

Rigged Hill Windfarm Repowering

Environmental Statement

Volume 1 - Text July 2019



Environmental Statement Volume 1: Preface

- This document comprises the Environmental Statement (ES) and its Non-Technical Summary prepared in support of an application for consent under The Planning Act (Northern Ireland) 2011 for the Repowering of the Operational Rigged Hill Windfarm (the 'Development').
- The Operational Rigged Hill Windfarm is located approximately 6 kilometres (km) south-west of Limavady in County 2. Derry/Londonderry, within the Causeway Coast and Glens Borough Council (CCGBC) administrative area, and consists of ten Nordtank 500 kilowatt (kW) wind turbines, which can produce up to a total of five megawatts (5 MW) of clean renewable energy. The repowering of the Operational Rigged Hill Windfarm involves the removal of the existing ten wind turbines from the Site and replacing them with seven new and more efficient turbines together with the associated ancillary infrastructure.

The Site is located on the summit of Rigged Hill, 377 metres (m) above ordnance datum (AOD), which takes the form of a north-south running ridge set between Temain Hill to the south of the Site (376 m AOD) and Boyd's Mountain (329 m AOD).

- The upper areas of the Site are predominantly moorland cover; the main land use, in conjunction with the Operational Rigged 3. Hill Windfarm, is agricultural grazing.
- The Environmental Statement (ES) comprises the following documents: 4.
 - A Non-Technical Summary ٠
 - The main report (this principal document) and supporting figures; and
 - **Technical Appendices** ٠
- In addition to the above, the application includes a Planning Statement, Design and Access Statement, Residential Visual Amenity Assessment and Pre-Application Consultation Report which are submitted in support of the application but do not form part of the ES.
- Further copies of the ES and/ or further information on the Development may be obtained from: 6.

ScottishPower Renewables ScottishPower House 320 St Vincent Street Glasgow G2 5AD Tel: +44(141) 614 0000

- A copy of the ES with its Technical Appendices is available in print; printing will be charged at cost price. In addition, all 7. documents are available (as PDF) on CD/DVD for £20.00. Copies of the Planning Statement, Design and Access Statement, Pre-Application Consultation Report and Non-Technical Summary (NTS) are available free of charge.
- The ES Volumes, NTS and supporting documents are available to view online at: 8.
 - https://www.scottishpowerrenewables.com/pages/rigged_hill_repowering.aspx
- The public can view the ES during normal office hours at Causeway Coast and Glens Borough Council Coleraine Office, 66 9. Portstewart Road, Coleraine, BT52 1EY.
- The ES is also available for viewing by the public during normal opening hours at the following location: 10.
 - Limavady Library, 5 Connell St, Limavady, BT49 0EA. ٠

Comments on the application for consent should be forwarded to the address below: 11.

> Causeway Coast and Glens Borough Council Coleraine Office 66 Portstewart Road Coleraine BT52 1EY.

Contents

- 1. Introduction
- 2. EIA Methodology
- 3. Development Description
- 4. Site Selection and Alternative Layouts
- 5. Planning
- 6. Landscape and Visual Impact Assessment
- 7. Hydrology, Hydrogeology, Geology, Soils and Peat
- 8. Ecology and Fisheries
- 9. Ornithology
- 10. Noise
- 11. Archaeology and Cultural Heritage
- 12. Access, Traffic and Transport
- 13. Tourism, Recreation, Land-Use and Socio-Economics
- 14. Other Issues
- 15. Summary of Effects and Mitigation



Introduction

11 Introduction

This Chapter of the Environmental Statement (ES) introduces the Repowering of the Operational Rigged Hill Windfarm (the Development) and provides details of the Environmental Impact Assessment (EIA) project team and the structure of the ES. This chapter is supported by the following technical appendix:

- Technical Appendix A1.1: Staff Qualifications and Experience.
- The existing Operational Rigged Hill Windfarm was developed and constructed by RES and B9 Energy Services in 1995, and 2. then acquired by ScottishPower Renewables UK Limited (the Applicant) who now own and operate the Site. The Operational Rigged Hill Windfarm is located approximately 6 kilometres (km) south-west of Limavady in County Derry/Londonderry, Northern Ireland and consists of ten Nordtank 500 kilowatt (kW) wind turbines, which can produce up to a total of five megawatts (MW) of clean renewable energy. To date, Rigged Hill Windfarm has made an important contribution to Northern Ireland's Renewable targets and low carbon objectives, and the Applicant is seeking to secure and build on this contribution by proposing to 're-power' the Operational Rigged Hill Windfarm (the Development).

