7
	Combined	24.7	29.3	32.1	34.3	35.8	36.9	37.5	37.8	37.8	37.8
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(12.8)	(8.2)	(5.4)	(4.3)	(4.9)	(5.9)	(7.6)	(9.5)	(11.6)	(13.4)
27	Existing	30.3	32.3	34.1	35.7	37.4	39.2	39.7	39.8	39.8	39.8
	Proposed	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
	Combined	30.7	33.2	35.2	37.0	38.6	40.3	40.8	40.9	40.9	40.9
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(7.2)	(4.7)	(3.1)	(2.4)	(2.3)	(2.5)	(4.2)	(6.6)	(9.3)	(12.0)

28	Existing	30.5	32.4	34.2	35.9	37.5	39.4	39.8	39.9	39.9	39.9
	Proposed	20.3	25.6	28.4	30.9	32.4	33.4	34.0	34.3	34.3	34.3
	Combined	30.9	33.2	35.2	37.1	38.7	40.4	40.8	41.0	41.0	41.0
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(7.0)	(4.7)	(3.1)	(2.3)	(2.2)	(2.4)	(4.2)	(6.5)	(9.2)	(11.9)
29	Existing	30.8	32.2	33.7	35.4	37.2	39.1	39.5	39.6	39.6	39.6
	Proposed	19.3	24.6	27.4	29.9	31.4	32.4	33.0	33.3	33.3	33.3
	Combined	31.1	32.9	34.6	36.5	38.2	39.9	40.4	40.5	40.5	40.5
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(6.8)	(5.0)	(3.7)	(2.9)	(2.7)	(2.9)	(4.6)	(7.0)	(9.7)	(12.4)
30	Existing	30.6	31.9	33.3	35.1	36.9	38.8	39.2	39.3	39.3	39.3
	Proposed	18.7	24.0	26.8	29.3	30.8	31.8	32.4	32.7	32.7	32.7
	Combined	30.9	32.6	34.2	36.1	37.9	39.6	40.1	40.2	40.2	40.2
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(7.0)	(5.3)	(4.1)	(3.3)	(3.0)	(3.2)	(4.9)	(7.3)	(10.0)	(12.7)
31	Existing	21.0	24.1	26.7	27.8	29.3	31.1	31.6	31.6	31.6	31.6
	Proposed	18.6	23.9	26.7	29.2	30.7	31.7	32.3	32.6	32.6	32.6
	Combined	23.0	27.0	29.7	31.6	33.1	34.4	35.0	35.1	35.1	35.1
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.5)	(10.5)	(7.8)	(7.1)	(7.6)	(8.4)	(10.1)	(12.2)	(14.3)	(16.1)
32	Existing	21.0	24.0	26.7	27.7	29.3	31.0	31.5	31.5	31.5	31.5
	Proposed	18.3	23.6	26.4	28.9	30.4	31.4	32.0	32.3	32.3	32.3
	Combined	22.9	26.8	29.5	31.4	32.9	34.2	34.8	34.9	34.9	34.9
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.6)	(10.7)	(8.0)	(7.3)	(7.8)	(8.6)	(10.3)	(12.4)	(14.5)	(16.3)
33	Existing	18.6	21.9	24.7	25.7	27.2	28.9	29.4	29.4	29.4	29.4
	Proposed	18.2	23.5	26.3	28.8	30.3	31.3	31.9	32.2	32.2	32.2
	Combined	21.4	25.8	28.6	30.5	32.0	33.3	33.9	34.1	34.1	34.1
	Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.1	47.3	49.4	51.2
	Exceedance	(23.6)	(19.2)	(16.4)	(14.5)	(13.0)	(11.7)	(11.2)	(13.3)	(15.4)	(17.2)
34	Existing	30.1	32.1	34.0	35.6	37.2	39.1	39.6	39.7	39.7	39.7
	Proposed	20.7	26.0	28.8	31.3	32.8	33.8	34.4	34.7	34.7	34.7

	Combined	30.5	33.1	35.2	37.0	38.6	40.2	40.7	40.9	40.9	40.9
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(7.4)	(4.8)	(3.1)	(2.4)	(2.3)	(2.6)	(4.3)	(6.6)	(9.3)	(12.0)
35	Existing	17.1	20.5	23.4	24.4	25.9	27.6	28.1	28.1	28.1	28.1
	Proposed	17.8	23.1	25.9	28.4	29.9	30.9	31.5	31.8	31.8	31.8
	Combined	20.5	25.0	27.8	29.8	31.3	32.6	33.1	33.3	33.3	33.3
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(17.0)	(12.5)	(9.7)	(7.7)	(7.5)	(8.7)	(10.7)	(13.2)	(15.9)	(18.3)
36	Existing	16.3	19.8	22.7	23.7	25.2	26.9	27.4	27.4	27.4	27.4
	Proposed	16.9	22.2	25.0	27.5	29.0	30.0	30.6	30.9	30.9	30.9
	Combined	19.6	24.2	27.0	29.0	30.5	31.7	32.3	32.5	32.5	32.5
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(17.9)	(13.3)	(10.5)	(8.5)	(8.4)	(9.5)	(11.5)	(14.0)	(16.7)	(19.1)
37	Existing	16.5	20.0	22.9	23.9	25.4	27.1	27.6	27.6	27.6	27.6
	Proposed	17.4	22.7	25.5	28.0	29.5	30.5	31.1	31.4	31.4	31.4
	Combined	20.0	24.6	27.4	29.4	30.9	32.1	32.7	32.9	32.9	32.9
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(17.5)	(12.9)	(10.1)	(8.1)	(8.0)	(9.1)	(11.1)	(13.6)	(16.3)	(18.7)
38	Existing	21.1	25.0	28.0	29.0	30.4	32.1	32.6	32.6	32.6	32.6
	Proposed	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
	Combined	25.4	30.2	33.1	35.1	36.6	37.8	38.4	38.6	38.6	38.6
	Criteria	37.5	37.5	37.5	37.5	37.5	39.3	41.5	43.7	46.0	48.2
	Exceedance	(12.1)	(7.3)	(4.4)	(2.4)	(0.9)	(1.5)	(3.1)	(5.1)	(7.4)	(9.6)
39	Existing	29.2	31.9	34.3	35.7	37.2	38.9	39.4	39.5	39.5	39.5
	Proposed	21.4	26.7	29.5	32.0	33.5	34.5	35.1	35.4	35.4	35.4
	Combined	29.8	33.1	35.6	37.2	38.7	40.3	40.8	40.9	40.9	40.9
	Criteria	37.5	37.5	37.5	38.1	38.9	40.7	42.9	45.2	47.7	50.3
	Exceedance	(7.7)	(4.4)	(1.9)	(0.9)	(0.2)	(0.4)	(2.1)	(4.3)	(6.8)	(9.4)
40	Existing	26.8	30.7	33.7	34.7	36.1	37.9	38.4	38.4	38.4	38.4
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.2	33.8	36.7	38.5	39.9	41.3	41.8	42.0	42.0	42.0
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2

	Exceedance	(8.3)	(3.7)	(0.8)	0.5	0.6	0.4	(0.6)	(2.1)	(3.7)	(5.3)
41	Existing	27.3	31.0	34.2	35.1	36.5	38.2	38.7	38.7	38.7	38.7
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.5	33.9	36.9	38.6	40.1	41.4	42.0	42.1	42.1	42.1
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.0)	(3.6)	(0.6)	0.7	0.8	0.6	(0.4)	(1.9)	(3.6)	(5.1)
42	Existing	26.2	30.0	33.0	34.0	35.5	37.2	37.6	37.6	37.6	37.6
	Proposed	26.0	31.3	34.1	36.6	38.1	39.1	39.7	40.0	40.0	40.0
	Combined	29.1	33.7	36.6	38.5	40.0	41.3	41.8	42.0	42.0	42.0
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.4)	(3.8)	(0.9)	0.6	0.7	0.5	(0.6)	(2.1)	(3.7)	(5.3)
43	Existing	18.7	22.1	25.0	26.0	27.4	29.2	29.7	29.7	29.7	29.7
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	25.1	30.0	32.9	35.1	36.6	37.7	38.3	38.6	38.6	38.6
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(12.4)	(7.5)	(4.6)	(2.4)	(2.3)	(3.5)	(5.5)	(8.0)	(10.7)	(13.0)
44	Existing	16.6	20.2	23.1	24.1	25.5	27.2	27.7	27.8	27.8	27.8
	Proposed	17.9	23.2	26.0	28.5	30.0	31.0	31.6	31.9	31.9	31.9
	Combined	20.3	24.9	27.8	29.8	31.3	32.5	33.1	33.3	33.3	33.3
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(17.2)	(12.6)	(9.7)	(7.7)	(7.6)	(8.7)	(10.7)	(13.2)	(15.9)	(18.3)
45	Existing	19.7	22.9	25.7	26.7	28.2	30.0	30.5	30.5	30.5	30.5
	Proposed	20.6	25.9	28.7	31.2	32.7	33.7	34.3	34.6	34.6	34.6
	Combined	23.2	27.7	30.5	32.5	34.0	35.2	35.8	36.0	36.0	36.0
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.3)	(9.8)	(7.0)	(6.1)	(6.6)	(7.6)	(9.3)	(11.3)	(13.4)	(15.2)
46	Existing	19.9	23.1	25.9	26.9	28.4	30.1	30.6	30.7	30.7	30.7
	Proposed	20.4	25.7	28.5	31.0	32.5	33.5	34.1	34.4	34.4	34.4
	Combined	23.2	27.6	30.4	32.5	34.0	35.2	35.7	36.0	36.0	36.0
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.3)	(9.9)	(7.1)	(6.2)	(6.7)	(7.7)	(9.4)	(11.4)	(13.5)	(15.3)
	Existing	20.8	23.9	26.6	27.7	29.2	30.9	31.4	31.5	31.5	31.5

47	Proposed	19.9	25.2	28.0	30.5	32.0	33.0	33.6	33.9	33.9	33.9
	Combined	23.4	27.6	30.3	32.3	33.8	35.1	35.6	35.8	35.8	35.8
	Criteria	37.5	37.5	37.5	38.6	40.7	42.8	45.1	47.3	49.4	51.2
	Exceedance	(14.1)	(9.9)	(7.2)	(6.3)	(6.9)	(7.8)	(9.5)	(11.5)	(13.6)	(15.4)
48	Existing	30.2	32.2	34.1	35.7	37.3	39.2	39.7	39.8	39.8	39.8
	Proposed	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
	Combined	30.7	33.1	35.2	37.0	38.6	40.2	40.8	40.9	40.9	40.9
	Criteria	37.9	37.9	38.3	39.4	40.9	42.8	45.0	47.5	50.2	52.9
	Exceedance	(7.2)	(4.8)	(3.1)	(2.4)	(2.3)	(2.6)	(4.2)	(6.6)	(9.3)	(12.0)
49	Existing	27.5	31.2	34.2	35.1	36.6	38.3	38.8	38.8	38.8	38.8
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	28.7	32.8	35.7	37.1	38.6	40.1	40.6	40.7	40.7	40.7
	Criteria	37.5	37.5	37.5	38.1	38.9	40.7	42.9	45.2	47.7	50.3
	Exceedance	(8.8)	(4.7)	(1.8)	(1.0)	(0.3)	(0.6)	(2.3)	(4.5)	(7.0)	(9.6)
50	Existing	18.2	21.6	24.4	25.4	26.9	28.6	29.1	29.2	29.2	29.2
	Proposed	21.5	26.8	29.6	32.1	33.6	34.6	35.2	35.5	35.5	35.5
	Combined	23.1	27.9	30.7	32.9	34.4	35.6	36.1	36.4	36.4	36.4
	Criteria	37.5	37.5	37.5	37.5	38.9	41.2	43.8	46.5	49.2	51.6
	Exceedance	(14.4)	(9.6)	(6.8)	(4.6)	(4.5)	(5.7)	(7.7)	(10.2)	(12.8)	(15.2)

Table 9 - 19: Comparison of Predicted Against Night Time Noise Limits

Receptor		Reference Wind Speed standardised to 10m height (m/s) (LA90)									
		3	4	5	6	7	8	9	10	11	12
1	Existing	23.5	26.4	29.4	32.2	33.2	33.9	33.6	34.0	34.0	34.0
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	26.7	31.1	34.0	36.6	37.9	38.8	39.1	39.4	39.4	39.4
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(16.3)	(11.9)	(9.0)	(6.4)	(5.1)	(4.2)	(3.9)	(5.3)	(7.8)	(9.9)
2	Existing	19.8	22.0	24.6	27.3	28.5	29.3	29.2	29.5	29.5	29.5
	Proposed	18.9	24.2	27.0	29.5	31.0	32.0	32.6	32.9	32.9	32.9
	Combined	22.4	26.2	28.9	31.5	32.9	33.9	34.2	34.5	34.5	34.5

	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(20.6)	(16.8)	(14.1)	(11.5)	(10.1)	(9.1)	(8.8)	(8.5)	(12.1)	(16.8)
3	Existing	21.9	25.0	28.1	30.8	31.8	32.4	32.2	32.5	32.5	32.5
	Proposed	24.4	29.7	32.5	35.0	36.5	37.5	38.1	38.4	38.4	38.4
	Combined	26.3	30.9	33.8	36.4	37.7	38.6	39.1	39.4	39.4	39.4
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(16.7)	(12.1)	(9.2)	(6.6)	(5.3)	(4.4)	(3.9)	(5.4)	(7.9)	(10.0)
4	Existing	24.3	27.9	31.2	33.9	35.0	35.5	35.1	35.5	35.5	35.5
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	27.2	31.6	34.6	37.3	38.6	39.3	39.6	39.9	39.9	39.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(15.8)	(11.4)	(8.4)	(5.7)	(4.4)	(3.7)	(3.4)	(4.8)	(7.4)	(9.4)
5	Existing	21.6	24.7	27.8	30.5	31.6	32.2	31.9	32.2	32.2	32.2
	Proposed	24.1	29.4	32.2	34.7	36.2	37.2	37.8	38.1	38.1	38.1
	Combined	26.0	30.6	33.5	36.1	37.5	38.4	38.8	39.1	39.1	39.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(17.0)	(12.4)	(9.5)	(6.9)	(5.5)	(4.6)	(4.2)	(5.7)	(8.2)	(10.3)
6	Existing	26.8	30.7	34.1	36.9	37.8	38.3	37.9	38.4	36.6	38.4
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.3	33.8	36.9	39.5	40.7	41.5	41.6	42.0	41.3	42.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
	Exceedance	(13.7)	(9.2)	(6.1)	(3.5)	(2.3)	(1.5)	(1.4)	(1.0)	(2.2)	(3.4)
7	Existing	18.9	22.6	25.9	28.7	29.6	30.1	29.8	30.2	30.2	30.2
	Proposed	24.8	30.1	32.9	35.4	36.9	37.9	38.5	38.8	38.8	38.8
	Combined	25.8	30.8	33.7	36.2	37.6	38.6	39.0	39.3	39.3	39.3
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
	Exceedance	(17.2)	(12.2)	(9.3)	(6.8)	(5.4)	(4.4)	(4.0)	(3.7)	(4.3)	(7.9)
8	Existing	18.3	22.0	25.3	28.1	29.0	29.5	29.2	29.5	29.5	29.5
	Proposed	23.2	28.5	31.3	33.8	35.3	36.3	36.9	37.2	37.2	37.2
	Combined	24.4	29.3	32.2	34.8	36.2	37.1	37.5	37.8	37.8	37.8
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
	Exceedance	(18.6)	(13.7)	(10.8)	(8.2)	(6.8)	(5.9)	(5.5)	(5.2)	(5.8)	(9.4)

9	Existing	17.8	21.4	24.7	27.5	28.5	29.0	28.6	29.0	29.0	29.0
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.8	27.6	30.6	33.1	34.5	35.4	35.8	36.1	36.1	36.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
	Exceedance	(20.2)	(15.4)	(12.4)	(9.9)	(8.5)	(7.6)	(7.2)	(6.9)	(7.5)	(11.1)
10	Existing	17.5	21.0	24.3	27.0	28.0	28.5	28.2	28.6	28.6	28.6
	Proposed	20.2	25.5	28.3	30.8	32.3	33.3	33.9	34.2	34.2	34.2
	Combined	22.0	26.8	29.7	32.3	33.6	34.5	34.9	35.2	35.2	35.2
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(21.0)	(16.2)	(13.3)	(10.7)	(9.4)	(8.5)	(8.1)	(7.8)	(11.4)	(16.1)
11	Existing	16.4	19.9	23.2	26.0	26.9	27.4	27.1	27.5	27.5	27.5
	Proposed	17.2	22.5	25.3	27.8	29.3	30.3	30.9	31.2	31.2	31.2
	Combined	19.8	24.4	27.4	30.0	31.3	32.1	32.4	32.7	32.7	32.7
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(23.2)	(18.6)	(15.6)	(13.0)	(11.7)	(10.9)	(10.6)	(10.3)	(13.9)	(18.6)
12	Existing	18.0	21.4	24.6	27.4	28.4	28.9	28.6	29.0	29.0	29.0
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	23.6	28.4	31.3	33.9	35.3	36.2	36.6	36.9	36.9	36.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.4)	(14.6)	(11.7)	(9.1)	(7.7)	(6.8)	(6.4)	(6.1)	(9.7)	(14.4)
13	Existing	18.7	22.1	25.3	28.0	29.0	29.6	29.3	29.6	29.6	29.6
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	23.8	28.6	31.5	34.0	35.4	36.3	36.7	37.0	37.0	37.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.2)	(14.4)	(11.5)	(9.0)	(7.6)	(6.7)	(6.3)	(6.0)	(9.6)	(14.3)
14	Existing	19.3	22.6	25.8	28.6	29.5	30.1	29.8	30.2	30.2	30.2
	Proposed	22.0	27.3	30.1	32.6	34.1	35.1	35.7	36.0	36.0	36.0
	Combined	23.8	28.5	31.4	34.0	35.4	36.3	36.7	37.0	37.0	37.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.2)	(14.5)	(11.6)	(9.0)	(7.6)	(6.7)	(6.3)	(6.0)	(9.7)	(14.3)
15	Existing	19.4	22.7	25.9	28.6	29.6	30.2	29.9	30.3	30.3	30.3
	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9