1.2 **The Applicant**

- ScottishPower Renewables is part of the ScottishPower group of companies, operating in the UK under the Iberdrola Group, one of the world's largest integrated utility companies and a world leader in wind energy. ScottishPower now only produces 100% green electricity - focusing on wind energy, smart grids and driving the change to a cleaner, electric future. The company is investing £4m every working day in 2019 to make this happen and is committed to speeding up the transition to cleaner electric transport, improving air quality and over time, driving down bills to deliver a better future, quicker for everyone.
- ScottishPower Renewables, is at the forefront of the development of the renewables industry through pioneering ideas, 4 forward thinking and outstanding innovation. Its ambitious growth plans include the expansion of its existing onshore wind portfolio, investment in new large scale solar deployment and innovative grid storage systems. The company is also delivering the Iberdrola Group's offshore windfarms in the Southern North Sea off East Anglia as part of an international pipeline of projects across Europe and the USA.
- With over 40 operational windfarms, all sites are managed through the world leading Control Centre at Whitelee Windfarm, located outside of Glasgow in Scotland.
- The Applicant has a long history of investment in Northern Ireland and currently owns and operates five onshore windfarms which include Rigged Hill, Corkey, Callagheen, Elliots Hill and Wolf Bog Windfarms, together with Barnesmore Windfarm in the Republic of Ireland. Through their long-term presence in Northern Ireland, the Applicant has contributed over £200,000 of community benefits, contributing to an assortment of groups and organisations including donations made to and managed by the Fermanagh Trust and funding local primary schools. This has supported a range of projects, such as improving community centre accessibility, sponsoring local youth group activities and creating a sensory garden for a playgroup.
- The development of its West of Duddon Sands Offshore Windfarm, in the Irish Sea (operational since 2014), enabled the construction of the c. £50 million bespoke facility at Belfast Harbour which began in early 2012, creating the first purpose built offshore wind installation and pre-assembly harbour in the UK and Ireland, supporting up to 300 jobs in the process.
- Through the construction of East Anglia ONE Offshore Windfarm in the North Sea, Lamprell (in partnership with Harland and Wolff) in 2017, were also awarded a significant foundation contract. The value of this contract was c. £30 million, with an average labour force of 200 people across the duration of the project.
- To date, the Applicant has experience of developing, constructing and operating repowered onshore windfarm projects 9. throughout the UK, including Carland Cross Windfarm in Cornwall, Coal Clough Windfarm near Burnley, and the consented repowering project at Llandinam Windfarm in Wales.
- As one of the UK's principal onshore wind developers, the Applicant seeks to maximise the local benefits that can be created 10. in the communities where they operate and continue to be a good neighbour. To date, the Applicant has enabled communities surrounding onshore windfarms to deliver initiatives across the UK by contributing over £20 million in community benefits.

1.3 Purpose

- capacity of the Development is less than 30 MW, and therefore an application for planning permission is being made under the provisions of The Planning Act (Northern Ireland) 2011. As stated within the Scoping Opinion dated 26th January 2018 and contained within Technical Appendix A2.2, this application requires an EIA under Schedule 2 of the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (the EIA Regulations). The findings of the EIA have been presented within this ES which accompanies the planning application submitted to the Causeway Coast and Glens Borough Council (the Council).
- Further description of the Development is presented in Chapter 3: Development Description and Chapter 4: Site Selection 12. and Alternative Layouts of this ES.
- This ES offers information on the identification and assessment of the likely significant environmental effects of the 13. Development and has been undertaken in accordance with the EIA Regulations. Additional details on the legislative requirements for EIA are presented in Chapter 2: EIA Methodology of this ES.

1.4 Key Terms

To ensure clarity in the ES the following terms are used:

Table 1.1: Defined Terms Used Within the ES

Term	Definition
Repowering	This is the process of removal and re machines, which are generally quiete
The Site	Refers to all land that falls within the
The Site Boundary	Refers to the red line boundary, at th
Operational Rigged Hill Windfarm	Refers to the existing Rigged Hill Wir
The Development	Refers to all elements of the application Windfarm, the details of which will be elements include the wind turbines, a
Survey Areas	Refers to areas within which surveys technical section.
Study Areas	Refers to areas which are considered defined within each technical section
Indicative Developable Area	Refers to an indicative area within the apply to other ancillary site infrastruc Scoping purposes.
The Council	Refers to the Causeway Coast and G
The Applicant	Refers to ScottishPower Renewables
EIA Regulations	Refers to The Planning (Environment
Scoping/Scoping Opinion	This is the process to identify key env Development are likely to cause sign can be removed from the assessmen
Energy Storage / Energy Storage Unit	Refers to the Energy Storage Elemer produced at one time for use at a late
The Onsite Substation and Control Building	Refers to the onsite substation and c

Based on the site area, potential turbine capacity, and the known onsite environmental and technical constraints, the installed

eplacement of older first-generation wind turbines with modern er, and capable of producing more electricity, more efficiently.

Site Boundary.

e time of Scoping.

ndfarm at the Site, which has been operational since 1995.

ion for the repowering of the Operational Rigged Hill e set out within Chapter 3: Development Description. These all site infrastructure, access tracks, energy storage etc.

are undertaken. These are specifically defined within each

d as part of the assessment process. These are specific and

e Site Boundary where turbines may be located. This does not cture or the energy storage element. This area was defined for

Glens Borough Council.

s UK Limited

tal Impact Assessment) Regulations (Northern Ireland) 2017.

vironmental issues, and to determine which elements of the ificant environmental impacts and to identify elements that

nt. Energy Storage is defined as the capture of energy er time.

ontrol building including the compound in which it is located.

Site and Setting 1.5

- The Development is a repowering of the Operational Rigged Hill Windfarm, situated approximately 6 km south-east of Limavady in County Derry/Londonderry.
- The land at Rigged Hill (the Site) is located on the summit of Rigged Hill, 377 metres (m) above ordnance datum (AOD), which takes the form of a north-south running ridge set between Temain Hill to the south of the Site (376 m AOD) and Boyd's Mountain (329 m AOD). Elevations of the Site range from approximately 110 m AOD in the west of the Site, to 377 m AOD at the summit of Rigged Hill. The ten existing turbines associated with the Operational Rigged Hill Windfarm are located in two rows running roughly in parallel with the ridgeline.
- The upper areas of the Site are predominantly moorland cover; the main land use, in conjunction with the Operational Rigged 17. Hill Windfarm, is agricultural grazing. There are a number of small unnamed watercourses and man-made open field drains within the Site, most of which drain in a westerly direction into the Castle River 3 km west of the Site, before discharging into the River Roe north of Limavady.
- A commercial coniferous plantation is located immediately north and west of the Site, with a small area of self-seeded trees within the Site adjacent to the western boundary.
- There are three telecommunications masts located on Temain Hill approximately 900 m to the south of the Site.
- There are no public roads within the Site and the Operational Rigged Hill Windfarm is currently accessed through Cam Forest 20. from the B66, located to the north of the Site. The historical land ownership pattern of this area is based on the land being divided into small plots. This has led to a highly dispersed settlement pattern with scattered farmsteads and dwellings as well as small clusters and ribbon development served by a network of rural roads.
- The Ulster Way which is a long-distance walking route currently passes through the Site; the original section of the Ulster Way 21. was rerouted to follow the Operational Rigged Hill Windfarm access track, as it passes from Temain Hill in the south towards Boyds Mountain.
- The wider site location is shown in Figure 3.1 and Figure 3.2. 22.

Overview of the Development 1.6

- The Development is described in detail in Chapter 3: Development Description of this ES and the layout is shown in Figure 3.2, and with the Operational Rigged Hill Windfarm site layout underlain, shown in Figure 3.3
- In summary the Development will comprise of the following phases: 24.
 - Decommissioning of Operational Rigged Hill Windfarm (initial phase of the Development);
 - Construction of the Development (likely to occur in tandem with the above phase);
 - Operation of the Development; and
 - Decommissioning of the Development (final phase).
- . The Development will comprise of the following main components: 25.
 - Decommissioning of the existing 10 turbines, removal and reinstatement of the redundant infrastructure;
 - The erection of seven three bladed horizontal axis wind turbines of up to 137 m tip height
 - Turbine foundations
 - Construction of approximately 4.82 km of new access tracks; ٠
 - Upgrade of approximately 1.75 km of existing access tracks;
 - Construction of temporary and permanent hardstanding areas for each turbine to accommodate turbine component laydown areas, crane hardstanding areas and external transformers and/or switchgears;
 - Temporary construction compound/laydown areas (some areas may be reinstated temporarily if required for future operational and decommissioning purposes);
 - Turning heads and passing places incorporated within the site access infrastructure;
 - New road junction with Terrydoo Road;

- Five new water crossings;
- Meteorological Mast;
- Buried underground electrical and communication cables;
- equipment;
- Energy storage units;
- Removal of self-seeded trees in east of the Site: and
- Associated ancillary works

1.7 Need for the Development

1.7.1 Windfarm Repowering

- The repowering of a windfarm involves the removal of existing wind turbines from a site and replacing them with new and more efficient turbines. This process normally results in an increased overall site generating capacity and output as well as generally reducing the total number of turbines within a site.
- Repowering the windfarm supports an ongoing 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 Ireland¹. Repowering also presents an opportunity to sustain and create additional jobs and to encourage continued investment in the renewable energy industry in Northern Ireland. The repowering of a windfarm differs from that of developing a greenfield site as the area has previously been developed, has demonstrated its suitability for use as a windfarm site, and will continue to be used for the same activity. As a result, the consenting and EIA process can draw on any information already available for the Site to assess effects.
- 28 system, repowering offers a number of major opportunities:
 - Increased site generation;
 - Reduced dependency on fossil fuels resulting in lower carbon dioxide (CO₂) emissions and output;
 - in Northern Ireland;
 - Sustains the existing development and construction jobs and creating opportunities for new supply chain jobs;
 - With a supportive planning framework, it can help create a long-term, stable investment platform for a clear pipeline of repowering projects, easing pressure on consenting authorities; and
 - Utilises over two decades of industry knowledge to inform and improve the siting, design and construction techniques to create more efficient projects.
- The Operational Rigged Hill Windfarm is consented in perpetuity, and the repowering of the windfarm with more efficient 29. machines will maximise the benefits of re-using an existing site whilst minimising new environmental effects. Operating for a longer period will also enables the Applicant to continue to drive down the overall cost of energy with benefits to the Northern Irish consumer, and provides opportunities to incorporate emerging technologies such as Energy Storage.
- Table 1.2 below provides a comparison between the Operational Rigged Hill Windfarm and the Development. 30.
- The proposed repowering project has the potential to result in an increase in the installed capacity of the Site from five MW to c. 28-29 MW, nearly six times the existing installed capacity. The proposed larger generator size, coupled with greater wind yields from the use of taller turbines with bigger rotors, and the improved efficiency of the latest turbine models will result in a major increase to total power generated at the Site, over five times the power output of the existing Site. Please refer to Section 1.7.6 of this chapter which sets out the need for and benefits of Energy Storage.

Substation, with roof mounted solar panels, and associated compound, including windfarm and grid connection operating

As well as the inherent benefits of creating and expanding upon the existing mix of renewables in Northern Ireland's electricity

Reduced number of turbines, utilising the latest turbine technology, sustaining and growing the level of renewable energy

¹ Department for the Economy (2010) Strategic Framework for Northern Ireland. Available online at: https://www.economyni.gov.uk/publications/energy-strategic-framework-northern-ireland [Accessed on 31/10/2017]

Rigged Hill Windfarm Repowering

Environmental Statement

Table 1.2: Comparison of Operational Rigged Hill Windfarm with the Development.							
Characteristic	Operational Rigged Hill Windfarm	The Development					
Number of Wind Turbines	10	7					
Maximum Tip Height	57 m	137 m					
Turbine Max Power	0.5 MW	c. 4 MW					
Overall Wind Farm Capacity	5 MW	c. 28-29 MW					
Energy Storage	No	Yes					

1.7.2 International Energy Policy

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.