	Combined	23.9	28.5	31.4	34.0	35.4	36.3	36.7	37.0	37.0	37.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.1)	(14.5)	(11.6)	(9.0)	(7.6)	(6.7)	(6.3)	(6.0)	(9.7)	(14.3)
16	Existing	27.5	31.2	34.5	37.3	38.3	38.8	38.3	38.8	38.8	38.8
	Proposed	22.8	28.1	30.9	33.4	34.9	35.9	36.5	36.8	36.8	36.8
	Combined	28.8	32.9	36.1	38.8	40.0	40.6	40.5	41.0	41.0	41.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
	Exceedance	(14.2)	(10.1)	(6.9)	(4.2)	(3.0)	(2.4)	(2.5)	(3.5)	(6.5)	(9.6)
17	Existing	18.0	21.4	24.7	27.4	28.4	28.9	28.6	29.0	29.0	29.0
	Proposed	21.2	26.5	29.3	31.8	33.3	34.3	34.9	35.2	35.2	35.2
	Combined	22.9	27.7	30.6	33.2	34.5	35.4	35.8	36.1	36.1	36.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(20.1)	(15.3)	(12.4)	(9.8)	(8.5)	(7.6)	(7.2)	(6.9)	(10.5)	(15.2)
18	Existing	18.0	21.4	24.6	27.4	28.4	28.9	28.6	29.0	29.0	29.0
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.9	27.6	30.5	33.1	34.5	35.4	35.8	36.1	36.1	36.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(20.1)	(15.4)	(12.5)	(9.9)	(8.5)	(7.6)	(7.2)	(6.9)	(10.6)	(15.2)
19	Existing	18.1	21.5	24.7	27.5	28.5	29.0	28.7	29.1	29.1	29.1
	Proposed	21.3	26.6	29.4	31.9	33.4	34.4	35.0	35.3	35.3	35.3
	Combined	23.0	27.8	30.7	33.3	34.6	35.5	35.9	36.3	36.3	36.3
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(20.0)	(15.2)	(12.3)	(9.7)	(8.4)	(7.5)	(7.1)	(6.7)	(10.4)	(15.1)
20	Existing	18.4	21.7	24.9	27.7	28.7	29.2	28.9	29.3	29.3	29.3
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	22.9	27.7	30.6	33.1	34.5	35.4	35.8	36.1	36.1	36.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(20.1)	(15.3)	(12.4)	(9.9)	(8.5)	(7.6)	(7.2)	(6.9)	(10.5)	(15.2)
21	Existing	19.1	22.5	25.8	28.6	29.5	30.1	29.7	30.1	30.1	30.1
	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
	Combined	23.7	28.5	31.4	34.0	35.3	36.2	36.6	36.9	36.9	36.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3

	Exceedance	(19.3)	(14.5)	(11.6)	(9.0)	(7.7)	(6.8)	(6.4)	(6.1)	(9.7)	(14.4)
22	Existing	22.4	25.5	28.6	31.3	32.4	33.0	32.7	33.0	33.0	33.0
	Proposed	21.1	26.4	29.2	31.7	33.2	34.2	34.8	35.1	35.1	35.1
	Combined	24.8	29.0	31.9	34.5	35.8	36.6	36.9	37.2	37.2	37.2
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(18.2)	(14.0)	(11.1)	(8.5)	(7.2)	(6.4)	(6.1)	(7.5)	(10.1)	(12.2)
23	Existing	27.0	30.0	33.0	35.7	36.8	37.5	37.1	37.6	37.6	37.6
	Proposed	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
	Combined	28.6	32.3	35.3	37.9	39.1	40.0	40.0	40.5	40.5	40.5
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
	Exceedance	(14.4)	(10.7)	(7.7)	(5.1)	(3.9)	(3.0)	(3.0)	(2.5)	(3.1)	(5.0)
24	Existing	20.5	23.7	26.9	29.7	30.7	31.2	30.9	31.3	31.3	31.3
	Proposed	20.8	26.1	28.9	31.4	32.9	33.9	34.5	34.8	34.8	34.8
	Combined	23.7	28.1	31.0	33.6	34.9	35.8	36.1	36.4	36.4	36.4
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(19.3)	(14.9)	(12.0)	(9.4)	(8.1)	(7.2)	(6.9)	(8.3)	(10.9)	(12.9)
25	Existing	18.6	22.1	25.4	28.1	29.1	29.6	29.3	29.7	29.7	29.7
	Proposed	21.9	27.2	30.0	32.5	34.0	35.0	35.6	35.9	35.9	35.9
	Combined	23.6	28.4	31.3	33.8	35.2	36.1	36.5	36.8	36.8	36.8
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.4)	(14.6)	(11.7)	(9.2)	(7.8)	(6.9)	(6.5)	(6.2)	(9.8)	(14.5)
26	Existing	21.2	24.4	27.6	30.3	31.3	31.9	31.6	32.0	32.0	32.0
	Proposed	22.7	28.0	30.8	33.3	34.8	35.8	36.4	36.7	36.7	36.7
	Combined	25.0	29.5	32.5	35.0	36.4	37.2	37.6	37.9	37.9	37.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(18.0)	(13.5)	(10.5)	(8.0)	(6.6)	(5.8)	(5.4)	(6.8)	(9.4)	(11.4)
27	Existing	30.3	32.3	34.7	37.3	38.6	39.6	39.2	39.8	39.8	39.8
	Proposed	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
	Combined	30.7	33.2	35.6	38.3	39.6	40.6	40.4	40.9	40.9	40.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(12.3)	(9.8)	(7.4)	(4.7)	(3.4)	(2.4)	(4.0)	(6.6)	(9.6)	(12.6)
	Existing	30.5	32.4	34.7	37.4	38.7	39.7	39.4	39.9	39.9	39.9

28	Proposed	20.3	25.6	28.4	30.9	32.4	33.4	34.0	34.3	34.3	34.3
	Combined	30.9	33.2	35.6	38.3	39.6	40.6	40.5	41.0	41.0	41.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(12.1)	(9.8)	(7.4)	(4.7)	(3.4)	(2.4)	(3.9)	(6.5)	(9.5)	(12.5)
29	Existing	30.8	32.2	34.1	36.7	38.2	39.3	39.2	39.6	39.6	39.6
	Proposed	19.3	24.6	27.4	29.9	31.4	32.4	33.0	33.3	33.3	33.3
	Combined	31.1	32.9	35.0	37.6	39.0	40.1	40.1	40.5	40.5	40.5
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(11.9)	(10.1)	(8.0)	(5.4)	(4.0)	(2.9)	(4.3)	(7.0)	(10.0)	(13.0)
30	Existing	30.6	31.9	33.7	36.4	37.8	39.0	38.9	39.3	39.3	39.3
	Proposed	18.7	24.0	26.8	29.3	30.8	31.8	32.4	32.7	32.7	32.7
	Combined	30.9	32.6	34.6	37.1	38.6	39.8	39.8	40.2	40.2	40.2
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(12.1)	(10.4)	(8.4)	(5.9)	(4.4)	(3.2)	(4.6)	(7.3)	(10.3)	(13.3)
31	Existing	21.0	24.1	27.1	29.8	30.9	31.5	31.2	31.6	31.6	31.6
	Proposed	18.6	23.9	26.7	29.2	30.7	31.7	32.3	32.6	32.6	32.6
	Combined	23.0	27.0	29.9	32.5	33.8	34.6	34.8	35.1	35.1	35.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(20.0)	(16.0)	(13.1)	(10.5)	(9.2)	(8.4)	(8.2)	(9.6)	(12.1)	(14.2)
32	Existing	21.0	24.0	27.0	29.8	30.8	31.5	31.2	31.5	31.5	31.5
	Proposed	18.3	23.6	26.4	28.9	30.4	31.4	32.0	32.3	32.3	32.3
	Combined	22.9	26.8	29.7	32.4	33.6	34.4	34.6	34.9	34.9	34.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(20.1)	(16.2)	(13.3)	(10.6)	(9.4)	(8.6)	(8.4)	(9.8)	(12.3)	(14.4)
33	Existing	18.6	21.9	25.0	27.8	28.8	29.4	29.1	29.4	29.4	29.4
	Proposed	18.2	23.5	26.3	28.8	30.3	31.3	31.9	32.2	32.2	32.2
	Combined	21.4	25.8	28.7	31.3	32.6	33.5	33.7	34.1	34.1	34.1
	Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.3	49.4
	Exceedance	(23.6)	(19.2)	(16.3)	(13.7)	(12.4)	(11.5)	(11.3)	(10.9)	(13.2)	(15.3)
34	Existing	30.1	32.1	34.6	37.3	38.5	39.4	39.0	39.7	39.7	39.7
	Proposed	20.7	26.0	28.8	31.3	32.8	33.8	34.4	34.7	34.7	34.7
	Combined	30.5	33.1	35.6	38.2	39.5	40.5	40.3	40.9	40.9	40.9

	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(12.5)	(9.9)	(7.4)	(4.8)	(3.5)	(2.5)	(4.1)	(6.6)	(9.6)	(12.6)
35	Existing	17.1	20.5	23.8	26.5	27.5	28.1	27.7	28.1	28.1	28.1
	Proposed	17.8	23.1	25.9	28.4	29.9	30.9	31.5	31.8	31.8	31.8
	Combined	20.5	25.0	28.0	30.6	31.9	32.7	33.0	33.3	33.3	33.3
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(22.5)	(18.0)	(15.0)	(12.4)	(11.1)	(10.3)	(10.0)	(9.7)	(13.3)	(18.0)
36	Existing	16.3	19.8	23.1	25.9	26.8	27.4	27.0	27.4	27.4	27.4
	Proposed	16.9	22.2	25.0	27.5	29.0	30.0	30.6	30.9	30.9	30.9
	Combined	19.6	24.2	27.2	29.8	31.1	31.9	32.2	32.5	32.5	32.5
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(23.4)	(18.8)	(15.8)	(13.2)	(11.9)	(11.1)	(10.8)	(10.5)	(14.1)	(18.8)
37	Existing	16.5	20.0	23.3	26.1	27.0	27.6	27.2	27.6	27.6	27.6
	Proposed	17.4	22.7	25.5	28.0	29.5	30.5	31.1	31.4	31.4	31.4
	Combined	20.0	24.6	27.6	30.2	31.5	32.3	32.6	32.9	32.9	32.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(23.0)	(18.4)	(15.4)	(12.8)	(11.5)	(10.7)	(10.4)	(10.1)	(13.7)	(18.4)
38	Existing	21.1	25.0	28.4	31.2	32.1	32.6	32.2	32.6	32.6	32.6
	Proposed	23.3	28.6	31.4	33.9	35.4	36.4	37.0	37.3	37.3	37.3
	Combined	25.4	30.2	33.2	35.8	37.1	37.9	38.3	38.6	38.6	38.6
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	47.2
	Exceedance	(17.6)	(12.8)	(9.8)	(7.2)	(5.9)	(5.1)	(4.7)	(4.4)	(5.0)	(8.7)
39	Existing	29.2	31.9	34.8	37.6	38.7	39.3	39.0	83.4	39.5	39.5
	Proposed	21.4	26.7	29.5	32.0	33.5	34.5	35.1	35.4	35.4	35.4
	Combined	29.8	33.1	36.0	38.7	39.8	40.6	40.5	83.4	40.9	40.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
	Exceedance	(13.2)	(9.9)	(7.0)	(4.3)	(3.2)	(2.4)	(2.5)	38.9	(6.6)	(9.7)
40	Existing	26.8	30.7	34.1	36.9	37.8	38.3	37.9	38.4	38.4	38.4
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.2	33.8	36.9	39.5	40.7	41.5	41.6	42.0	42.0	42.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
	Exceedance	(13.8)	(9.2)	(6.1)	(3.5)	(2.3)	(1.5)	(1.4)	(1.0)	(1.6)	(3.4)

41	Existing	27.3	31.0	34.5	37.3	38.3	38.7	38.1	38.7	38.7	38.7
	Proposed	25.5	30.8	33.6	36.1	37.6	38.6	39.2	39.5	39.5	39.5
	Combined	29.5	33.9	37.1	39.7	41.0	41.7	41.7	42.1	42.1	42.1
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
	Exceedance	(13.5)	(9.1)	(5.9)	(3.3)	(2.0)	(1.3)	(1.3)	(0.9)	(1.4)	(3.3)
42	Existing	26.2	30.0	33.4	36.2	37.1	37.6	37.2	37.6	37.6	37.6
	Proposed	26.0	31.3	34.1	36.6	38.1	39.1	39.7	40.0	40.0	40.0
	Combined	29.1	33.7	36.8	39.4	40.7	41.4	41.7	42.0	42.0	42.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.6	45.4
	Exceedance	(13.9)	(9.3)	(6.2)	(3.6)	(2.3)	(1.6)	(1.3)	(1.0)	(1.6)	(3.4)
43	Existing	18.7	22.1	25.4	28.2	29.1	29.6	29.3	29.7	29.7	29.7
	Proposed	24.0	29.3	32.1	34.6	36.1	37.1	37.7	38.0	38.0	38.0
	Combined	25.1	30.0	32.9	35.5	36.9	37.8	38.3	38.6	38.6	38.6
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(17.9)	(13.0)	(10.1)	(7.5)	(6.1)	(5.2)	(4.7)	(4.4)	(8.1)	(12.7)
44	Existing	16.6	20.2	23.5	26.2	27.2	27.7	27.4	27.8	27.8	27.8
	Proposed	17.9	23.2	26.0	28.5	30.0	31.0	31.6	31.9	31.9	31.9
	Combined	20.3	24.9	27.9	30.5	31.8	32.6	33.0	33.3	33.3	33.3
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(22.7)	(18.1)	(15.1)	(12.5)	(11.2)	(10.4)	(10.0)	(9.7)	(13.4)	(18.0)
45	Existing	19.7	22.9	26.1	28.8	29.8	30.4	30.1	30.5	30.5	30.5
	Proposed	20.6	25.9	28.7	31.2	32.7	33.7	34.3	34.6	34.6	34.6
	Combined	23.2	27.7	30.6	33.2	34.5	35.4	35.7	36.0	36.0	36.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(19.8)	(15.3)	(12.4)	(9.8)	(8.5)	(7.6)	(7.3)	(8.7)	(11.2)	(13.3)
46	Existing	19.9	23.1	26.2	29.0	30.0	30.6	30.3	30.7	30.7	30.7
	Proposed	20.4	25.7	28.5	31.0	32.5	33.5	34.1	34.4	34.4	34.4
	Combined	23.2	27.6	30.5	33.1	34.5	35.3	35.6	36.0	36.0	36.0
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(19.8)	(15.4)	(12.5)	(9.9)	(8.5)	(7.7)	(7.4)	(8.8)	(11.3)	(13.4)
47	Existing	20.8	23.9	27.0	29.7	30.8	31.4	31.1	31.5	31.5	31.5
	Proposed	19.9	25.2	28.0	30.5	32.0	33.0	33.6	33.9	33.9	33.9

	Combined	23.4	27.6	30.5	33.1	34.4	35.2	35.5	35.8	35.8	35.8
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.7	47.3	49.4
	Exceedance	(19.6)	(15.4)	(12.5)	(9.9)	(8.6)	(7.8)	(7.5)	(8.9)	(11.5)	(13.5)
48	Existing	30.2	32.2	34.6	37.3	38.6	39.5	39.1	39.8	39.8	39.8
	Proposed	20.5	25.8	28.6	31.1	32.6	33.6	34.2	34.5	34.5	34.5
	Combined	30.7	33.1	35.6	38.3	39.5	40.5	40.4	40.9	40.9	40.9
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.4	47.5	50.5	53.5
	Exceedance	(12.3)	(9.9)	(7.4)	(4.7)	(3.5)	(2.5)	(4.0)	(6.6)	(9.6)	(12.6)
49	Existing	27.5	31.2	34.5	37.3	38.3	38.8	38.4	38.8	38.8	38.8
	Proposed	22.2	27.5	30.3	32.8	34.3	35.3	35.9	36.2	36.2	36.2
	Combined	28.7	32.8	35.9	38.6	39.7	40.4	40.3	40.7	40.7	40.7
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5	47.5	50.6
	Exceedance	(14.3)	(10.2)	(7.1)	(4.4)	(3.3)	(2.6)	(2.7)	(3.8)	(6.8)	(9.9)
50	Existing	18.2	21.6	24.8	27.6	28.6	29.1	28.8	29.2	29.2	29.2
	Proposed	21.5	26.8	29.6	32.1	33.6	34.6	35.2	35.5	35.5	35.5
	Combined	23.1	27.9	30.8	33.4	34.8	35.6	36.1	36.4	36.4	36.4
	Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	46.6	51.3
	Exceedance	(19.9)	(15.1)	(12.2)	(9.6)	(8.2)	(7.4)	(6.9)	(6.6)	(10.3)	(14.9)
	Existing	27.3	31.0	34.5	37.3	38.3	38.7	38.1	38.7	38.7	38.7

9.82. At all NSR locations, the predicted cumulative levels are below the derived assessment criteria across the wind speed range except at four receptors. At Receptors 6, 40, 41, and 42; there was a slight exceedance of the day time limits at the wind speeds of 6, 7, and 8m/s at a height of 10m. Therefore, the noise effects from the cumulative operation of all local wind turbine developments at these four receptor locations is deemed as **High** and therefore a **Significant** impact is anticipated.

MITIGATION MEASURES

Construction/Decommissioning Phase

9.83. The following good practice measures will be required of all contractors during construction:

- Operations shall be limited to times agreed with Limavady Borough Council Environmental Health Department.
- The site contractors shall publicise the programme (in local newspapers, through mailings to local residents and through an on-site information board at the site access) for the commencement and duration of operations, provide details of the project programme and provide named contacts for daytime and out of hours.
- A community liaison group, comprising representatives from the nearest communities and the Applicant, shall meet regularly prior to and during the construction period to facilitate communication between the parties and ensure that opportunities are taken to minimise noise nuisance through effective project management.
- The site contractors shall prepare detailed method statements for each construction activity, which will include identification of potentially noisy operations and details of noise control measures to be adopted, to be available for inspection by Limavady Borough Council's Environmental Health Department.
- The contractors shall be required to select the quietest item of suitable plant available for all site operations where practicable.
- The work programme on site will also be phased to reduce the combined effects arising from several noisy operations.
- Where necessary and practicable, noise from fixed plant and equipment shall be contained within suitable acoustic enclosures or behind acoustic screens.
- All sub-contractors appointed by the main contractor shall be formally and legally obliged, through contract, to comply with all environmental noise conditions.
- Where practicable, night time working will not be carried out. However, any plant and equipment required for operation at night (23:00 - 07:00) shall be mains electric powered where practicable. Any night-time lighting rigs, pumps or other equipment shall be powered using mains electricity or silenced and suitably shielded to ensure

compliance with World Health Organisation (WHO) night-time noise criteria at the nearest residential properties, assuming open windows.

Operational Phase

9.84. The Enercon turbine has different operating modes built in and can be switched at any time. It can also be programmed to switch modes depending on the wind speed at that time. It is proposed that turbines 1 and 2 will switch into the 500kW operating mode at the wind speeds of 6-8m/s at a height of 10m. This will be during the day time period only and only when receptors 6, 40, 41, and 42 are downwind from these turbines. Other forms of mitigation, other than the proposed, are also being investigated as there appear to be additional technological solutions. Should any other form of mitigation be proposed, details will be submitted to the local authority prior to commissioning for agreement and such a condition would be requested. Any mitigation proposed should meet the noise output from the Proposed Development in the Table 9-22.

9.85. Measurements of the noise emissions of the E92 in the 500kW operating mode are summarised in Tables 9.20 and 9.21 and the manufacturers document can be found in Appendix 9B.

Table 9 - 20: Summary of 1/3 Octave Band Centres at 10m/s Winds

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
Sound Power Level, LWa (dB(A))	81.6	87.2	89.5	91.5	92.5	91.1	83.5	67.2	98.0

9.86. ETSU-R-97 recommends the addition of penalties, where tonal noise of audibility 2dB or more are present, ranging from 1.5dB at a tonal audibility of 2dB to 5dB at audibility of 6.5dB or more. No tonal penalty is applicable to this turbine type.

9.87. With regards to uncertainty, the manufacturer's warranty document outlined a standard uncertainty across all windspeeds of 1dB.

Table 9 - 21: Tonal Penalties and Effective Sound Power Levels

Standardised 10 m Integer Wind Speed (m/s)	3	4	5	6	7	8	9	10	11	12
Apparent Sound Power Level, LWA (dB)	90.5	95.9	97.9	98.0	98.0	98.0	98.0	98.0	98.0	98.0

Uncertainty (dB)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Applicable Tonal Penalty (dB)	-	-	-	-	-	-	-	-	-	-
Effective Sound Power Level, LWA (dB)	91.5	96.9	98.9	99.0	99.0	99.0	99.0	99.0	99.0	99.0

Residual Effects

9.88. Tables 9-22 shows a comparison of the predicted cumulative noise levels with the mitigation measure in place, for the day time period, with the recommended noise limits for each receptor within an exceedance. The term 'exceedance' is used to denote the difference between the predicted wind turbine noise level and the recommended limit. A negative value (in brackets) indicates that the predicted noise level is within the limit.

Table 9 - 22: Comparison of Predicted Against Day Time Noise Limits

Receptor		Reference Wind Speed standardised to 10m height (m/s) (LA90)									
		3	4	5	6	7	8	9	10	11	12
6	Existing	26.8	30.7	33.7	34.7	36.1	37.9	38.4	38.4	36.6	38.4
	Proposed	25.5	30.8	33.3	34.9	36.0	36.8	37.3	37.5	37.5	37.5
	Combined	29.2	33.8	36.5	37.8	39.1	40.4	40.9	41.0	40.1	41.0
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.3)	(3.7)	(1.0)	(0.1)	(0.2)	(0.4)	(1.5)	(3.1)	(5.6)	(6.2)
40	Existing	26.8	30.7	33.7	34.7	36.1	37.9	38.4	38.4	38.4	38.4
	Proposed	25.4	30.8	33.2	34.8	35.9	36.7	37.2	37.5	37.5	37.5
	Combined	29.2	33.7	36.5	37.8	39.1	40.3	40.8	40.9	40.9	40.9
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.3)	(3.8)	(1.0)	(0.2)	(0.3)	(0.5)	(1.6)	(3.1)	(4.8)	(6.3)
41	Existing	27.3	31.0	34.2	35.1	36.5	38.2	38.7	38.7	38.7	38.7
	Proposed	25.4	30.7	33.2	34.9	36.0	36.8	37.3	37.5	37.5	37.5
	Combined	29.4	33.9	36.7	38.0	39.3	40.6	41.1	41.2	41.2	41.2
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.1)	(3.6)	(0.8)	(0.0)	(0.1)	(0.2)	(1.3)	(2.9)	(4.5)	(6.1)
42	Existing	26.2	30.0	33.0	34.0	35.5	37.2	37.6	37.6	37.6	37.6
	Proposed	25.9	31.3	33.7	35.3	36.4	37.2	37.6	37.9	37.9	37.9
	Combined	29.1	33.7	36.4	37.7	39.0	40.2	40.6	40.8	40.8	40.8
	Criteria	37.5	37.5	37.5	37.9	39.3	40.8	42.4	44.1	45.7	47.2
	Exceedance	(8.4)	(3.8)	(1.1)	(0.2)	(0.4)	(0.6)	(1.8)	(3.3)	(4.9)	(6.5)

SUMMARY & CONCLUSION

Noise

9.89. The construction/decommissioning phase assessed as Temporary and **Low** impact and therefore effects are not **Significant**. This will remain the same as for the Consented Development which is already underway.

9.90. Mitigation is not required in order for effects to be not significant, as set out above. However, some construction/decommissioning phase mitigation measures have been outlined and are generally common practice.

9.91. The operational phase is assessed as having a **high** impact at four receptors within the study area and a low to **negligible** impact at all others. The four receptors with a **High** impact will therefore experience a **significant effect,** prior to mitigation. Mitigation has been proposed in the form of switching turbine operating modes at specific wind speeds and directions, although the Applicant reserves the right to change mitigation option in agreement with the council, as long as the conditioned limits can be achieved. The residual impacts of the Proposed Development are **low** to **negligible** at all receptors and therefore effects are not **Significant**.

Vibration

9.92. Given the large distance between the vibration generating activities and the NSRs and vibrations would be below background level, there will be a **negligible** impact and therefore effects are not **Significant**.

Chapter 10: Existing Infrastructure and Aviation

10. EXISTING INFRASTRUCTURE AND AVIATION

INTRODUCTION

Background

10.1. Neo Environmental Ltd has been appointed by Smulgedon Wind Farm Ltd (the "Applicant") to undertake the Existing Infrastructure and Aviation chapter of an Environmental Statement (ES) for a proposed amendment (the "Proposed Development") to a consented wind farm (**Planning Reference B/2009/0070/F**) on lands at Smulgedon Hill, BT49 OPY (the "Application Site"). The original consented development ("Original Consent") consists of seven wind turbines of 120.5m to tip. Please see **Figure 1** for the layout of the Proposed Development.

10.2. For the purposes of this Environmental Statement (ES) the larger consented development area that constitutes the original wind farm and all associated infrastructure will be referred to as "the Original Application Area."

10.3. This chapter will describe and assess the potential effects on existing infrastructure including: Television and Communications and Aviation.

Development Description

10.4. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all seven turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

10.5. For a full description of the Proposed Development and the various elements, please see **Chapter 1: Introduction** of this Environmental Statement.

10.6. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Site Description

10.7. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

10.8. The area that encompass the amendment application (the "Application Site") lies at an elevation of approximately 210m-290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474. on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

10.9. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the land holdings are bound by post and wire fencing throughout the area. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the land holdings before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

LEGISLATION, POLICY & GUIDANCE

10.10. The Proposed Development has been assessed against existing national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance:

- Department for the Environment (DoE) (2009) Planning Policy Statement 18: Renewable Energy;1
- PPS 18 Best Practice Guidance;2
- Ofcom (2009) Tall Structures and Their Impact on Broadcast and Other Wireless Services;3
- Wind Energy and Aviation Interests – Interim Guidelines;4
- Best Practice Guidelines for Irish Wind Energy Industry (IWEA) and5
- CAP 764 – CAA Policy and Guidelines on Wind Turbines.;6

10.11. The most relevant policy documents for this Chapter are discussed in more detail below.

Planning Policy Statement 18: Renewable Energy (2009)

Aviation

10.12. PPS 18 sets out the DOE's planning policy for development that generates energy from renewable resources and that requires the submission of a planning application with the aim of *"facilitating the siting of renewable energy generating facilities in appropriate locations*

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1 https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18__renewable_energy.pdf

2 https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18__renewable_energy__best_practice_guidance.pdf

3 https://www.ofcom.org.uk/__data/assets/pdf_file/0026/63494/tall_structures.pdf

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48101/file17828.pdf

5 https://www.iwea.com/images/files/9660bdfb5a4f1d276f41ae9ab54e991bb600b7.pdf

6 https://publicapps.caa.co.uk/docs/33/CAP764%20Issue6%20FINAL%20Feb.pdf

within the built and natural environment in order to achieve Northern Ireland's renewable energy targets and to realise the benefits of renewable energy."

10.13. Of particular relevance is Policy RE 1 – Renewable Energy Development:

"Development that generates energy from renewable resources will be permitted provided the proposal, and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on:

- public safety, human health, or residential amenity;
- visual amenity and landscape character;
- biodiversity, nature conservation or built heritage interests;
- local natural resources, such as air quality or water quality; and
- public access to the countryside.

Application for wind energy development will also be required to demonstrate the following:

- (iv) that no part of the development will give rise to unacceptable electromagnetic interference to communications installations; radar or air traffic control systems; emergency services communications; or other telecommunication systems.
- (v) that no part of the development will have an unacceptable impact on roads, rail or aviation safety.

10.14. The Best Practice Guidance to PPS 18 provides aviation guidance and states that wind turbines can result in two potential aviation effects. Paragraph 1.3.65 states that *"firstly, they may present a risk of collision with low flying aircraft and secondly, they may interfere with the proper operation of radar by limiting the capacity to handle air traffic, and aircraft instrument landing systems."*

10.15. In relation to collision risk for aircraft, Paragraph 1 .3.67 states that *"in the interests of aviation safety, lights may be required on wind turbine development and is mandatory in all cases where the structure exceeds 150 m high."*

10.16. In terms of potential radar effects, the Best Practice Guidance to PPS 18, Paragraph 1.3.69 advises that *"any large structure is liable to show up on radar, but wind turbines can present a particular problem as they can be interpreted by radar as a moving object, which is only intermittently seen (as the nacelle rotates to face the wind)."* As such, consultation is required with relevant aviation stakeholders with regard to the Proposed Development, although most consultations conducted for the Original Consent will still be valid. Paragraph 1.3.70 states that *"if an objection is raised by either a civil aviation or Defence Estates consultee, the onus is on the applicant to prove that the proposal will have no adverse effect on aviation interests."*

Television Reception

10.17. The Best Practice Guidance to PPS 18 states the following in Paragraph 1.3.60 in relation to television reception interference, *"when this occurs, it is of a predictable nature and can generally be alleviated by a range of measures such as ae rial redirection / upgrade or the installation or modification of a local repeater station or cable connection."*

Microwave Communications

10.18. PPS 18 highlights that a wind farm application will need to state *"that no part of the development will give rise to unacceptable electromagnetic interference to communications installations; radar or air traffic control systems emergency services communications; or other telecommunications systems"*

10.19. In terms of microwave link and interference from wind turbines, PPS18 states in Paragraph 1.3.59 that "*provided careful attention is paid to siting, wind turbines should not cause any significant adverse effects on communication systems which use electromagnetic waves as the transmission medium."*

METHODOLOGY

10.20. The initial assessment included a desk based assessment of installations that may be impacted by the proposed development, as well as consultation with the various stakeholders responsible for aviation and communications installations.

10.21. The desk based assessment used a variety of information sources, including:

- A propriety database of UK aviation and radar installations
- CAA Aviation Maps and
- Ordnance Survey of Northern Ireland Maps

10.22. The following types of installation have been considered in the desk assessment;

- Civil Airports and radar
- Other licensed civil airfields
- Unlicensed civil airfields
- Ulster Hang Gliding and Paragliding Association Club
- Meteorological radar
- Television transmitters
- Microwave Communications Links and
- UHF Radio Telemetry Links.

CONSULTATION

10.23. Consultations for the original consented development were undertaken with organisations and system operators that could be affected by the proposed scheme. The consultee responses remain relevant for the Proposed Development and further consultations were undertaken with Belfast International Airport (BIA), Belfast City Airport (BCA), City of Derry Airport (CoDA) and The Joint Radio Company Limited (JRC). It should be noted that the Proposed Development will result in a reduction of 5.6m in the overall tip height of the wind turbine.

10.24. Responses from consultees are detailed in **Table 10.1** below with dates provided for any updated responses since the original Consent:

Table 10.1 Consultee Response Table

Consultee & Date	Summary of Response
Belfast City Airport 30/01/2020	BCA have no aerodrome safeguarding related concerns: • Location is outside BCA Obstacle Limitation Surfaces (OLS) • > 30 km from the airfield • Not in line of sight of their radar
Belfast International Airport 30/01/2020	BIA have no aerodrome safeguarding related concerns: • Location is outside of BIA safeguarded area.
City of Derry Airport 04/02/2020	CoDA have no objection to the proposed change to the turbine type.
The Joint Radio Company Limited (JRC) 10/02/2020	JRC does not foresee any potential problems based on known interference scenarios and the data provided.
Consultee responses from Original Consent	
Arqiva	Unlikely to affect the UHF broadcast feeds
British Parachuting Association	Not within 1km of Airfield therefore no objection to the Development.

CAA	Advises the consultation of NATS and the British Hang Gliding and Parachuting Association. Recommends that structures over 300 feet should be plotted on civil aviation maps.
CSS	No formal response received from CSS but a verbal confirmation was obtained that CSS does not respond to enquiries for wind farms in Northern Ireland.
MoD (Defence Estates)	No objections, do not cover Northern Ireland
National Grid Wireless	Will have no affect on their operations.
Northern Ireland Water	No objections.
Ofcom	Identified the PSNI link within the vicinity of the site.
PSNI	PSNI radio site adjacent to the proposal, and has many links operating from it. Require exclusion zone of 100m.
Ulster Hang Gliding & Paragliding Club	No Comment received

BASELINE CONDITIONS

10.25. The following installations and systems have been identified following consultation, desktop study and survey.

Aviation

10.26. The nearest civil airport is City of Derry Airport which lies approximately 22km to the northwest of the Development site. The nearest civil airport with radar facilities is Belfast International Airport (Also known as Aldergrove) which lies approximately 52km to the southeast.

10.27. The nearest military airfield shown on the Aviation Map is Ballykelly which lies approximately 15km to the northwest. This is a government heliport with an associated free-fall parachuting drop zone at this location.

10.28. The closest airfield to Smulgedon is Ballyrogan which is an airfield located 4km to the northeast of the site, and is used by the British Paragliding Association, who were consulted on the Original Consented Development. They highlighted no problems.

10.29. From an initial desk based assessment it is believed that there is no known meteorological radar within 30km.

Telecommunications

10.30. Ofcom identified one fixed microwave link for the Original Consented Application that passes in the vicinity of the Proposed Development, operated by Police Service of Northern Ireland (PSNI).

10.31. The turbine layout was modified to ensure that all turbines are outside the calculated microwave link exclusion zones (for the known links) and it is therefore anticipated the Proposed Development will not interfere with operation of the communications links.

SUMMARY OF EFFECTS

10.32. A summary of the potential effects, mitigation and residual effects discussed in this chapter is included in Table 10.2 below.