- The United Nations Framework Convention on Climate Change (UNFCCC)², implemented by the United Nations in May 1992, 33. 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 was implemented in 1997³. National governments who signed up to the Kyoto Protocol are committed to reducing their greenhouse gas emissions.
- The Paris Agreement⁴ 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.
- European and national energy policy has been established from the Kyoto Protocol and Paris Agreement requirements and 35. will continue to be framed by emerging guidance and scientific information. For example, the IPCC 2018 report⁵, "Global Warming of 1.5°C", 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".

1.7.3 European Energy Policy

- 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.
- The EU produced the Renewable Energy Directive 2009/28/EC⁶, 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.
- 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.

http://unfccc.int/resource/docs/convkp/kpeng.pdf [Accessed 02/10/2017]

⁴ The United Nations Framework Convention on Climate Change (2015) The Paris Agreement. Available online at:

https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf [Accessed 02/10/2017]

The 2050 target will not be shifted into national targets via EU legislation, but allows more flexibility for Member Countries to 39. meet their greenhouse gas emission reduction targets in the most cost-effective method in regards to their own specific circumstances.

1.7.4 UK Energy Policy

- 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. The strategy supports the precedent to ensure the UK can deliver 30% renewable electricity by 2020.
- The Overarching National Policy Statement for Energy (EN-1) and The National Policy Statement for Renewable Energy Infrastructure (EN-3) states that projections suggest that by 2020, 30% or more of the UK's electricity generation could come from renewable sources.
- The UK Climate Change Act⁹ 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), to be introduced from July 2019 onwards, commits the UK to a reduction in greenhouse gases by 100% lower than the 1990 baseline, following the declaration of a "Climate Emergency" by the UK Government. The amendment to this act will have direct implications on Northern Irish Energy Policy in the future.

1.7.5 Northern Irish Energy Policy

- In 2010, the Department for Enterprise, Trade and Investment (DETI) published the Strategic Energy Framework¹⁰ (SEF) 43 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.
- 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.
- DETI produced a report in 2013 titled Envisioning the Future: Considering Energy in Northern Ireland¹¹ to 2050 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.
- Additionally, the Northern Ireland Investment Strategy 2011-2021¹² 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.
- For the 12 month period January 2018 to December 2018, 38.2% of total electricity consumption in Northern Ireland was 47. 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)¹³. The Onshore Renewable Energy Action Plan (OREAP) 2013-2020¹⁴ recognises the importance of the contribution of onshore

The UK Renewable Energy Strategy⁸ sets out to identify how the required growth in renewable energy use could be delivered.

² The United Nations Framework Convention on Climate Change (UNFCCC) (1992). Available online at: http://unfccc.int/resource/docs/convkp/conveng.pdf [Accessed 02/10/2017]

³ The United Nations Framework Convention on Climate Change (1997) The Kyoto Protocol. Available online at:

⁵ IPCC (2018). Global Warming of 1.5°C. Available at: <u>https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf_[accessed on 01/02/2019]</u>. ⁶ The Renewable Energy Directive 2009/28/EC. Available online at: <u>http://eur-lex.europa.eu/legal-</u>

content/en/ALL/?uri=CELEX%3A32009L0028 [Accessed 02/10/2017]

The EU 2050 Strategy. Available online at: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy [Accessed 02/10/2017]

⁸ The UK Renewable Energy Strategy (2009). Available online at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228866/7686.pdf [Accessed 02/10/2017]

¹⁰ Department of Enterprise, Trade and Investment (2010). Strategic Energy Framework. Available online at: https://www.economyni.gov.uk/publications/energy-strategic-framework-northern-ireland [Accessed on 12/10/2017]

¹¹ DETI (2013) Envisioning the Future: Considering Energy in Northern Ireland Available at <u>https://www.nienvironmentlink.org/cmsfiles/policy-</u> hub/files/documentation/Energy/2050 main report - final version.pdf [Accessed 09/05/2019] ¹² Northern Ireland Executive (2015). Investment Strategy for Northern Ireland 2011 – 2021. Available online at: <u>https://www.infrastructure-</u> ni.gov.uk/publications/investment-strategy-northern-ireland-2011-2021 [Accessed: 12/10/2017] ¹³ Department for the Economy, March 2019, Electricity Consumption and Renewable Generation in Northern Ireland January 2018 to December 2018, Available online at: https://www.economy-ni.gov.uk/publications/electricity-consumption-and-renewable-generation-northernireland-january-2018-december-2018 [Accessed 15/5/19]

¹⁴ Department of Enterprise, Trade and Investment (2013). Onshore Renewable Electricity Action Plan. Available online at: https://www.economy-ni.gov.uk/articles/onshore-renewable-electricity-action-plan [Accessed: 12/10/2017]

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.

1.7.6 Repowering

- In 2019, RenewableUK published a report¹⁶ showing that older wind farms, which were built in 1990s, are now being decommissioned and that if they are not replaced then 8GW could be retired, which equates to17.5% of the UK's renewable power output and capable of powering 5 million homes.
- The report states that these older turbines should be replaced by new turbines that are larger and more efficient, whilst resulting in a reduced number of turbines overall. Under their optimum scenario, older turbines would be replaced or repowered by 12 GW of new turbines, a net increase. However, under an intermediate scenario, where present approval trends continue, the capacity could be reduced by 2 GW, or by 5.5 GW under the lowest scenario considered.
- Under these more pessimistic scenarios the UK would find it harder to meet its energy needs as well as its carbon reduction 50. targets. This in turn emphasises the need for, and importance of repowering proposals in meeting Northern Ireland's future energy needs.