Table 10.2 Summary of Effects Table

Potential Effect	Mitigation	Residual Effects
Construction Effects		
Interference caused by tall cranes on site	Erection cranes unlikely to be in direct vicinity of links. No mitigation necessary.	No significant effect.
Utilities	None necessary.	No existing utilities will be effected.
Operational Effects		
Aviation	No mitigation required. MoD to be advised before construction commences of potential obstruction.	No significant effect.
Television	Any effects can be resolved through technical solutions including change in aerial height, replacement and retuning of aerials or provision of satellite or cable services.	No significant effect.
Telecommunications	Microwave links avoided.	No significant effect.
Decommissioning Effects		
None identified		

MITIGATION MEASURES

10.33. It is expected that the Proposed Development will have **No Significant effects** on the civil airports and airfields and therefore no mitigation is required.

10.34. No mitigation is required for military airfields as there are **No Significant effects anticipated** for these assets.

10.35. Technical solutions can resolve any adverse impacts with regard to television reception interference. These mitigation measures can include:

Change in aerial height

Replacement of receiving aerials

Returning of television receivers or

Provision of 'free to air' satellite or cable services to affected households.

RESIDUAL EFFECTS

10.36. Upon implementation of the above mitigation measures (where required) which were deemed acceptable for the Original Consented Development and conditioned (**Condition 22, of planning Ref B/2009/0070/F – previously discharged**), the Proposed Development will result in **Negligible residual effects**. The conditions applied to the Original Consented Development (**Planning Reference B/2009/0070/F**) should be included in any decision for the Proposed Development.

SUMMARY & CONCLUSION

10.37. As there is a reduction in the overall height of the turbines by 5.6m, it is concluded that the amendments to the Proposed Development is unlikely to result in any additional aviation or telecommunication issues. Belfast International Airport (BIA), Belfast City Airport (BCA), City of Derry Airport (CoDA) and The Joint Radio Company Limited (JRC) have been consulted and confirmed that they have no safeguarding related concerns or objections to the proposed changes to the turbine type and they don't foresee any potential problems. Therefore, effects upon aviation and telecommunication assets are considered **Negligible.**

Chapter 11: Traffic and Transportation

11. TRAFFIC AND TRANSPORTATION

INTRODUCTION

11.1. This chapter of the Environmental Statement (ES) provides an assessment of the potential effects of increased road traffic expected as a result of the construction, operation and decommissioning of the Development. The chapter assesses the significance of these effects against recognised guidelines and, where required, appropriate mitigation measures are considered.

11.2. A Construction Traffic Management Plan (CTMP), including an abnormal load route assessment, **(Volume 4, Technical Appendix 11.1)** has also been produced to support the application.

11.3. This chapter is also supported by the following Figures (see **Volume 3**):

- Appendix 11.A – Figures
  - Figure 11.1: Collision Data
- All other figures referenced in this Chapter can be found in the **Appendices of Technical Appendix 11 (CTMP) within Volume 4 of this ES**.

11.4. It should be noted that the traffic generated and loads will not differ substantially from the Original Consented Development (**Ref: B/2009/0070/F, as amended).** The only changes to the original consent include slightly higher load numbers due to the larger crane pads and foundations. The abnormal load haul route has been changed to come from Belfast, rather than from the north. This is the same route which numerous other wind farms in the area have used / proposed to use and it is thought it is more suitable for the larger loads associated with the revised development.

PROJECT DESCRIPTION

11.5. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all 7 turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor

increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

11.6. For a full description of the Proposed Development and the various elements, please see Chapter 1: Introduction of this Environmental Statement.

11.7. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

SITE DESCRIPTION AND RECEIVING ENVIRONMENT

11.8. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

11.9. The area that encompass the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

11.10. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

STATEMENT OF AUTHORITY

11.11. This ES Chapter has been produced by Michael McGhee BSc TechIOA of Neo Environmental. Having completed a civil engineering degree in 2012, Michael has worked on over 1GW of renewable energy applications across the UK and Ireland, including detailed transport statements and EIA Chapters for major developments.

CONSULTATION

Table 11-1: List of Consultations with Relevant Bodies

Consultee & Date	Summary of Response	Addressed within ES
Infrastructure NI 04/02/20	Surrounding roads traffic counts received. No issues with the final abnormal load route	Chapter 11 Traffic and Transport Chapter 11.1 Construction Traffic Management Plan
PSNI 05/11/19	Accident data received, no further comment	Chapter 11 Traffic and Transport

LEGISLATION, POLICY & GUIDANCE

11.12. The Proposed Development has been assessed against existing national, regional and local policies and guidance. The assessment has been collated and considered based upon the following legislation, planning policy and guidance:

National Policies & Guidance

11.13. This Environmental Statement (ES) Chapter has been collated and considered based on the following legislative and guidance context:

- Strategic Planning Policy Statement (SPPS)[1]
- Planning Policy Statement 3 (PPS3)[2]

[1]

[2] Planning Service (Feb 2005), PPS3: Access Movement & Parking, Available at: http://www.planningni.gov.uk/index/policy/planning_statements/pps03-access-parking.pdf

- Planning Policy Statement 13 (PPS13)[3]
- Planning Policy Statement 18 (PPS18)[4]
- Transport Assessment Guidelines for Development Proposals in Northern Ireland (TAG)[5]
- Development Control Advice Note 15 (DCAN15)[6]
- Guidelines for the Environmental Assessment of Road Traffic[7]
- Guidelines for Traffic Impact Assessment[8]

Strategic Planning Policy Statement (SPPS)

11.14. As noted in paragraph 60 in Chapter 3, Planning Policy Statement 3: Access, Movement and Parking (PPS3), its clarification and Planning Policy Statement 13: Transportation and Land Use (PPS13) are retained policies for the purposes of the SPPS transitionary arrangements. In terms of PPS3 and PPS13 there is considered to be no conflict with the equivalent provisions in the SPPS, therefore until the Council adopts its Plan Strategy, PPS3 and PPS13 will apply, together with the SPPS, with no less weight attached to the retained policy.

11.15. SPPS policy on transportation is set out on pages 106 to 110. It consolidates and restates policy set out in PPS3 (as clarified) and PPS13.

Planning Policy Statement 3: Access, Movement and Parking (PPS3) (Revised Feb 2005)

11.16. This policy sets out the Department of the Environment's planning policies for vehicular and pedestrian access, transport assessment, the protection of transport routes and parking. Policy AMP 2 states: "*Planning permission will only be granted for a development proposal involving direct access, or the intensification of the use of an existing access, onto a public road where: Such access will not prejudice road safety or significantly inconvenience the flow of traffic.*"

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[3] Regional Planning & Transportation Division (Feb 2005), PPS13: Transportation and Land Use, Available at http://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/pps13.htm

[4]

[5] Planning Service and Department of Regional Development (Nov 2006), Transport Assessment Guidelines for Development Proposals in Northern Ireland, Available at http://www.planningni.gov.uk/index/policy/supplementary_guidance/spg_other/transport.htm

[6]Planning Service and Roads Service (Aug 1999), DCAN15: Vehicular Access Standards, Available at http://www.planningni.gov.uk/index/policy/supplementary_guidance/dcans/dcan15.htm

[7] Various Authors. 1992. Guidelines for the Environmental Assessment of Road Traffic. Institute of Environmental Management and Assessment

[8] Institute of Highways and Transportation, Guidelines for Traffic Impact Assessment, 1994

11.17. Policy AMP 2 considers a number of aspects of each development proposal including the number of access points onto a public road, as well as the speed and volume of traffic using the adjacent public road and any expected increase.

Planning Policy Statement 13: Transportation and Land Use (PPS13)

11.18. PPS13 should be read in conjunction with the provisions and policies set out within PPS3. It seeks to guide the integration of transportation and land use and is a material consideration in dealing with planning applications.

11.19. The primary objectives of PPS13 echo those within PPS3. The following general principles are pertinent in the determination of this application and have shaped the production of the transport assessment:

- General Principle 3: The process of Transport Assessment (TA), should be employed to review the potential transport impacts of a development proposal.
- General Principle 11: Innovative measures should be developed for the safe and effective management of traffic.
- General Principle 12: The integration of transport and land use planning should seek to create a more accessible environment for all.

Transport Assessment Guidelines for Development Proposals in Northern Ireland (November 2006)

11.20. The guidance document has been prepared to assist in the preparation of Transport Assessments for development proposals in Northern Ireland. It is based on the policies set out in PPS13.

11.21. A detailed Transport Assessment is required when the development will generate:

- *"100 or more vehicle movements in the peak hour;*
- *Significant traffic at peak times in a congested area, a sensitive location or an important traffic route or junction;*
- *Significant freight movements;*
- *Traffic late at night in a residential area, particularly lorries; and Raise significant concerns over road safety".*

Development Control Advice Note: Vehicular Access Standards

11.22. This advice note provides general guidance on the standards for vehicular access when an access road from a development requires access to a public road. It sets out the requirements for visibility which apply to developments which access the public road network.

METHODOLOGY

Study Area

11.23. The study area for this project includes the roads within the normal HGV load delivery route (including stone and concrete). This would be finalised post consent however, circular routes are proposed to help ease congestion on the local road network, see **Vol 4: Technical Appendix 11.1: Figure 11.1.17**.

11.24. The abnormal haul route which can be viewed on **Technical Appendix 11.1: Figure 11.1.1 in Volume 4** of this ES. This is taken from Belfast Port as this is the most likely location for wind turbine components to be imported into the country.

Baseline Conditions

11.25. Baseline traffic flow conditions were established on key routes within the vicinity of the Application Site to enable comparison with the Development traffic. Partial information was acquired from the Department for Infrastructure (DfI) public traffic counts. Automatic traffic counts (ATCs) were undertaken in late February/early March 2020 at a further two locations on the surrounding road network, these counts recorded vehicle types, numbers and speeds.

11.26. Baseline road conditions were established using information gathered during a route drive over survey and subsequent desk study.

Assessment Limitations

11.27. In terms of traffic flow information for the highway network surrounding the site; abundant information has been obtained to allow an appropriate assessment to be made of the potential traffic impacts as a result of the wind farm.

Evaluation Methods

Receptor Sensitivity

11.28. The Guidelines for the Environmental Assessment of Road Traffic identify groups and special interests which should be considered:

- Private and commercial vehicle users;

- Users and operators of public transport;
- People walking; and
- People cycling.

11.29. Categories of receptor sensitivity have been defined from the principles set out in the Guidelines for the Environmental Assessment of Road Traffic, and include the following:

- The need to identify particular groups or locations which may be sensitive to changes in traffic conditions;
- The list of affected groups and special interests set out in the guidance;
- The identification of links or locations where it is felt that specific environmental problems may occur; and
- Such locations *"… would include accident black spots, conservation areas, hospitals, links with high pedestrian flows etc."*

11.30. These categories have been used to outline in broad terms the sensitivity of receptors to traffic for the categories of impact assessed in this chapter. Although assessed in detail, each receptor assessed will have a different sensitivity to each specific impact, in relation to severance, pedestrian amenity, fear and intimidation, pedestrian and driver delay, accidents and safety, hazardous loads.

Magnitude of Effect

11.31. This assessment considers the following access, traffic and transportation effects of the Development during the initial decommissioning / construction phases and operation:

Traffic Generation

11.32. The magnitude of the effect of increase in traffic flow is a function of the existing traffic volumes on haul routes and the percentage increase in flow as a result of the Development.

11.33. The Department for Regional Development's Guidance suggests that assessment is required for any development which generates 30 or more two-way vehicle movements in an hour.

11.34. The Institute of Environmental Management and Assessment Guidelines (IEMA Guidelines) suggest two broad principles, to be used as a screening process to delimit the scale and extent of assessment. These are:

- Rule 1 – include road links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- Rule 2 – include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

11.35. Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects can be considered to be low or not significant and further detailed assessments are not warranted. Consequently, where the predicted increase in traffic flow is greater than these thresholds, the effects are considered to be potentially significant, and assessed in greater detail.

11.36. These guidelines are intended for the assessment of environmental effects of road traffic associated with major new developments giving rise to traffic generation, as opposed to short-term construction. In the absence of alternative guidance and, as the traffic generation during the operational phase is very low, these guidelines have been applied to assess the short-term initial decommissioning / construction phases of the Development.

11.37. It is worth noting that on roads where existing traffic levels are generally low (e.g., rural roads and some unclassified roads), any increase in traffic flow may result in a predicted increase that would be higher than the IEMA Guideline thresholds. In these situations, it is important to consider any increase in terms of overall traffic flow in relation to the capacity of the road before making a conclusion in EIA terms.

11.38. Any change in traffic flow which is greater than the thresholds set out in the IEMA guidelines would be subject to further analysis using this method to establish if the increased traffic flow is within the capacity of the road. In instances where traffic flow is higher than the IEMA Guideline thresholds but within the capacity limits of the road, and the potential magnitude on receptors is minor or negligible, this increase would generally be considered to be not significant. It is acknowledged that capacities can be reduced by local conditions.

Accidents and Safety

11.39. The IEMA guidance suggests that, *"Professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g. junction conflicts".*

Driver Delay;

11.40. The IEMA Guidance states such delays *"… are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system."*

Pedestrian Amenity

11.41. This is broadly defined as the relative pleasantness of a journey, it is affected by traffic flow, traffic composition and pavement width / separation from traffic. The IEMA guidance suggests a tentative threshold for judging the significance of changes in pedestrian amenity of where traffic flow (or its lorry component) is halved or doubled.

Severance

11.42. The IEMA guidance states that *"severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery."* Furthermore, *"Changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively"*. However, the guidance acknowledges that the measurement and prediction of severance is difficult. The assessment of severance pays full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities and whether crossing facilities are provided.

11.43. Volume 11, Section 3, Part 8, Chapter 6 of the Design Manual for Roads and Bridges entitled 'Pedestrians and Others and Community Effects' provides further guidance on this aspect of new severance. It states that new severance should be described in terms of "Slight", *"Moderate"* or *"Severe"* and that these categories *"… should be coupled with an estimate of the numbers of people affected, their location and the community facilities from which they are severed."* In addition (with specific reference to relief from existing severance), it acknowledges that there is a traffic flow threshold below which changes in severance are not considered significant (existing AADT (Annual Average Daily Traffic) flow below 8,000 vehicles).

Pedestrian Delay;

11.44. The IEMA Guidelines state: *"Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads."* The guidance suggests that assessors *"… use their judgement to determine whether pedestrian delay is a significant impact"*.

Fear and Intimidation

11.45. The impact of fear and intimidation is dependent upon the volume of traffic, its HGV composition and its proximity to people or the lack of protection caused by such factors as narrow footway widths. The guidance states that there are no commonly agreed thresholds for estimating this from known traffic and physical conditions, but thresholds are suggested which could be used. These are based on previous research and are shown in Table 11-2.

Table 11-2: Fear and Intimidation Thresholds

Degree of Hazard	Average Traffic Flow over 18 hr day	Total 18 hour HGV	Average Vehicle Speed over 18 hour

	– VEHICLES/HOUR 2-WAY	FLOW	DAY – MPH
High	+1,800	+ 3,000	+ 20
Medium	1,200 – 1,800	2,000 – 3,000	15 – 20
Minor	600 – 1,200	1,000 – 2,000	10 – 15
Negligible	<600	<1,000	<10

- Note 1: Although no category is given in the guidance for flows less than the "Moderate" threshold, this has been estimated and added to the table by Neo.
- Note 2: These categories of degree / magnitude of hazard have also been expressed consistently with the terms used in this assessment

Hazardous Loads

11.46. The guidance states that the Environmental Assessment needs to clearly outline the estimated number and composition of such loads, but the analysis should reflect the nature of the load in question. The IEMA guidelines acknowledge that most developments will not result in increases in the number of movements or hazardous / dangerous loads.

11.47. The guidance makes it clear that a *"… critical feature of environmental assessment is determining whether a given impact is significant."* Furthermore *"For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor backed up by data or quantified information whenever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact …".*

Significance of Effects

11.48. For the purposes of this assessment and in accordance with the criteria set out within the IEMA guidelines, the scale (magnitude) of any increase in traffic flows on a particular section of the road network as a result of the Development activities will determine the significance of any effects associated with such increases. For example, an increase in traffic flows of more than 90% on a particular section of the road network, will likely have a major effect on the road section being assessed.

11.49. An assessment has been made of the significance of further effects taking into account the importance / sensitivity of the receptor, the magnitude of effect, the duration/ persistence of the effect and the likelihood of the effect occurring. The criteria used to determine the significance of effects are detailed in Table 11.3.

Table 11-3: Rating of Significant Environmental Impacts

Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor			
	High	Medium	Low	Negligible
Very High	Profound	Very Significant	Significant	Imperceptible
High	Very Significant	Significant	Moderate	Imperceptible
Medium	Significant	Moderate	Slight	Imperceptible
Low	Slight	Slight	Slight	Imperceptible
Negligible	Not Significant	Not Significant	Imperceptible	Imperceptible

BASELINE CONDITIONS

Abnormal Load and HGV Access Route

11.50. The proposed access route for Abnormal Load Vehicles (ALV) will be from Belfast before taking the M2. From the M2 the vehicles will take the A26 to Ballymoney and then Coleraine before turning left onto the A29 towards Garvagh. They will then turn right onto the Craigmore Road before turning left at Ringsend onto the Boleran road. The delivery will then turn right onto the Belraugh road and then left onto Legavallon Road, where the site entrance points are located. The proposed return route is the same as the delivery route. Once the turbine components have been delivered the vehicles will be shortened so they are no longer than a typical articulated HGV. **Figure 11.1.1: Appendix 11.1A, in Technical Appendix 11.1 (CTMP) of Vol 4,** shows the route.

11.51. The abnormal load haul route has been changed to come from Belfast, rather than from the north as in the consented development. This is the same route which numerous other wind farms in the area have used or have consent to use and it is thought it is more suitable for the larger loads associated with the revised development.