1.7.7 Energy Storage

- The previous Northern Ireland Affairs Committee published its Third Report of Session 2016–17, Electricity Sector in Northern Ireland, on 1 May 2017 as House of Commons Paper HC 51, in which it stated that Northern Ireland is anticipated to fall into a deficiency of supply by 2021. The report goes on to state:
- "Electricity storage presents a particular opportunity for Northern Ireland, where these technologies could allow the market to take full advantage of the significant investment that has been made in renewable generation in recent years. The ability to store renewable energy-capturing excess electricity at times of high generation so that it can be used when the wind does not blow—has the potential to dramatically increase the contribution of renewables to the system, reduce costs for consumers through lower wholesale prices and constraint payments, and allow for the more efficient management of the electricity grid through better control of supply and demand and reduced congestion on the network"¹⁷.
- Balancing the electricity grid to ensure demand is met by supply is a key requirement of Northern Ireland Electricity (NIE). 53.

When unforeseen demand is put on the network, such as when a large power station suddenly comes offline, the energy storage element of the Development can provide a flexible and rapid release of electricity, which could in turn allow NIE to regulate electricity supply and demand without any greenhouse gas emissions. Conversely, it will also have the capacity to absorb electricity quickly which will allow for the oversupply power onto the grid to be managed.

Environmental Statement 1.8

- This ES reports the findings of the assessment of the potential significant environmental effects of the Development during the initial decommissioning of the Operational Rigged Hill Windfarm and the construction, operational and final decommissioning phases of the Development. This assessment forms part of the extensive process of the EIA, 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.
- The objectives of the ES are summarised as follows: 55.
 - To identify both positive and negative potential effects that may be significant, resulting from the initial decommissioning, construction, operational and final decommissioning phases of the Development, taking into consideration the size 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 to the likely significant effects;
 - To predict the extent and assess the significance of the 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.
- The general methodology for the ES is detailed in Chapter 2: EIA Methodology

1.9 EIA Project Team

- This ES has been compiled by Arcus Consultancy Services Ltd (Arcus), an independent specialist in the production of EIAs on 57 behalf of the Applicant. Arcus is a specialist renewable energy consultancy comprising over 60 staff with a proven track record of delivering windfarm EIA projects over the past 13 years. Many of Arcus' staff also have substantially longer experience of windfarm work, through roles with previous companies. To date, Arcus have submitted over 60 applications for renewable EIA developments.
- Arcus had overall responsibility for the coordination of the EIA and the production of the ES with input from other independent 58. specialist consultants where necessary. Table 1.3 provides details of the authors and contributors of each aspect of the ES. Further details on the qualifications of each member of staff can be found in Technical Appendix A1.1.

able 1.3: EIA Project Team							
ES Chapter		Organisation					
Chapters 1 - 4	Introductory ES Chapters	Arcus Consultancy Services Ltd					
Chapter 5	Planning Policy Context	Juno Planning & Environmental Ltd					
Chapter 6	Landscape and Visual Amenity	Optimised Environments Ltd (OPEN)					
Chapter 7	Hydrology, Hydrogeology, Geology, Soils and Peat	Arcus Consultancy Services Ltd					
Chapter 8	Ecology and Fisheries	NM Ecology and Paul Johnston Associates					
Chapter 9	Ornithology	Bird Surveyors Ltd					
Chapter 10	Noise	Arcus Consultancy Services Ltd					
Chapter 11	Archaeology and Cultural Heritage	Arcus Consultancy Services Ltd					
Chapter 12	Access, Transport and Traffic	Arcus Consultancy Services Ltd					
Chapter 13	Tourism, Recreation and Socio-Economics	Arcus Consultancy Services Ltd					
Chapter 14	Other Issues and Interrelationships	Arcus Consultancy Services Ltd and ScottishPower Renewables.					
Chapter 15	Summary of Mitigation	Arcus Consultancy Services Ltd					

¹⁵ Department of Enterprise, Trade and Investment (2017). Mid-Term Review of the Onshore Renewable Electricity Action Plan. Available online at: https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Mid-term-Review-OREAP-Report.pdf [Accessed: 31/01/2019]

¹⁶ RenewableUK (2019), Onshore Wind: The UK's Next Generation ¹⁷ Third Report of Session 2016–17, Electricity sector in Northern Ireland, 1 May 2017, House of Commons Paper HC 51, Accessed 15/1/19, https://publications.parliament.uk/pa/cm201617/cmselect/cmniaf/51/5106.htm

1.10Glossary of Common AcronymsThe common acronyms used throughout this ES are contained in Table 1.4 below.

Table 1.4 Common Acronyms

Acronym	Term
AAR	Average Annual Rainfall
ADT	Average Daily Traffic
AGL	Above Ground Level
AHSV	Area of High Scenic Value
ALRA	Abnormal Load Route Assessment
ALV	Abnormal Load Vehicle
AM	Amplitude Modulation
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
ASSI	Area of Special Scientific Interest
ATC	Automatic Traffic Count
BCT	Bat Conservation Trust
BPG	The Best Practice Guide
CCGBC	Causeway Coast and Glens Borough Council
CEDaR	Centre for Environmental Data and Reporting
CIfA	Chartered Institute for Archaeologists
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	The Construction Industry Research and Information Association
CO ₂	Carbon Dioxide
DA	Drainage Assessment
DAERA	Department of Agriculture, Environment and Rural Affairs
dB	Decibel
dB(A)	A-weighted decibel
DBERR	Department for Business, Enterprise and Regulatory Reform
DBEIS	Department of Business, Energy & Industrial Strategy
DCAN	Development Control Advice Note
DCEMP	Decommissioning / Construction Environmental Management Plan
DETI	Department for Enterprise, Trade and Investment
DfC	Department of Communities
Dfl	Department for Infrastructure
DMRB	Design Manual for Roads and Bridges
DoE	Department of Environment
DoENI	Department of the Environment Northern Ireland
DTI	Department of Trade and Industry
DWI	Drinking Water Inspection
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EPA	The Environmental Protection Act 1990
ES	Environmental Statement

Acronym	Term
f	Frequency
ft	feet
FTE	Full time equivalent
GIS	Geographical Information System
GLVIA	Guidelines for Landscape and Visual
GPG	The Good Practice Guide
GPP	Guidance for Pollution Prevention
GSNI	Geological Survey of Northern Ireland
GVA	Grass Value Added
GWDTE	Groundwater Dependent Terrestrial E
ha	Hectare
НВ	Historic Building
HED	Historic Environment Division
HGV	Heavy Goods Vehicle
HMP	Habitat Management Plan
Hz	Hertz
H&S	Health and Safety
ICOMOS	International Council on Monuments a
IEMA	The Institute of Environmental Manag
IEF	Important Ecological Feature
IGR	Irish Grid Reference
IOA	Institute of Acoustics
km	kilometres
kV	kiloVolts
LA90,t	A-weighted background noise level for
L _{Aeq,t}	A weighted equivalent continuous sou
LCRE	Low Carbon Renewable Energy
LCA	Landscape Character Area
LCT	Landscape Character Type
LDP	Local Development Plan
LGD	Local Government District
LVIA	Landscape and Visual Impact Assess
Lw	Sound Power Level
m	metres
m²	Metres squared
m ³	Cubic metres
ms ⁻¹	Meters per second
MW	MegaWatts
NAP	The Northern Area Plan
NCR	National Cycle Route
NED	Natural Environment Division
NI	Northern Ireland
NIE	Northern Ireland Electricity
NIEA	Northern Ireland Environment Agency

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Acronym	Term	Acronym	Term
NILCA	Northern Ireland Landscape Character Assessment	ZTV	Zone of Theoretical Visibility
NIRIG	Northern Ireland Renewables Industry Group		-
NITB	Northern Irish Tourism Board		
NNR	National Nature Reserve		
NRFA	National River Flow Archive		
NVC	National Vegetation Classification System		
OAM	Other Amplitude Modulation		
OSNI	Ordnance Survey of Northern Ireland		
PAC	Pre-Application Consultation		
PAN	Planning Advice Note		
PID	Public Information Day		
PMP	Peat Management Plan		
PPG	Pollution Prevention Guidelines		
PPP	Pollution Prevention Plan		
PPS	Planning Policy Statement		
PSRA	Peat Slide Risk Assessment		
PWS	Private Water Supplies		
RDS	Regional Development Strategy		
RG	Registered Garden		
RoW	Right of Way		
RTC	Road Traffic Collisions		
SAC	Special Area of Conservation		
SDL	Settlement Development Limit		
SEF	Strategic Energy Framework		
SEPA	Scottish Environment Protection Agency		
SGN	Supplementary Guidance Note		
SLNCI	Sites of Local Nature Conservation Importance		
SMR	Sites and Monuments Record		
SNH	Scottish Natural Heritage		
SPA	Special Protection Area		
SPG	Supplementary Planning Guidance		
SPPS	Strategic Planning Policy Statement		
SPR	ScottishPower Renewables		
SuDS	Sustainable Drainage Systems		
t	Tonnes		
ТА	Transport Assessment		
TIA	Traffic Impact Assessment		
TMP	Traffic Management Plan		
The EIA Regulations	The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017		
UK	United Kingdom		
V	Volts		
VP	Viewpoint		
WCEMP	Water Construction Environmental Management Plan		
WFD	Water Framework Directive		

2. EIA Methodology

2.1. Introduction

EIA is a process aimed to ensure that permissions for developments with potentially significant effects on the environment are granted only after an assessment of the likely significant environmental effects has been carried out. The assessment must be carried out following consultation with statutory consultees, other interested parties and members of the public. This chapter of the ES describes the EIA process for the Development and is supported by the following Technical Appendices:

- Appendix A2.1: Scoping Report (submitted August 2017);
- Appendix A2.2: Scoping Opinion (received January 2018); and
- Appendix A2.3: List of Cumulative Sites.
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