11.52. Normal HGV load delivery routes (including stone and concrete) would be finalised post consent. Circular routes are proposed to help ease of congestion on the local road network. The potential circular routes have been illustrated in **Figure 11.1.17: Appendix 11.1A of the CTMP in Technical Appendix 11.1 (CTMP) in Vol 4.**

Existing Traffic Flow Data

11.53. Existing traffic flow data was obtained from Infrastructure NI for the A29 (Drumcroon Road), Boleran Road, Legavallon Road, and the A6 (Glenshane Road). A seven-day ATC survey was undertaken from the 27th of February to the 4th of March 2020 at the further two locations.

11.54. Increases in background traffic will occur on the local road network irrespective of whether or not the Development is constructed. Projected baseline traffic flows for the expected year of the construction phase ending (anticipated to be 2022) have been calculated by applying growth factors.

11.55. Projected baseline traffic flows for the expected year of construction have been calculated by using Department for Transport's 'National Road Traffic Forecasts'[9] report and a growth factor of 1.0153, which is outlined within this report, has been applied across the board.

11.56. **Table 11-4** shows the baseline and projected traffic flows, which have been used for assessing the significance of the effect of increased traffic along the routes.

Table 11-4: Baseline and Projected Traffic Flows (2021)

Location	Year	Traffic Flow					
		LGV	Projected	HGV	Projected	Total	Projected
A29 Drumcroon Road	2018	5124	5438	476	505	5600	5943
Craigmore Road	2020	1068	1101	73	75	1141	1176
Boleran Road	2020	2097	2161	191	197	2288	2358
Belraugh Road	2020	1068	1101	146	150	1214	1251
Legavallon Road	2018	3417	3626	293	311	3710	3937
A6 Glenshane Road	2020	13217	13621	1204	1241	14421	14862

Road Capacity

11.57. Typical capacity values for a variety of road types are provided within the Design Manual for Roads and Bridges, in which capacity is defined as the maximum sustainable flow of traffic passing in one hour under favourable road and traffic conditions and depends on the road type, speed limit and width. **Table 11-5** gives the estimated capacity of each of the roads within the Study Area.

[9] Department for Transport – National Road Traffic Forecasts by Vehicle Type

Table 11-5: Threshold Capacity

Road	Speed Limit (kph)	Capacity (Veh/hr/direction)	Two Way Hourly Traffic	Theoretical 24hr Daily Capacity
A29 Drumcroon Road	96	1200	2400	57600
Craigmore Road	96	900	1800	43200
Boleran Road	96	900	1800	43200
Belraugh Road	96	900	1800	43200
Legavallon Road	96	900	1800	43200
A6 Glenshane Road	113	1200	2400	163200

Accident Data

11.58. Analysis has been undertaken of all 'serious' and 'fatal' road traffic collisions (RTCs) within the last three years for the roads close to the site entrance, which include; Legavallon Road, Temple Road, and Belraugh Road. 'Serious' RTCs are defined as those which result in hospitalisation of one or more of the parties involved. 'Fatal' RTCs are defined as those in which one or more parties' dies within 30 days as a result of injuries sustained. Table 11-6 includes a summary of these incidents, whilst their locations can be viewed on Figure 11.1: Appendix 11, Volume 3.

Table 11-6: Accident Data

Ref	Date	Area	Severity
1	14-Jan-17	Belraugh Road 1473m North of Coolnasillagh Rd	Slight
2	24-Jun-18	Belraugh Road 539m South of Temain Rd	Slight
3	25-Feb-19	Belraugh Road 519m South of Temain Rd	Slight
4	06-Aug-17	Legavallon Road 300m East of Belraugh Rd	Slight
5	04-Dec-17	Legavallon Road 37m West of Temple Rd	Slight
6	29-Oct-18	Legavallon Road 260m West of Rannyglas	Slight
7	12-Jun-19	Legavallon Road at Junction of Temple Rd	Slight

11.59. Seven 'slight' RTCs were identified in the Study Area. The RTCs appear to be distributed throughout routes within the Study Area with no particular clusters or hotspots identifiable.

Sensitive Receptors

11.60. Whilst the site is located in a predominantly rural area, a number of receptors likely to be sensitive to traffic have been identified in the vicinity of the site. There are a number of residential properties which front directly onto the proposed HGV haul routes. Residents of these properties are likely to require unrestricted access to the roads in order to access their place of employment and/or local services. These properties are also likely to be highly sensitive to changes in traffic density, noise and vibration from HGVs.

11.61. St Patricks and St Joseph's Primary School is located just off Churchtown Road, near the town of Garvagh. There are limited industrial areas on what is predominantly a rural route. One of note is the River Ridge Recycling Centre, off of Craigmore Road. There are various local agriculture and farm enterprises, however there are no major employers or traffic drivers other than for the Recycling Centre. The main source of local traffic is likely to be generated by transport between small towns and farming activity.

11.62. There are no pedestrian facilities along the haul route and therefore the number of pedestrians using the route is likely to be low, however their sensitivity is likely to be High. This is the same with cyclists using the route.

POTENTIAL EFFECTS

Do Nothing Scenario

11.63. In the absence of the Proposed Development it is likely that the existing traffic levels in the surrounding road network will remain unchanged, albeit including the existing growth factors. It should also be noted that the existing consented windfarm would still be constructed and that the construction traffic numbers would only vary slightly to that within this chapter.

Construction and Decommissioning Phase

Public Highway Improvements

11.64. The ALV route assessment identified that minor road improvements would be required in order to accommodate access. These modifications would be limited to minor widening works at the site accesses. The following road modifications will be required to accommodate the loads required for the Proposed Development (as per the Original Consent).

- Dunsilly West Roundabout (see **Figure 11.1.2: Technical Appendix 11.1: CTMP (Vol 4))**
- Kilraughts Road Roundabout see (see **Figure 11.1.5: Technical Appendix 11.1: CTMP (Vol 4)**)

- Portrush Road Roundabout see (see **Figure 11.1.6: Technical Appendix 11.1: CTMP (Vol 4)**)
- Left-hand turn from Craigmore Road onto Boleran Road, the vehicle will overrun onto private land (see **Figure 11.1.13: Appendix 11.1B, Technical Appendix 11.1: (CTMP) Vol 4**)). This private land is to be upgraded as part of the Craiggore Wind Farm (Planning Ref: B/2012/0268/F). The Applicant has agreed with the owners of that application that the upgraded junction can be used for this Development and it will be left in-situ for until the proposed works are complete.
- Right-hand turn from Belraugh Road onto Legavallon Road (see **Figure 11.1.15: Appendix 11.1B of Technical Appendix 11.1 (CTMP) in Vol 4**). A temporary load bearing surface will be required within the Applicants land holdings. A topographical survey to check there is no conflict with the blade over sail and the roadside barrier.

11.65. For further information on remedial works please refer **Technical Appendix 11.1**.

11.66. The recommended route is sufficiently wide (i.e. approximately 5.5m or greater) and hence no intervisibility bays would be required. As such, no Private Street Determination (PSD) drawing will be required for the bays. No other offsite highway works were identified by the route assessment.

11.67. The site access points have been designed in accordance with DCAN15 and achieved the required visibility splays along Legavallon Road (see **Figure 11.1.18 and 11.1.19: Appendix 11.1A: CTMP (Vol 4)**). Road signs would be erected to direct construction traffic to this access.

Construction Traffic Numbers

11.68. During the eight-month construction period, personnel would travel to the site by private car, light vehicles or minibus. In addition to these vehicles, the following HGVs would access the site:

- Low loaders and tipper lorries transporting excavators, and removing spoil
- Low Loaders and flat-bed lorries to deliver rebar, equipment, plant and control building components
- Tipper lorries delivering and moving material and stone for access tracks
- HGVs delivering concrete for turbine foundations
- Extendable semi-low and platform trailers (i.e. TDVs) with escort vehicle delivering turbine components and

- Cranes delivered as mobile units and on low-loaders.

11.69. The Turbine Delivery Vehicles (TDV) will constitute abnormal loads during delivery to the site. Once the component is unloaded, the TDV would be retracted to the size of a standard articulated lorry (approximately 16.5 metres in length) and not require an escort vehicle.

11.70. Whilst travelling to site on public highways, the main erection crane would be de-rigged and its axle weights would be within that permissible by current legislation. The width of the crane would be approximately 3m and the length of the crane would be approximately 18m long. One smaller assisting crane (of 150 – 300 tonnes) will also be required for the blade erection, and assembling of the main lifting crane.

11.71. The nacelle would be the heaviest single component; the overall weight of this ALV being in the region of 110-125 tonnes. The longest vehicle that would access the site will be the wind turbine blade delivery vehicles. These vehicles delivering the blades, would be approximately 46 metres in length and this dimension of vehicle is used for swept path analysis simulation. Further details are provided in the CTMP included within **Vol 4: Technical Appendix 11.1.**

11.72. The loading capacity of the small water crossing bridges will be obtained from Roads Service and inspections carried out, only if required; ensuring that bridges could withstand the loading from the large construction vehicles and transporters.

11.73. Remedial and minor works along the proposed construction access route as detailed above would generally require completion in advance of the wind turbine component deliveries. To ensure that this is the case, the developer would comply with any legal conditions, for such improvements to be made, within the grant of a planning permission. The developer understands that Article 11 agreement of the Roads Order (NI) would be required to execute works that fall within the highway boundary.

11.74. The predicted construction traffic levels are shown in **Vol 4: Technical Appendix 11.1 (CTMP): Appendix 11.1C** as monthly totals and in **Table 11-7** as daily averages for each month rounded up to the nearest whole number. Numbers in these tables are expressed as vehicle movements.

11.75. The total number of off-site vehicle movements generated during the construction of the Development is estimated to be 10,590 over the eight-month period compromising of:

- 7,558 vehicle movements comprise construction personnel (LGVs);
- 2,979 movements comprise deliveries of equipment and materials to the site (HGVs); and
- 53 movements comprise deliveries of turbine components and crane (abnormal loads).

11.76. As can be seen from **Appendix 11.1C in Vol 4: Technical Appendix 11.1 (CTMP)**, the vehicle movements are not uniform throughout the construction period with the peak number of

2,076 vehicle movements anticipated during month four. This equates to approximately 104 movements per day (assuming a 20-day working month), comprising of daily average:

- 54 movements per day HGVs
- 50 movements per day of cars and LGVs and
- 1 to 2 abnormal load deliveries.

11.77. **Table 11-7** below shows the estimated amount of deliveries and movements for the main infrastructure.

Table 11-7: Estimates HGV Deliveries for construction equipment and infrastructure

	Month of Construction Programme								
Vehicle Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Abnormal Loads	-	-	-	-	1 to 2	1 to 2	-	-	1
HGVs	6	32	53	54	2	1	0	1	19
Cars/ LGVs	46	48	50	50	46	46	46	46	47
Total	**52**	**80**	**103**	**104**	**48**	**47**	**46**	**47**	**66**

Traffic Impacts

11.78. A detailed breakdown of the distribution of vehicle movements in each month, and for each element of work, throughout the construction phase of the Development is included in **Vol 4, Technical Appendix 11.1 (CTMP), Appendix 11.1C**. The peak month of construction, from a traffic perspective, was identified and was used to predict the traffic increase on routes within the Study Area. A worst-case scenario in which all predicted traffic passes each location within the study was assumed.

11.79. **Table 11-8** details the anticipated vehicle flow in the peak month and the percentage increase above the predicted baseline at each point within the study.

Table 11-8: Percentage Traffic Increase due to Construction Traffic During Peak Month

Route	Peak Percentage Traffic Increase		
	Cars/LGVs	HGVs (including abnormal loads)	Total Vehicles (AADT)
A29 Drumcroon Road	1.07%	9.11%	1.75%

Craigmore Road	5.27%	61.14%	8.84%
Boleran Road	2.68%	23.37%	4.41%
Belraugh Road	5.27%	30.57%	8.31%
Legavallon Road	1.60%	14.79%	2.64%
A6 Glenshane Road	0.43%	3.71%	0.70%

11.80. As can be seen in **Table 11-8** the predicted peak increase in construction traffic for LGVs and total vehicle movements in both cases is lower than the 10% threshold of significance. The overall impact form staff s therefore is considered to be **negligible** and therefore effects are **not significant.** However, at four of the roads, the increase in HGV traffic exceeds the 10% threshold.

11.81. When considered the effect of traffic generation on routes which have a low baseline traffic flow, it is important to consider the capacity of the routes in question. **Table 11-9** outlines the theoretical route capacity of each road within the Study Area. As can be seen, all routes within the Study Area are operating significantly below capacity and are predicted to continue to do so during the peak month of decommissioning/construction of the Development.

Table 11-9: Residual Capacity

Road	Theoretical 24hr Daily Capacity	Peak Monthly Flow
A29 Drumcroon Road	57,600	6,047
Craigmore Road	43,200	1,280
Boleran Road	43,200	2,462
Belraugh Road	43,200	1,355
Legavallon Road	43,200	4,041
A6 Glenshane Road	163,200	14,966

11.82. As demonstrated from inspection of **Table 11-9** sufficient residual capacity is available on each route within the Study Area to accommodate the temporary increase in traffic which will occur during the initial decommissioning and construction phases of the Development. It is therefore concluded that the effect of traffic generation on routes within the Study Area is **low** which will result in a **Temporary Slight Adverse effect**.

Severance

11.83. Severance refers to the level of crossing difficulty for pedestrians, which may be caused by the introduction of additional traffic. The threshold for assessing severance given in EART is a 30% increase in traffic results in a 'slight' severance impact.

11.84. During the construction and decommissioning period, traffic impacts will be below the 30% threshold on the roads within the haul route. However, the increase in HGV's will be above this threshold. Due to the low baseline traffic flow, the roads within the Study Area are operating significantly below capacity and this will continue during the peak month of the construction period.

11.85. Pedestrian activity in the vicinity of the site is extremely low, primarily due to the remote nature of the site and a lack of dedicated pedestrian infrastructure on the surrounding road network. Therefore, the impact from staff travel and from HGV traffic on severance is considered to be **low** which will result in a **Temporary Slight Adverse effect**.

Accidents and Road Safety

Staff Traffic

11.86. Staff will generally travel within the normal network peak hours and at times when background traffic flows are likely to be relatively high. Any increase in traffic can result in the potential for accidents to rise, most notably at the site access junction. There has only been one accident near to the site access point and the severity was 'slight'. No trends or hotspots could be identified from the data. In the absence of any other identifiable factors, an increase in traffic flow or change in composition is not sufficient to affect a change in the safe operation of the road network.

11.87. There is likely to be a temporary increase in traffic along the haul route during peak times during the construction/decommissioning stages of the Proposed Development. The impact from staff travel on road safety will result in a **Temporary Slight Adverse effect.**

HGV Traffic

11.88. HGV travel will be managed to avoid peak times, where possible, and there will also be a delivery booking system in place to avoid multipole HGV deliveries at the same time into the site entrance point. The limited number of HGV movements during the construction /decommissioning phase each day will result in a **low** impact to road safety. In addition, it is evident that no areas of the study area have high levels of accidents and there is nothing to suggest that the highway layout or conditions were significant.

11.89. Therefore, the impact upon road safety along the haul route will be of **Temporary slight Adverse effect**.

Driver Delay

11.90. EART Guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. All routes within the Study Area are operating significantly below their theoretical capacity, and are predicted to continue to do so during the peak month of decommissioning /construction activity of the Development. The effect of a general increase in traffic on driver delay is therefore considered to be **negligible** and **not significant.**

11.91. EART states that driver delay can increase at the site entrance where there is an increase in on-street parking. Parking for staff will be provided entirely within the Application Site and therefore background traffic on Legavallon Road, waiting at the site access would not be affected. However, there may be a slight delay as vehicles enter the site, particularly during peak times.

11.92. Some driver delay is expected to occur on routes due to the slow movement of ALVs between the port and the Site entrance. ALVs will be scheduled to avoid peak traffic times. On dual carriageways/motorways, namely the M2 and A26, the effect is likely to be minimal as vehicles will be able to overtake slow moving ALVs. The principal effect will occur on smaller routes, however due to the short distance which ALVs are required to travel between dual carriageways/motorways and the Site entrance, the effect is unlikely to be significant. ALVs will be timed as far as reasonably possible to avoid peak times. It is therefore considered that the effect of ALVs on driver delay is **low** which will result in a **Temporary Slight Adverse effect**.

Pedestrian Amenity, Fear and Intimidation

11.93. An identified area of potential environmental impact, as outlined within EART, is pedestrian amenity, fear and intimidation which are affected by the perceived traffic flow, traffic composition, footway width and its separation away from the carriageway.

11.94. Due to the Proposed Development's remote nature, there are no dedicated pedestrian facilities on the majority of the surrounding road network; as a result, pedestrian activity is very low. Therefore, the effect from staff travel and from HGV traffic on pedestrian amenity, fear and intimidation is considered to be **negligible** and **not significant**.

Hazardous Loads

11.95. Fuel will be regularly transported to the site. All fuel will be transported by suitably qualified contractors and all regulations for the transportation and storage of hazardous substances will be observed. No other hazardous substances are expected to be transported to site.

11.96. It is therefore considered that the effect of the transportation of hazardous substances is **negligible** and **not significant**.

Operational Phase

11.97. The predicted levels of traffic associated with the operation and maintenance of the windfarm are summarised in Table 11-10.