2.2. EIA Process

- The legislative framework for EIA is set out by the EIA Directive, European Directive 2011/92/EU¹, as amended by Directive 2014/52/EU²). The requirements of the EIA Directive are transposed by the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017³ ("the EIA Regulations").
- The EIA Directive aims to ensure that a planning authority granting planning permission for a development proposal makes its 4 decision with the full knowledge of any likely significant effects on the environment by setting out a procedure known as environmental impact assessment to assess such effects.
- Schedule 2 of the EIA Regulations lists developments for which an EIA is required for certain types of development where there are likely to be significant effects on the environment by virtue of factors such as the nature, size or location of the development proposal. The following paragraphs under Schedule 2 are of relevance to the Development:
 - Paragraph 3(j) includes "installations for the harnessing of wind power for energy production (windfarms)"; and
 - Paragraph 13 (a) includes "Any change to or extension of development of a description listed...where that development is already authorised, executed or in the process of being executed"
- As the Development falls under Paragraph 3 (j) and Paragraph 13 (a) of Schedule 2 of the EIA Regulations, and because of 6. the proposed height and total number of turbines comprising within the Development, as extended, the Applicant determined that an EIA should be carried out and are submitting an ES as part of the planning application. Schedule 4 of the EIA Regulations details what information is required to be included within the Environmental Statement (ES). The following paragraphs under Schedule 4 are of relevance to the Development and this ES:
 - Paragraph 3: "A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge."
 - Paragraph 4: " A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape."
- The results of the EIA will be presented in an ES which, as prescribed in the EIA Regulations, is required to include a "description of the likely significant effects" of the Development; effects which are not considered to be significant do not need

to be described. It is therefore necessary for the scope of the EIA to be appropriately and clearly defined to ensure that only likely significant effects are identified, described and assessed.

2.3. EIA Methodology

9.

The ES has been prepared following a systematic approach to EIA and project design. The process of distinguishing environmental effects is iterative and cyclical, running concurrent with the design process. The main stages to an EIA are:

- addressed:
- •
- Preparation of the ES; and
- Submission of the planning application and ES including publicity of the ES.

2.3.1. Scoping and Consultation

- Consultation has an essential role throughout the EIA process, including at the following key stages: 10
 - Pre-scoping procuring initial feedback on the Development;
 - Scoping and public information days documentation of key issues; ٠
 - Technical Assessments gathering baseline information from relevant organisations and confirming survey ٠ methodologies;
 - ٠
 - consideration of baseline information; and
- Further information regarding consultation is outlined within the individual technical chapters.

2.3.1.1. Scoping

- The aim of the Scoping process is to identify key environmental issues at an early stage, to determine which elements of the Development are likely to cause significant environmental effects and identify areas that can be 'scoped out' of the assessment. This focuses the next phase of assessment on likely significant effects only.
- In light of this, the Applicant sought to advance the collation of baseline information by undertaking early stage consultation, 13. field surveys and desk-based assessment for each of the technical areas Assessed in Chapters 6-14 in advance of preparing the Scoping Report. The findings were described in the Scoping Report, and together with independent professional judgement, formed the basis of the recommendation to 'scope in' or 'scope out' each element of the assessment.
- The request for a Scoping Opinion was submitted to the Council in August 2017. The request was accompanied by the 14. Scoping Report which described the Development, the proposed EIA methodology and the key areas to be 'scoped in' or 'scoped out' of any further assessment. The document was also sent to a range of consultees as agreed in advance with the Council by the authors of the ES.
- A copy of the Scoping Report is included as **Technical Appendix A2.1**.
- Appendix A2.2.

Table 2.1 provides an overview of the comments raised by the consultees at the scoping stage. The detail of the individual responses received from consultees during consultation, including at the scoping stage, is set out in the relevant technical chapters. Where appropriate in the technical chapters, reference is provided as to where the comments have been addressed within this ES. Where a Consultee disagreed with 'scoping out' a technical area from further assessment, and where

³ The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 Available online at: https://www.legislation.gov.uk/nisr/2017/83/contents/made [Accessed 16/10/2017]

• Scoping and ongoing consultation, including consideration of responses from all parties and how these should be

Technical environmental assessments-, including baseline studies, input to the design process, identification of potential significant environmental effects and identification of suitable mitigation and improvement measures;

Informing site design - communication with statutory and non-statutory consultees and local communities, and

Discussing opportunities for mitigation and improvement with statutory and non-statutory consultees.

The Scoping Opinion was issued by the Council and received on 26th January 2018, a copy of which is included as **Technical**

¹ The European Council Directive 2011/92/EU. Available online at: <u>http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011L0092</u> [Accessed 16/10/2017]

² The European Council Directive 2014/52/EU. Available online at: <u>http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052</u> [Accessed 15/11/2017]

reasoning was provided this information has been considered and further assessment of this technical area undertaken as appropriate.

able 2.1: Scoping Responses																	
Consultee																	
	No Response	No comments	Referral to other consultees	Planning Policy	Socio-economic / recreation	Landscape and Visual	Ecology / Ornithology	Hydrology / Hydrogeology	Cultural Heritage	Noise	Existing infrastructure	Shadow Flicker / Reflectivity	Access / Traffic	Cumulative Effects	Construction	Operational Works	Other Issues
British Horse Society	\checkmark																
The Honourable The Irish Society					✓		✓										
Bannside Rambling Club					\checkmark												
Ulster Federation of Rambling Clubs (Governing body for Rambling and Hill-Walking Clubs in the North of Ireland)	~																
Walk Northern Ireland	\checkmark																
National Trust (Northern Ireland)	\checkmark																
Department for Infrastructure (Dfl) Roads													\checkmark				
Causeway Coast and Glens Borough Council (CCGBC)- Planning Department			✓	~	~	~					✓	~				✓	✓
CCGBC – Coast and Countryside	\checkmark																
CCGBC – Environmental Health										\checkmark							
CCGBC – Biodiversity	\checkmark																
Transport Northern Ireland																	
DfI - Rivers Agency		\checkmark															
Department of Agriculture, Environment and Rural Affairs (DAERA) - Marine and Fisheries Division								✓									
DAERA - Forestry Division							\checkmark		\checkmark								
DAERA - Countryside Management Branch	\checkmark																
DAERA – Northern Ireland Environment Agency (NIEA) Water Management Unit								~									