Table 11-10- Summary of Vehicle Movements during Operation

Activity	Annual Vehicle Movements	Duration
Standard Turbine Servicing	14 visits (28 vehicle movements per annum)	1 visit per turbine, lasting 1 day twice a year.
Unscheduled Servicing	7 visits (14 vehicle movements per annum)	1 visit per turbine, lasting 1 day every 18 months
Access Track Maintenance	20 visits (40 vehicle movements per annum)	2 vehicles per day for a period of 5 days twice a year
Substation maintenance	1 visit (2 vehicle movements per annum)	1 visit per year

11.98. In addition, routine site inspections would be undertaken once a month in a four-wheel drive vehicle to ensure that the turbines are operating at their maximum efficiency.

11.99. In the unlikely event that all of the above events occur on the same day, vehicle movements would not be expected to exceed 10 movements per day. The effect of the operational traffic falls substantially below the guidance thresholds and is considered to be **not significant.**

MITIGATION MEASURES

11.100. A strategy to manage the effect of traffic generated as part of the Development has been created. This section details the anticipated mitigation measures, helping to reduce the effects of construction traffic from the Development.

11.101. A CTMP has been produced and is included as **Technical Appendix 11.1**, which details the measures to be implemented to mitigate against traffic generated during the construction phase.

11.102. The CTMP details the routeing of HGVs and required control measures, ensuring the effects of construction traffic on the surrounding network is kept as low as possible. This includes:

- Traffic timing and routing strategies
- Staff travel planning;

- Wheel washing facilities;
- Pre and post construction condition surveys;
- Speed Restrictions on internal access tracks;
- Delivery management system; and
- Temporary signage.

MITIGATION & RESIDUAL EFFECTS

11.103. **Table 11-11** summarises the mitigation measures proposed and associated predicted residual effects relating to generated traffic from the Proposed Development.

Table 11-11: Summary of Residual Impacts

POTENTIAL IMPACT		MITIGATION	SIGNIFICANCE OF RESIDUAL EFFECTS
Construction and Decommissioning Stages			
Traffic Impacts	Staff	Staff to be envouraged to vehicle share Where possible staff will access the site outwith peak times	Not signigicant
	HGVs	One way haul route Delivery booknig system Deliveries to avoid peak times	Temporary Slight Adverse
Severance	Staff	None	Temporary Slight Adverse
	HGVs	None	Temporary Slight Adverse
Accidents & Road Safety	Staff	Staff to be envouraged to vehicle share	Temporary Slight Adverse

		Where possible staff will access the site outwith peak times	
	HGVs	One way haul route Delivery booknig system Deliveries to avoid peak times.	Temporary Slight Adverse
Driver Delay	Staff	Staff to be envouraged to vehicle share Where possible staff will access the site outwith peak times Staff parking completely contained within Applaition Site	Not Significant
	HGVs (Abnormal Loads	One way haul route Delivery booknig system Deliveries to avoid peak times	Temporary Slight Adverse
Pedestrian Amenity, Fear & Intimidation	Staff	None	Not significant
	HGVs	None	Not significant
Haazerdous Loads	Staff	None	Not significant
	HGVs	None	Not significant
Operational Stage			
Traffic Impacts	LGVs	None	Long-Term Imperceptible Negative Effect.

CUMULATIVE EFFECTS

11.104. Significant cumulative effects may occur during initial decommissioning/construction phases of the Development where this overlaps with construction of another nearby development. Developments which have the potential to result in cumulative effects are:

- Craiggore Windfarm
- Rigged Hill Wind Farm
- Upper Ballyrogan

11.105. Table 11-12 provides daily traffic generation figures that have been assumed for each of the identified developments. Exact traffic data is not available for the identified developments and in order to provide a reasonable assessment, it has been assumed that traffic generation for each project will be in proportion to that generated by the proposed Development (calculated pro-rata, per turbine).

11.106. It should be noted that each of these developments will have considered the Original Consent or application for Smulgedon Wind Farm in their cumulative assessments and that the cumulative effects were deemed acceptable. Any additional cumulative effects from the revised design are considered minor.

Table 11-12: Extrapolated Cumulative Daily Traffic Movements

Development	No. Turbines	Total Traffic	HGV
Craiggore Windfarm	10	260	100
Rigged Hill Wind Farm	7	252	124
Upper Ballyrogan	5	180	54
Total		**692**	**278**

11.107. The cumulative traffic associated with the identified developments will primarily result due to the import of materials and from staff movements. For the purposes of this assessment, it has been assumed that all traffic will use each road within the Study Area. However, due to the locations of the other wind farms and other more appropriate routes for access and haulage to them, it is likely that traffic using the same roads will be less than stated.

11.108. Table 11-13 indicates the anticipated total traffic (including baseline) and the percentage increase above baseline in the worst-case cumulative scenario.

Table 11-13: Percentage Traffic Increase due to Cumulative Construction Traffic During Peak Month

Route	Peak Percentage Traffic Increase		
	Cars/LGVs	HGVs (including abnormal loads)	Total Vehicles (AADT)
A29 Drumcroon Road	7.61%	55.04%	11.64%
Craigmore Road	37.61%	369.51%	58.85%
Boleran Road	19.16%	141.23%	29.35%
Belraugh Road	37.61%	184.76%	55.31%
Legavallon Road	11.42%	89.41%	17.58%
A6 Glenshane Road	3.04%	22.40%	4.66%

11.109. As indicated in **Table 11-13** the addition of all construction traffic from all identified cumulative developments results in a worst-case increase of 37.61% at Craigmore and Belraugh Road over baseline flow.

11.110. There is sufficient residual capacity on each of the roads within the Study Area to accommodate the predicted increase in traffic which may occur in the cumulative scenario. The likelihood of all of the identified developments being constructed simultaneously is considered low. In the event that a number of the identified developments are scheduled to be constructed simultaneously then it is assumed that their Traffic Management Plans would be agreed in consultation to minimise disruption. For these reasons the likely impact is expected to be significantly lower than stated in **Table 11-13.**

11.111. The impact on traffic and transport due to cumulative effects is therefore considered to be **low** which will result in a **Temporary Slight Adverse effect**. Also, as outlined, these wind farms will already have assessed cumulative effects which have including the Original Consent for Smulgedon, which were deemed acceptable (due to being consented). There is a negligible increase in traffic from the changes proposed for Smulgedon from this Proposed Development.

SUMMARY & CONCLUSION

11.112. This chapter has assessed the likely significance of effects of the Proposed Development on road traffic.

11.113. It should be noted that the changes from the Proposed Development when compared to the Original Consents for Smulgedon Wind Farm are minor and will have a negligible change in

effects for traffic and transport, particularly on the local roads surrounding the Development. The abnormal load haul route has been changed to come from Belfast, rather than from the north. This is the same route which numerous other wind farms in the area have used and it is thought it is more suitable for the larger loads associated with the revised development.

11.114. Following the application of a CTMP to mitigate effects on the Local Road Network, the Proposed Development has been assessed as having **no significant residual effects** on the identified receptors. Some upgrading works will be required to the public road network to facilitate the ALVs getting to site; however these works are minor.

11.115. The likely traffic generated by the Proposed Development during its construction, operation and decommissioning phases has been identified and the site access proposals have been discussed. The operational impacts have not been considered in detail due to the low volume of traffic generation anticipated and is considered to be **not significant.**

11.116. Furthermore, traffic generated as a result of the decommissioning is anticipated to be similar to the construction phase and therefore the impacts can be considered to be the same. As such, it is the effects from traffic generated during the construction phase of the development that have formed the focus of this assessment.

11.117. The potential effects relating to traffic, severance, accidents and road safety, driver delay and pedestrian amenity, fear and intimidation, and hazardous loads have been assessed and identified as **not significant** to **Temporary Slight Adverse**. Where relevant, mitigation measures have been considered and are outlined in **Table 11-10** above. The resulting effects are deemed to be **not significant**.

11.118. In addition, the cumulative effects of other local wind farm construction phases, assuming that the construction phase is completed at the same time as the Proposed Development, has also been assessed as having a **Temporary Slight Adverse effect**. Cumulative effects were already assessed for the Original Consent for Smulgedon Wind Farm with these other wind farms and effects were deemed acceptable, as planning permission was granted for them.

11.119. The Proposed amendments to the Wind Farm are deemed to be compliant with relevant policy and legislation.

Chapter 12: Miscellaneous Issues

12. MISCELLANEOUS

INTRODUCTION

12.1. This Chapter of the Environmental Statement (ES) evaluates the effects of the Proposed Development on issues not covered elsewhere in the ES, which include:

- Air Quality and Climate Effects;
- Health and Safety; and
- Effects of Weather

12.2. The assessment will consider the potential significant effects of the Proposed Development during all phases of the development; construction, operation and decommissioning.

Assessment Methodology

12.3. For each of the above issues, baseline conditions have been established through consultation and desk-based technical assessments. Effects during the construction / decommissioning phases are classed as temporary, short term effects and effects associated with the operational phase are classified as permanent, long term but reversible effects should the Proposed Development be decommissioned.

AIR QUALITY, CLIMATE AND RENEWABLE ENERGY

Introduction

12.4. The UK faces three major challenges in energy policy; the need to tackle climate change by reducing greenhouse gas emissions; the need to ensure a secure, diverse and clean energy supply; and the need to ensure that that energy is affordable.

12.5. This section outlines the effects of the Proposed Smulgedon Wind Farm on air quality, climate and renewable energy supplies. It outlines government policies and legislation relevant to such developments and describes the wind farms contribution towards meeting targets set out in these policies.

LEGISLATION AND POLICY

European Union Policy

12.6. The National Emission Ceilings ("NEC") Directive[1] replaces earlier legislation (Directive 2001/81/EC) and sets national emission reduction commitments for EU Member States for five air pollutants: nitrogen oxides (NOx); non-methane volatile organic compounds (NMVOCs); sulphur dioxide (SO2); ammonia (NH3); and fine particulate matter (PM2.5). The directive transposes the reduction commitments for 2020 under the 2012 revised Gothenburg Protocol, under the Convention on Long-range Transboundary Air Pollution (LRTAP Convention). The more ambitious reduction commitments agreed for 2030 are designed to reduce the health impacts of air pollution by half compared with 2005.

12.7. Of most relevance to the Proposed Development are SO2, NOx and PM2.5.

12.8. The main source of emissions of SO2 is from combustion in energy production and transformation, however government data updated in February 2020 shows that the UKs annual emissions of sulphur dioxide ("SO2") have fallen by 98% since 1970, to 160 thousand tonnes in 2018[2]. Emissions decreased by 8.5% from 2017 to 2018 driven by a decline in coal use power stations, continuing a long-term decrease in emissions from this source. The UK meets the current emission ceilings for sulphur dioxide for the period of 2010-2018.

12.9. Similarly, emissions of nitrogen oxides have fallen by 74 per cent since 1970[3]. There was a decrease of 5.4 per cent between 2017 and 2018. This is a greater annual decrease than the

[1] https://www.legislation.gov.uk/uksi/2018/129/made

[2] https://www.gov.uk/government/publications/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-1970-to-2018-sulphur-dioxide-so2

[3] https://www.gov.uk/government/publications/emissions-of-air-pollutants/annual-emissions-of-nitrogen-oxides-in-the-uk-1970-2018

long-term trend, since emissions have fallen by an average of 4.6 per cent per year between 1990 and 2018. This trend was driven by a decline in coal use in power stations. This latest data shows that the UK exceeded the current emission ceilings for nitrogen oxides, which apply from 2010 to 2019, for the year 2010 only, but were in compliance with these commitments in all other years. As permitted under the National Emission Ceilings Directive and the 2012 amendment to the CLRTAP, in 2018 the UK successfully applied for an adjustment to total national emissions of nitrogen oxides which brought the 2010 total into compliance with the UK's commitments for reducing emissions.

12.10. Annual emissions of PM2.5 have fallen by 78 per cent since 1970, to 107 thousand tonnes in 2018[4]. There was an increase of 1.8 per cent between 2017 and 2018. Levels have generally decreased year-on-year between 1970 and the late-2000s. There are many reasons for this long-term decrease covering most emissions sectors, but the reduction in the burning of coal is a major cause.

UK Policy

12.11. The Energy White Paper, "*Our Energy Future – Creating a Low Carbon Economy*" published in 2003[5] highlighted the need for the UK to shift its energy sources away from fossil fuels, which are becoming increasingly limited from localised sources, resulting in a reliance on imports. It emphasised the need for the UK to look towards energy sources and new technologies which produce little or no carbon emissions. The paper outlined a commitment to cut the UK's CO2 emissions by 60% by 2050.

12.12. The 2003 White Paper was then followed up by the 2007 Paper, "*Meeting the Energy Challenge*[6]" which set the strategy for achieving the goals set in the 2003 paper through investments in renewable energy sources, particularly wind.

12.13. In November 2007 the UK passed legislation which introduced a long-term framework to tackle climate change – The Climate Change Act[7]. The Act makes it the duty of the Secretary of State to ensure that the net UK carbon account for all six Kyoto greenhouse gases (Carbon dioxide (CO2); Methane (CH4); Nitrous oxide (N2O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF 6)) for the year 2050 is at least 80% lower than the 1990 baseline, toward avoiding dangerous climate change. The Act aims to enable the UK to become a low-carbon economy and gives ministers powers to introduce the measures necessary to achieve a range of greenhouse gas reduction targets. The Committee on Climate Change ("CCC") was also created under the Act to provide advice to UK Government on these targets and related policies.

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[4] https://www.gov.uk/government/publications/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-1970-to-2018-particulate-matter-pm10-and-pm25

[5] https://webarchive.nationalarchives.gov.uk/+/http:/www.berr.gov.uk/files/file10719.pdf

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/243268/7124.pdf

[7] https://www.legislation.gov.uk/ukpga/2008/27

Northern Ireland Policy

12.14. All government departments in Northern Ireland bear a collective responsibility in achieving the Executive's Programme of Government target to reduce greenhouse gas emissions by 25% on 1990 levels, by 2025. The Executive's 2010 Sustainable Development Strategy "Everyone's Involved" includes the following Strategic Objectives ("SO"s):

- Increase the number of jobs in the low carbon (SO 1.1);
- Reduce greenhouse gas emissions (SO 5.1);
- Increase the proportion of energy derived from renewable resources (SO 5.2); and
- Increase energy security (SO 5.4).

12.15. The Department of Enterprise Trade and Investment ("DETI") published the currently adopted Strategic Energy Framework in September 2010 which set the following four key energy goals: *"building competitive markets; ensuring security of supply; enhancing sustainability; and developing our energy infrastructure."* The NI Executive's target that Northern Ireland would seek to achieve 40 per cent of its electricity consumption from renewable sources by 2020, as set out in the Strategic Energy Framework was met ahead of schedule.

12.16. Northern Irelands Department for the Economy published a report – "*Electricity Consumption and Renewable Generation in Northern Ireland: Year ending June 2019*" detailing the that for the 12 month period July 2018 – June 2019, 44% of total electricity consumption in Northern Ireland was generated from renewable sources".

12.17. The context for energy has changed substantially since the 2010 Strategic Energy Framework was published. In June 2019, the UK became the first major economy to commit to a 100 per cent reduction in greenhouse gas emissions by 2050 and this 'net zero' target represents a significant step-change in the commitment to addressing the climate crisis. The Department for the Economy has begun the process of developing a new energy strategy to decarbonise the Northern Ireland energy sector by 2050 at least cost to the consumer. A new energy strategy will be published by the end of 2021.

AIR QUALITY

12.18. UK Air Quality short to medium term standards and objectives are set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (DEFRA, 2007[8]), while Limit Values and Target Values are contained within the EU Ambient Air Quality Directive and fourth Daughter Directive.

12.19. The Air Quality Strategy notes in paragraph 159 that *"what is clear is that over these timescales, air quality improvements are intimately connected with energy futures and the mix of sources used for energy generation".*

12.20. Air Quality Standards Regulations (Northern Ireland) 2010

12.21. Section 15 of the National Planning Policy Framework ("NPPF"), "*Conserving and enhancing the natural environment*" notes that planning policies and decisions should contribute to and enhance the natural and local environment by *"…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality…".*

12.22. Paragraph 181 of the NPPF also notes *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants…. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement…."*

Air Quality during Construction and Decommissioning

12.23. During the construction and decommissioning of wind farms, there is potential for an increase in dust, particularly in dry, windy conditions. The movement of soils and rubble during construction and site preparation activities may result in the generation of airborne dust. The occurrence and significance of dust generated by earth moving operations is extremely difficult to estimate and depends upon meteorological and ground conditions at the time and locations of the earthworks.

12.24. Airborne dust generated in such a manner (from soil) is typically coarse and therefore remains airborne for short periods only. US Environmental Protection Agency (US EPA) research[9]

[8] https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1

[9] USEPA AP42, Fifth Edition, Compilation of Air Pollutant Emission Factors: Volume 1, Stationary Point and Area Sources

shows that > 90% of total airborne dust returns to rest within 100m of the emission source and > 98% within 250 m. Construction dust is therefore only expected to represent a potential nuisance to exposed human receptors (residential properties) at distances of less than 250 m of the construction activities. The nearest residential property is located approximately 675m from proposed construction activities, and therefore effects associated with dust creation during site preparation and construction are considered to be **Negligible and Insignificant.**

12.25. The main options for mitigation of dust effects that will be considered where necessary are:

- A site representative will be appointed to co-ordinate the implementation of any mitigation measures and to whom complaints/queries about construction can be directed;
- Adequate dust suppression facilities will be used on site. This may include the provision of water bowsers with sufficient capacity and range to dampen down all areas that may lead to dust escape on site;
- Any storage on site of aggregate or fine materials will be properly enclosed and screened to prevent dust escape;
- Wheel wash facilities will be installed for vehicles entering and exiting the site. The facility will automatically clean the lower parts of HGVs by removing mud, clay etc. from the wheels and chassis in one drive through operation;
- Good housekeeping arrangements will be employed so that the site is kept as clean a s possible. There will be daily inspections of the working areas and immediate surrounding areas to ensure that any dust accumulation or spillages are removed/cleaned as soon as possible; and
- Complaints will be investigated and action will be taken where appropriate.

12.26. On-site vehicles and plant have the potential to release emissions during the construction and decommissioning phases of the Proposed Development. As a consequence of the relative small-scale nature of the development, in combination with the high degree of dispersion of airborne pollutants that would occur prior to reaching sensitive receptors (nearby dwellings) emissions originating from onsite plant are considered to be negligible.

12.27. Given the short-term nature of the construction period and the distances to the nearest residential properties, impacts on local air quality are considered to be **negligible and insignificant.**

EFFECT ON CARBON DIOXIDE EMISSIONS

Carbon Savings

12.28. Wind farms are low carbon forms of electricity generation, which are supported in general by UK energy policy as a significant way of limiting climate change.

12.29. The Proposed Development will generate electricity from a renewable source of energy, therefore offsetting the need for power generation from the combustion of fossil fuels including coal and oil. Consequently, during its operational lifespan the Proposed Development has the potential to displace electricity generated from fossil fuels and consequently represents carbon savings.

12.30. The amount of CO_2 savings therefore depends on which source of electricity generation the wind farm generating capacity is displacing at any given time. A renewable energy development would have a maximum potential to save carbon emissions when substituting coal fired generation. However, it is not appropriate to define the electricity source for which this renewable electricity project would substitute due to uncertainty in the future grid mix.

12.31. Using BEIS's "all fossil fuels" emissions statistic of 446 tonnes of carbon dioxide per gigawatt hour (GWh) of electricity supplied in Table 5E of the *Digest of UK Energy Statistics (July 2020)*[10], the estimated prevention of emissions in CO2 from the Proposed Development has been calculated both annually and for the estimated lifetime of the wind farm. The estimated figure of energy production for the development is 51.4 GWh.

Table 1-1: Estimated prevention of emissions in tonnes of CO_2.

Estimated Prevention of Emissions in CO_2 (tonnes)	
Annual	Wind Farm Lifetime (30 years)
22,924	687,732

12.32. In addition, the operation of the Development could, based on the same assumptions, also displace other gases related to coal-fired electricity generation including those associated with acid rain such as sulphur dioxide (SO_2) and oxides of nitrogen (NO_X).

[10]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/905060/DUKES_2020_MASTER.pdf

Carbon Produced

12.33. All electricity generation technologies emit CO_2 at some point during their lifecycle, whether from extraction and refining of raw materials, or during manufacture, transport and construction. Fossil fuel fired power plants will also emit CO_2 during combustion of their fuel.

12.34. The Parliamentary Office of Science and Technology (2006)[11] published a report on the carbon footprint of electricity, which compares the lifecycle CO_2 emissions of different electricity generation systems currently used in the UK, including fossil fuelled and low carbon technologies. Onshore wind power ranks with one of the lowest carbon footprints at 4.64g CO_2eq/kWh, in comparison to 58g CO_2eq/kWh for solar photovoltaics, approximately 500g C O_2eq/kWh for gas and greater than 1000g CO_2eq/kWh for conventional coal combustion.

[11] https://www.parliament.uk/documents/post/postpn268.pdf

Summary of Effects

12.35. The UK Government has set ambitious targets for achieving net-zero greenhouse gas emissions by 2050 against the 1990 baseline. The motion calls on the government to, "*increase the ambition of the UK's climate change targets under the Climate Change Act 2008 to achieve net zero emissions before 2050, to increase support for and set ambitious, short-term targets for the roll-out of renewable and low carbon energy and transport, and to move swiftly to capture economic opportunities and green jobs in the low carbon economy while managing risks for workers and communities currently reliant on carbon intensive sectors*".

12.36. The cumulative effect of the Development with other UK renewables generation is considered to be a fundamental change in the climate effects of UK energy supply, which is a **Major, positive, effect that is significant under EIA Regulations** and will contribute to the UK's legally binding emission reduction targets.

HEALTH AND SAFETY

12.37. Properly designed and maintained wind turbines are a safe technology. Site design and inbuilt buffers from sensitive receptors will minimise the risk to humans from the operation of the turbines. Risks associated with ice build-up, lightning strike and structural failure are removed or reduced through inbuilt turbine mechanisms in modern machines, potential health impacts are therefore related primarily to decommissioning/construction related impacts, and operational impacts on residential amenity.

Legislation and Policy Framework

12.38. Both the construction and operation of a wind farm pose elements of danger. All construction work must comply with the statutory requirements set out in Health and Safety legislation, which is listed below but not limited to the following:

- BWEA (now Renewable UK) Health & Safety in the Wind Energy Industry Guidelines;
- Health & Safety at Work (Northern Ireland) Order 1978;
- Construction (Design & Management) Regulations (Northern Ireland) 2007;
- Management of Health and Safety at Work Regulations (Northern Ireland) 2000;
- Construction (Health, Safety & Welfare) Regulations (Northern Ireland) 1996;
- Work at Height (Northern Ireland) 2005;
- Electricity at Work (Northern Ireland) 1991;
- Lifting Operations and Lifting Equipment Regulations 2000;
- Noise at Work Regulations (Northern Ireland) 2006;
- Manual Handling Regulations 1992;
- Health & Safety Signage (Safety Sign & Signals) regulations 1996;
- Personal Protective Equipment at Work Regulations 1992; and
- Construction (Head Protection) Regulations 1989.

12.39. The site would operate to the BWEA Guidelines for Health and Safety in the Wind Energy Industry. Potentially hazardous areas such as foundation excavations would be fenced and signed as appropriate.

Health and Safety during Construction

12.40. In order to effectively prevent the risk of accidents, strict working conditions will be enforced and a clear system of identifying hazards and implementing effective control measures will be put into place.

12.41. The wind farm designers will undertake a design review to scope out, as far as is practicable, any risks associated with the Proposed Development. Those risks which are unable to be scoped out will be clearly highlighted to the competent and adequately resourced Planning / Project Supervisor.

12.42. The Planning Supervisor will notify the relevant Safety Authorities (HSENI) and prepare the Pre-Tender Health and Safety Plan and ensure that a Construction phase Health and Safety Plan in adequately developed.

12.43. The Principal Contractor will be responsible for conducting regular risk assessments for all operations that have an inherent risk. A site-specific safety induction for all visitors and staff will be enforced and Personal Protective Equipment ("PPE") will be supplied for all authorised persons within the site boundary. 'Toolbox talks' will be held every morning to re-iterate the points raised within the safety induction.

12.44. There will be dedicated access points for authorised persons with the correct permits and permissions to access the site; and mandatory supervision for authorised visitors. The site entrance will be securely locked with only designated key holders to prevent unauthorised access during both the construction and operational phases.

Health and Safety during Operation

12.45. An operational wind farms consists of both static and oscillating parts, and includes electromechanical plant, all of which can pose a danger. Access to the proposed Smulgedon Wind Farm, individual turbines and associated substations will be strictly controlled, with designated key and permit holders. Restricted access will only be to authorised persons, or persons under authorised supervision, and therefore the operation of the wind farm can only be carried out under specific strict rules and conditions established by the owner and operator.

12.46. The chosen wind turbine model will require full certification from an internationally recognised authority and have a proven track record of safe operation. A Supervisory Control And Data Acquisition (SCADA) system monitors the wind farm's performance and should a fault occur, an individual turbine can be shut down and an engineer can be called to investigate and diagnose the fault. Should the turbine develop a serious fault that cannot be rectified, the turbine would be disconnected from the grid.

12.47. The operational and maintenance safety manuals for the selected turbines will be available for authorised persons to view. Regular checks and routine maintenance will be undertaken.

12.48. Wind farms could pose a risk if not managed and maintained properly. Health and Safety legislation, requires detailed analysis and avoidance measures to identify every component of the development, construction and operation of a wind farm. Such measures will be contained within the Health and Safety File, kept onsite and will be made available to inspect by the Health and Safety Executive upon request.

Public Health and Safety during Construction and Operation

12.49. The Proposed Smulgedon wind farm is located on private land with no Public Rights of Ways (PRoWs) located within the Application Site. It will not be possible for the public to access the site, unless under the supervision of authorised persons. However, once the wind farm is operational, as with any development, there is a potential for acts of malicious damage and vandalism. Plant, equipment and buildings will be designed to incorporate the best available technology so that in the event that unauthorised access occurs the site would pose no more danger to the public than any other remote site.

12.50. Inherently, wind farms have demonstrated that they provide a safe process for electricity generation and there is no record of serious risk of fatality being caused to a member of the public. As a result, risk to the public during construction and operation would be **negligible and insignificant.**

12.51. Potential risks to public health and safety associated with wind turbines are lightning strikes; extreme winds; ice throw, shadow flicker and low frequency noise. Shadow flicker is assessed in **Chapter 13** and low frequency noise is discussed within **Chapter 9**. Driver distraction; extreme winds; lightning strikes and ice throw are discussed below.

EFFECTS OF WEATHER

Lightning Strikes

12.52. The turbines are also equipped with lightning protection equipment. In the unlikely event that lightning occurs, the equipment effectively and safely conducts the lightning strike down the tower and into the earth.

Extreme Winds

12.53. Due to the exposed nature of wind farm sites, turbines are designed to withstand extreme weather conditions, however the highest risk to a wind turbine and its component parts, such as the rotor, is excessive and extreme wind speeds (>100 mph).

12.54. The turbines are fitted with sensors that, in instances of unexpected extreme winds which exceed safe operating limits, the rotor blades will be braked and parked in a safe position. This prevents excessive wear on the gear box.

Ice Throw

12.55. In certain meteorological conditions, such as still, cold weather, it is possible for ice to form on the rotor blades. If this situation occurs, two types of risk may result:

- Ice fragments being thrown from the rotor and
- Ice fall from the turbines while shut down.

12.56. Ice throw has been noted as a risk in extremely cold conditions, for example in the high latitudes of Scandinavia or the very high altitudes in Europe. Ice fall occurs if ice accumulates on the turbine and falls to the ground when it melts. This would occur when the temperature warms following a period of extreme cold conditions.

12.57. Due to the more temperate climate of the UK, it is considered that weather conditions which encourage ice throw / fall occur for less than seven days of the year[12] within this area of Northern Ireland.

12.58. Despite the low risk, turbines will be fitted with vibration sensors which detect any imbalance which might be caused by icing, in which case the affected turbines would be shut down.

12.59. The minimum separation distance between a wind turbine and an occupied property on this site is 675m and therefore effects associated with ice throw / fall are considered to be **Negligible and Insignificant.**

[12] https://pdfs.semanticscholar.org/203e/01c012a2d8366a76a20809326f78ccb7a674.pdf

Driver Distraction

12.60. There is no documented evidence of existing wind farms located close to roads being linked to driver distraction or effects on road safety. Drivers are faced with a number of varied and competing distractions during any normal journey, including advertising hoardings deliberately designed to attract attention. As a result, Smulgedon wind farm is **not anticipated to cause any significant issues** in terms of highway safety due to driver distraction.

Summary of Effects

12.61. The appropriate legislation and guidance will be adhered to during the design, construction and operational phases of the Proposed Development, and the best available technology will be utilised in the selection of the turbine design.

12.62. Consequently, risk to the safety of the operators during construction and maintenance of the wind farm, or to the general public during construction or operation is considered to be **negligible and not significant** according to EIA Regulations.

Chapter 13: Shadow Flicker

13. SHADOW FLICKER ASSESSMENT

INTRODUCTION

Background

13.1. Neo Environmental Ltd has been appointed by Smulgedon Wind Farm Ltd (the "Applicant") to undertake the Shadow Flicker Assessment chapter of an Environmental Statement for a proposed amendment (the "Proposed Development") to a consented wind farm (**Planning Reference B/2009/0070/F**) on lands at Smulgedon Hill, BT49 OPY (the "Application Site"). The original consented development ("Original Consent") consists of seven wind turbines of 120.5m to tip. Please see **Figure 2** of the Associated Planning Drawings, submitted as part of the application, for the layout of the Proposed Development.

13.2. For the purposes of this Environmental Statement (ES) the larger consented development area that constitutes the original wind farm and all associated infrastructure will be referred to as "the Original Application Area".

Project Description

13.3. The proposed amendments to the Original Consent consist of a reduction in the overall tip height from 120.5m to 114.90m (5.6m) and hub height from 85m to 68.9m (16.1m), and to increase the rotor diameter from 71m to 92m (21m) for all seven turbines. This larger rotor diameter will result in the harnessing of wind energy using more modern and efficient turbines that maximise the potential of the site, with only a minor alteration. However, the reduction in tip and hub height will make the turbines less prominent. There will also be minor increases to the crane pads and wind turbine foundations to accommodate the turbines. Furthermore, this application also incorporates the access and revised track layout consented under planning reference B/2013/0196/F. As these were previously assessed in detail and as they were consented, no significant effects were outlined. Fieldwork was undertaken to validate the original assessments, with no additional effects identified.

13.4. For a full description of the Proposed Development and the various elements, please see **Chapter 1: Introduction** of this Environmental Statement.

13.5. The Application Site only covers the wind turbines and their revised crane pads and their foundations as well as the additionally consented site entrance and access tracks (B/2013/0196/F). However, the Original Application Area will be assessed and referenced where relevant.

Site Description & Receiving Environment

13.6. The Application Site is located at Smulgedon, approximately 9km to the northeast of Dungiven and 8km west of the village of Garvagh in County Derry, Northern Ireland. Gortnamoyagh Forest surrounds the eastern and southern edge of the overall Original Application Area boundary. This range of mountains and hills forms a long series of prominent ridges, uplands and valleys that stretch in a broad arc for approximately 35km between Malligan in the north to the Sperrin Mountains in the south.

13.7. The area that encompasses the amendment application (the "Application Site") lies at an elevation of approximately 210m – 290m AOD and covers a total area of c. 6.12 hectares. It is centred at approximate Grid Reference (NGR) E276110 N41474 on the small Smulgedon Hill, which is sandwiched between larger summits to the north and south. Smulgedon Hill is a small irregular-shaped hill rising to approximately 290m above sea level. It is overshadowed immediately to the north by Donald's Hill, Rigged Hill and Boyd's Mountain which together form a plateau, approximately 380m high.

13.8. Local topography is broadly defined by undulating hills, with the development area generally sloping from west to east. The current landuse within the land holdings is grazing, with heath, unmanaged grasslands and semi-improved grassland present. Fields within the Original Application Area are bound by post and wire fencing throughout. The Legavallon Road runs in a general east to west direction along the northeastern boundary of the Original Application Area before turning south through the very eastern part of the land holdings for circa 840m and exiting the site to the east. The Belraugh Road also runs east to west for circa 330m along the most eastern part of the northern boundary of the Original Application Area.

Scope of Assessment

13.9. The objective of this assessment is to identify and describe any likely significant shadow flicker effects on key receptors during the operational phase of the proposed development.

13.10. This statement is supported by the following Appendices:

- Appendix 13A: Figures (Volume 3)
  - Figure 13.1: Shadow Flicker Output Map
- Appendix 13B: Detailed Shadow Flicker Times at Receptors (Volume 4)
- Appendix 13C: Merged Shadow Flicker Times at Receptors (Volume 4)
- Appendix 13D: Enercon Technical Information: Shadow Shut-off (Volume 4)

Statement of Authority

13.11. This Shadow Flicker Assessment has been produced by Michael McGhee of Neo Environmental. Having completed a civil engineering degree in 2012, Michael has produced shadow flicker assessments for circa 70 wind turbine developments across the UK and Ireland.

Definitions

13.12. The term '*Shadow Flicker*' refers to the flickering effect caused when wind turbine blades periodically cast shadows through narrow window openings within neighbouring receptors. The possibility and duration of such effects depends upon a number of environmental conditions, including: the position of the sun, the time of day, the day of the year, ambient weather conditions and the position of the wind turbine in relation to a sensitive receptor.

13.13. Shadow flicker has the potential to cause disturbance to neighbouring receptors, therefore it needs to be assessed as part of the planning application. Shadow flicker effects generally occur within 10 rotor diameters of a wind turbine. Where effects are considered to be significant, mitigation measures may be implemented.

13.14. The shadow flicker effect lasts only for a short period and happens only in certain specific combined circumstances such as when:

- The sun is shining and is at a low angle in the sky (after dawn and before sunset);
- The turbine is located directly between the sun and the affected property; and
- The wind speed is high enough to move the turbine blades and the turbine is operational.

LEGISLATION & PLANNING POLICY CONTEXT

Planning Policy Statement (PPS) 18: Renewable Energy[1]

13.15. The policies in this document set out the main considerations that the Department of Environment will consider in assessing proposals for renewable energy and heat generating facilities.

13.16. In relation to wind turbine shadow flicker it states:

- *"Applications for wind energy development will also be required to demonstrate all of the following:*
  - *that the development will not cause significant harm to the safety or amenity of any sensitive receptors (including future occupants of committed developments) arising from noise; shadow flicker; ice throw; and reflected light"*

13.17. It goes on to state that the publication Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy'[2] will be considered in assessing proposals.

13.18. This guidance states that:

"shadow flicker at neighbouring offices and dwellings within 500m should not exceed 30 hours per year or 30 minutes per day"

13.19. The shadow flicker recommendations are based on research by Predac, a European Union sponsored organisation promoting best practice in energy use and supply which draws on experience from Belgium, Denmark, France, the Netherlands and Germany.

13.20. The distance of a property from the turbine(s) is a key factor affecting the duration and intensity of shadow flicker. Paragraph 1.3.74 of the Northern Irish Companion Guide to Draft PPS 18 states that "*the further the observer is from the turbine the less pronounced the effect will be"* due to the following reasons:

- *"there are fewer times when the sun is low enough to cast a long shadow";*
- *"when the sun is low it is more likely to be obscured by either cloud on the horizon or intervening buildings and vegetation";*

[1] Department of the Environment (2009) *Planning Policy Statement 18: Renewable Energy*. Accessed at https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18_renewable_energy-2.html

[2] Department of the Environment (2009) *Planning Policy Statement 18: Best Practice Guidance*. Accessed at https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18_renewable_energy-2.html

- *"the centre of the rotor's shadow passes more quickly over the land reducing the duration of the effect".*

Update of UK Shadow Flicker Evidence Base

13.21. Parsons Brickenhoff, on behalf of the Department of Energy and Climate Change (DECC), produced shadow flicker guidance within the 'Update of UK Shadow Flicker Evidence Base'[3] document. This guidance provides a vast quantity of academic literature and methodologies used in various countries across Europe to assess shadow flicker. It states:

"Planning guidance in the UK requires developers to investigate the impact of shadow flicker, but does not specify methodologies.

To enable the Department of Energy and Climate Change to advance current understanding of the shadow flicker effect, this report details the findings of an investigation into the phenomenon of shadow flicker. This report presents an update of the evidence base which has been produced by carrying out a thorough review of international guidance on shadow flicker, an academic literature review and by investigating current assessment methodologies employed by developers and case study evidence. Consultation (by means of a questionnaire) was carried out with stakeholders in the UK onshore windfarm industry including developers, consultants and Local Planning Authorities (LPAs). This exercise was used to gauge their opinion and operational experience with shadow flicker, current guidance and the mitigation strategies that can and have been implemented."

"It has become clear that there is no standard methodology that all developers employ when introducing environmental and site specific data into shadow flicker assessments. The three key computer models used by the industry are WindPro, WindFarm and Windfarmer. It has been shown that the outputs of these packages do not have significant differences between them. All computer model assessment methods use a 'worst case scenario' approach and don't consider 'realistic factors such as wind speed and cloud cover which can reduce the duration of the shadow flicker impact."

13.22. The DECC guidance states that shadow flicker has *"been proven to occur only within ten rotor diameters of a turbine position'' [page 7 paragraph 2.2.1.1 Department of Energy and Climate Change (DECC) (2011), Update of UK Shadow Flicker Evidence Base] and further states in page 32 that ''The Shadow Flicker module of WindFarm is one of the most used in the industry. This software predicts the times throughout the year when shadow flicker is likely to occur and predicts a worst case scenario impact at the receptor/aperture where shadow flicker would be observed''.*

13.23. The DECC guidance concludes:

[3] Parsons Brinckerhoff, on behalf of DECC (2011) *Update on UK Shadow Flicker Evidence Base*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48052/1416-update-uk-shadow-flicker-evidence-base.pdf

"A key finding of this study is that in the UK there have not been extensive issues with shadow flicker, and the results of a questionnaire survey to the industry and planning authorities has yielded few complaints. In these cases, shadow flicker issues were resolved using turbine shut down systems which are the standard mitigation approach adopted across Europe.

……. the 10 rotor diameter rule has been widely accepted across different European countries, and is deemed to be an appropriate assessment area, although there is potentially a need to differentiate between appropriate assessment areas at different latitudes. This is an area where the scientific evidence base could be readdressed.''

''Mitigation measures adopted by developers have been successful. Careful site design to eliminate shadow impacts is important, with mitigation measures such as turbine shut down systems being used regularly. These systems are acceptable for all parties, and by virtue of their success, the issue of shadow flicker appears to be minor. Mitigation measures are often put into planning conditions.''

13.24. The assessment of the Proposed Development will use the height data conversion and shadow flicker modules of the Resoft WindFarm Release 4 software package.

ASSESSMENT METHODOLOGY

13.25. This section presents the methodology used in assessing the potential impact of shadow flicker from the wind turbine on the receiving environment. The following sources of information were considered in this assessment:

- The design layout of the Proposed Development;
- Published literature as described previously; and
- A desk-based assessment of the dwellings in the vicinity of the Proposed Development and any other potential sensitive receptors.

13.26. Shadow Flicker effect has the potential to occur within 10-rotor diameters of a wind turbine. For this assessment, the 10-rotor diameter separation distance has been calculated as 920m, based on a proposed rotor diameter of 92m, and this has therefore been used as the standard study area, combined around the total area for all turbines.

13.27. All residential properties have been identified within this distance and windows have been included at a reference height of 2m above the ground. Maps from Ordnance Survey Northern Ireland (OSNI) were then used to derive the angle of the windows from due north. This information was then plotted into the software to produce calculations for average shadow flicker duration (in hours) per year at each receptor.

13.28. In addition to considering all constructed buildings, a search was undertaken of the online planning database of all dwellings with valid planning permission, that have not yet been constructed, within the study area. These dwellings are to be included in the shadow flicker assessment using typical windows expected.

13.29. The Resoft WindFarm Release 4 software package was utilised to analyse potential shadow flicker at the sensitive receptors. The software calculates times throughout the year when a turbine's rotors, as viewed from the window of a house, are in line with the sun. This then estimates the potential for shadow flicker effects at a selected receptor.

13.30. The software calculates a maximum effect scenario assuming:

- The sun is always shining with the ability to cast clear shadows at all times of the day throughout the whole year;
- There is no screening through intervening vegetation or built structures;
- The wind direction is always parallel to the wind turbine-sun-receptor alignment, casting the widest shadow; and
- The turbine will always be rotating.

13.31. After the shadow flicker effects are calculated using the software, data from the nearest weather station to the wind turbines will be used to determine the annual average sun hours for the Application Site, based on an annual average of 12 hours daylight per day. Applying this to the output results produces a more realistic expectation of annual shadow flicker effects and mean daily effects, although cannot be considered for the maximum daily shadow flicker effects.

Significance Criteria

13.32. PPS18 states that shadow flicker effects should not exceed 30 hours per year or 30 minutes per day at residential receptors within 500m of a wind turbine. Therefore, effects in excess of 30 hours per year or 30 minutes per day at properties within 500m of a turbine are considered to be **Significant.** Effects of less than 30 hours per year and 30 minutes per day or on properties more than 500m of a turbine are considered to be **Not Significant.**

BASELINE DESCRIPTION

13.33. There is a total of 17 receptors located within the 920m study area (Please see **Appendix 13A: Figure 13.1, Volume 3** for receptor locations). All of the receptors are residential dwellings and windows on all four sides of the receptors have been analysed using their respective angles relative to true north. The general locations, distance from the wind turbine and the receptor numbers are outlined in **Table 13-1** below.

Table 13-1: Receptors Assessed for Shadow Flicker Effects

Receptor	Easting	Northing	Distance to Nearest Turbine
1	274559	414871	871m
2	274719	415012	776m
3	274726	414997	763m
4	274773	415054	752m
5	274905	415347	844m
6	275258	415744	902m
7	275811	415673	715m
8	275895	415731	740m
9	275910	415728	733m
10	276011	415743	727m
11	276977	414298	748m
12	277080	414207	877m
13	277067	414157	887m
14	275046	413943	778m
15	274618	414192	898m
16	274501	414455	916m
17	274492	414488	919m

13.34. Receptors were identified using mapping and aerial photography data from 2018 and 2019. The Northern Ireland Planning Portal[4] was also consulted in order to determine whether any recent receptors may have been constructed or consented within the 920m study area that do not yet appear on these sources (last accessed 14/09/20). Receptors 7 and 8 were included as proposed residences which have not yet been constructed.

[4] *http://epicpublic.planningni.gov.uk/publicaccess/* last accessed 04/09/19

ASSESSMENT OF POTENTIAL EFFECTS

13.35. The results of the shadow flicker modelling are summarised in **Table 13-1.** The model calculates times throughout the year when a turbine, viewed from the window of a building, is in line with the sun, and therefore the potential exists for shadow flicker to occur.

13.36. The results of the shadow flicker modelling for maximum daily shadow flicker assume that daylight hours consist of 100% sunshine and therefore represent a worst-case scenario. No account of screening has been taken into consideration, and it has been assumed that every building has a window facing directly onto the turbine.

13.1. The theoretical predicted maximum shadow flicker durations were calculated for the receptors within the study area. Receptors 7, 8, 9 and 10 were each identified as potentially experiencing in excess of 30 hours of shadow flicker effect each year, while Receptors 7, 8, 9, 10 and 11 were identified as potentially receiving more than 30 minutes of shadow flicker effect each day.

13.2. **Figure 13.1: Appendix 13A, Volume 3** shows a map output generated by the software which indicates where shadow flicker is likely to occur. Visible effects have been limited to 30 hours per year, in line with European and UK wide best practice.

Table 13-2: Shadow Flicker Effects at Receptors

Receptor	Days Per Year	Max Hours Per Day	Mean Hours Per Day	Total Hours per Annum	Total Hours and Minutes per Annum (hh:mm)
1	17	0.44	0.35	5.9	05:54
2	6	0.24	0.15	0.9	00:54
3	16	0.41	0.29	4.6	04:36
4	21	0.44	0.37	7.7	07:42
6	75	0.47	0.35	26.1	26:06
5	72	0.46	0.4	29.1	29:06
7	82	1.09	0.9	74.1	74:06
8	62	1.05	0.89	55.3	55:18
9	64	1.05	0.89	56.9	56:54
10	70	1.42	1.18	82.9	82:54
11	58	0.53	0.41	24	24:00

12	55	0.46	0.36	20	20:00
13	74	0.46	0.35	25.8	25:48
14	0	0	0	0	0
15	37	0.29	0.21	7.7	07:42
16	36	0.44	0.33	11.8	11:48
17	34	0.44	0.32	10.9	10:54

13.3. Detailed shadow flicker tables showing the exact times and dates when shadow flicker can occur at each of the receptors can be found in Appendix 13B and 13C, Volume 4.

13.4. These detailed shadow flicker output and times represent a worst-case scenario where 100% sun is assumed during daylight hours. Consulting the nearest weather station, at Banagher, Caugh Hill, c. 18km to the southwest of the nearest turbine, indicates that there is an annual average of 29.6% sun during daylight hours (assuming an annual average of 12 hours daylight per day). Applying this to the above results produces a more realistic expectation of annual shadow flicker effects and mean daily effects, although this cannot be considered for the maximum daily shadow flicker effects. Table 13-3 below shows these effects adjusted for the expected levels of sun, produced by multiplying the annual hours by the 29.6% sun value from the nearest weather station.

Table 13-3: Shadow Flicker Effects at Receptors, adjusted for Expected Sun Hours

Receptor	Days Per Year	Max Hours Per Day	Mean Hours Per Day	Total Hours per Annum	Total Hours and Minutes per Annum (hh:mm)
1	17	0.44	0.10	1.8	01:48
2	6	0.24	0.04	0.3	00:18
3	16	0.41	0.09	1.4	01:24
4	21	0.44	0.11	2.3	02:18
5	75	0.47	0.10	7.7	07:42
6	72	0.46	0.12	8.6	08:36
7	82	1.09	0.27	21.9	21:54
8	62	1.05	0.26	16.4	16:24
9	64	1.05	0.26	16.8	16:48
10	70	1.42	0.35	24.5	24:30

11	58	0.53	0.12	7.1	07:06
12	55	0.46	0.11	5.9	05:54
13	74	0.46	0.10	7.6	07:36
14	0	0	0	0.00	0
15	37	0.29	0.06	2.3	02:18
16	36	0.44	0.10	3.5	03:30
17	34	0.44	0.09	3.2	03:12

13.5. Therefore, when accounting for expected sun hours, no receptors within the 920m study area are expected to experience greater than 30 hours of mean shadow flicker per year or mean daily shadow flicker effects of more than 30 minutes per day. However, without mitigation Receptors 7 – 11 may experience greater than 30 minutes of maximum shadow flicker effects during a single day.

MITIGATION MEASURES

13.6. The calculated shadow flicker effect, including dates and times when shadow flicker is likely to occur, is contained within the accompanying Appendix 13B and 13C, Volume 4. When accounting for expected sun hours, no receptors within the 920m study area are expected to experience greater than 30 hours of mean shadow flicker per year or mean daily shadow flicker effects of more than 30 minutes per day. However, without mitigation five of the residential properties (Receptors 7, 8, 9, 10 and 11) within the 920m study area may experience greater than 30 minutes of maximum shadow flicker effects during a single day.

13.7. There are a number of mitigation measures which can be implemented in order to reduce shadow flicker effects within properties if this is deemed necessary. Such measures include vegetation planting to screen flicker effects and turbine shut down periods. The times of shadow flicker effect have been calculated for each receptor; therefore, the turbine can be shut down during these times, eliminating these effects. It should be noted that the detailed shadow flicker effects output by the software used are based on a worst-case scenario, i.e. perfect weather conditions and the sun shining constantly. It is proposed to use this shut down mitigation for this project.

13.8. This mitigation operates by entering data from Appendix 13B and 13C, Volume 4 for the receptors which will potentially experience shadow flicker effects into a table in the control system of the wind turbine. The shut-off system is a calendrical system which uses the worst-case data to determine specific shut-off times. Fine-tuning of these times is possible at any time for each of the turbines. In addition, actual illuminance will be measured via three sensors fitted to each turbine in order to identify when light and shadow levels are sufficient to require automatic shut-off. Once the shadow flicker conditions are no longer met for a specific time (usually five minutes) the turbine is automatically restarted.

13.9. Further detail on the wind turbine shadow flicker prevention software can be found within the Enercon Shutdown System information in Appendix 13C, Volume 4.

13.10. This mitigation has been implemented for similar projects throughout the UK.

CUMULATIVE EFFECTS

13.11. Cumulative effects have been considered in relation to other wind farms which may have their study areas (10x rotor diameters as previously defined) overlap with the study area defined for this shadow flicker assessment. One wind farm, namely Craiggore Wind Farm, was identified to have the potential for cumulative effects with Smulgedon Wind Farm. This wind farm is centred at approximately IG E276303 N417058 and is located within the townlands of Moneyguiggy and Craiggore Forest. However, shadow flicker effects upon nearby receptors were assessed to be zero within the Environmental Statement submitted with the associated planning application[5]. As such, **no cumulative effects** will occur with this or any other wind farm.

[5] RES Ltd (2018) *Craiggore Wind Farm: Environmental Statement: Volume 1 – Main Report*. RES UK & Ireland Ltd: Larne.

SUMMARY

13.12. This shadow flicker assessment has been undertaken based upon a 920m study area, within which 17 receptors have been identified. The possible occurrence of shadow flicker was assessed by modelling the Proposed Development using the Resoft WindFarm Release 4 software package and assessing the likelihood of shadow flicker impacting on the receptors identified within the study area.

13.13. As with all tall structures, wind turbines can cast long shadows on the neighbouring area when the sun is low in the sky. During sunny conditions under certain combinations of geographical position and the time of day, the sun may pass behind the moving rotor blades and cause a shadow to flicker on and off on neighbouring properties. This is known as shadow flicker. The shadow flicker effect lasts only for a short period and happens only in certain specific combined circumstances such as when:

- The sun is shining and is at a low angle in the sky (after dawn and before sunset);
- The turbine is located directly between the sun and the affected property; and
- The wind speed is high enough to move the turbine blades and the turbine is operational.

13.14. Northern Irish, UK and other international guidelines on shadow flicker have been consulted where wind energy is well established. Most guidelines state that shadow flicker impact is not an issue at receptors which are greater than 10 rotor diameters from a turbine. Guidance also indicates that shadow flicker should not exceed 30 hours per year and 30 minutes per day limits stated within the Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy'[6].

13.15. The theoretical predicted maximum shadow flicker durations were calculated for the receptors within the study area. When accounting for expected sun hours, no receptors within the 920m study area are expected to experience greater than 30 hours of shadow flicker per year or mean daily shadow flicker effects of more than 30 minutes per day. <u>However, without mitigation five of the residential properties (Receptors 7, 8, 9, 10 and 11) within the 920m study area may experience greater than 30 minutes of maximum shadow flicker effects during a single day.</u>

13.16. The proposed turbines will incorporate a shut-off system using a calendrical system with the worst-case data from this assessment to determine specific shut-off times. Fine-tuning of these times is possible at any time for each of the turbines. Further detail on the wind turbine

[6] Department of the Environment (2009) *Planning Policy Statement 18: Best Practice Guidance*. Accessed at https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18_renewable_energy-2.html

shadow flicker prevention software can be found within the Enercon Shutdown System information in Appendix 13C, Volume 4.

13.17. In consideration of the above, shadow flicker effects will be within acceptable limits.

APPENDICES

Appendix 13A – Figures (Volume 3)

- Figure 13.1: Shadow Flicker Output Map

Appendix 13B - Detailed Shadow Flicker Times at Receptors (Volume 4)

Appendix 13C – Merged Shadow Flicker Times at Receptors (Volume 4)

Appendix 13D – Enercon Technical Information: Shadow Shut-off (Volume 4)

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