Consultee																	
	No Response	No comments	Referral to other consultees	Planning Policy	Socio-economic / recreation	Landscape and Visual	Ecology / Ornithology	Hydrology / Hydrogeology	Cultural Heritage	Noise	Existing infrastructure	Shadow Flicker / Reflectivity	Access / Traffic	Cumulative Effects	Construction	Operational Works	Other Issues
DAERA - NIEA Natural Environment Division						✓	~	~						~	~		✓
DAERA - NIEA Countryside, Coast & Landscape Team	\checkmark																
DAERA - NIEA Conservation Science (Ornithologist)	\checkmark																
DAERA - Council for Nature Conservation and the Countryside	✓																
DAERA Inland Fisheries Group								\checkmark									
Department for Communities (DfC)- Historic Environment Division (HED) – Buildings & Monuments									✓								
Shared Environmental Services							\checkmark	\checkmark									
Royal Society for the Protection of Birds							✓										
Department of Enterprise, Trade and Investment (DETI) - Geological Survey (NI)								✓									
Northern Ireland Water											\checkmark						\checkmark
Tourism Northern Ireland		\checkmark															
Loughs Agency							\checkmark	\checkmark									
Belfast International Airport	\checkmark																
Derry Airport	\checkmark																
Ministry of Defence																\checkmark	

2.3.1.2 Public consultation

17. Three rounds of public information days (PIDs) were undertaken for this Development. The first round of PIDs were held on the 24th and 25th of August 2017 at the Garvagh Community Building in Garvagh and the Roe Valley and Cultural Centre in Limvady respectively. The events ran from 2pm until 8pm at Garvagh and from 10am until 4pm at Limavady, with 3 attendees at Garvagh and 18 at Limavady. The aim of the first round of information days was to invite comments and obtain feedback in the early design stages to ensure that local considerations helped to inform design decisions.

- Of the 21 people attending the first round of exhibitions, seven local residents completed feedback forms, all of whom were supportive of repowering the Operational Rigged Hill Windfarm, and there were no responses received that indicated they were against the concept of repowering the Operational Rigged Hill Windfarm.
- The second round of PIDs were held on the 6th and 7th of June 2019 at the Roe Valley and Cultural Centre in Limavady and the Garvagh Community Building in Garvagh respectively. Similarly, the events ran from 2pm until 8pm and 10am until 4pm at the respective events. The aim of this second round of information days was to present the final design reached following the rigorous EIA process, and EIA results.
- 11 people attended the exhibitions over the course of two days. Four feedback forms were completed, all of which stated 20. support for the repowering of the Operational Rigged Hill Wind Farm, in common with the earlier exhibitions. Some comments were made with respect to potential noise effects for nearby properties and other environmental effects.
- A final PID was held at the Roe Valley Arts and Cultural Centre on 26th June 2019 running from 10am until 12:30pm held prior 21. to finalisation of the planning submission and to meet statutory requirements, there were no attendees at this event.
- Further information on the PIDs, including feedback from attendees and responses as relevant is provided in the Pre-22. Application Consultation (PAC) Report. The PAC Report has been submitted to the Council as a standalone document alongside the planning application. The PAC Report summarises the consultation that has been undertaken with the local community, detailing how comments received have been responded to and addressed.

2.3.2. Technical Assessments

- Each of the technical assessments follows a systematic approach with the main steps as follows: 23.
 - Introduction, assessment methodology and significance criteria;
 - Description of the baseline conditions;
 - Assessment of potential effects;
 - Mitigation measures and residual effects;
 - Cumulative effects assessment;
 - Summary of effects (residual effects); and
 - Statement of significance.
- A summary of each step is highlighted below. 24.

2.3.2.1. Introduction, Assessment Methodology and Significance Criteria

Each technical assessment sets out the legislation, policy and guidance together with scope and methodology used to carry 25. out the assessment of potential effects, including the criteria that are used to establish which effects are significant. The methodology seeks to ensure transparency in the assessment. Where a level of significance is attributed to an effect, this is based on a technical guidance and professional judgement and generally informed by consideration of the sensitivity of the receptor and the degree of the effect.

2.3.2.2. Description of Baseline Conditions

- In this case, the Operational Rigged Hill Windfarm has been operating for over 20 years and holds a consent in perpetuity. The baseline scenario for the EIA is therefore not that of an undisturbed greenfield site. In line with the EIA Regulations the ES includes:
- "A description of the relevant aspects of the current state of the environment (the 'baseline scenario' and an outline of the 27. likely evolution thereof without implementation of the project as far as its natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge".
- The assessments therefore use a "with windfarm" scenario, taking account of the existing condition of the environment, as the 28. current baseline, this incorporates all existing site infrastructure, access tracks, hardstandings, cables, and substation building as well as the wind turbines, foundations and the current land use management. Describing and having an understanding of the baseline conditions, provides a base reference against which the changes due to implementation of the Development are measured.

- An understanding of the current baseline conditions allows an assessor to evaluate the sensitivity of any receptors within defined study areas This data was obtained through online searches of the Northern Ireland Planning Portal and other renewable technology databases. A cut-off date of 3 months prior to submission for single turbines and 6 months for windfarms was requested by the Council in May 2018, in respect of the collation of cumulative data. The final update of both sets of data was carried out in March 2019, 4 months prior to the anticipated submission date of July 2019. A list of all single wind turbines and windfarms within 5 km of the Site centre, was obtained from the Council in May 2019. No height threshold was applied to this search. A list of the consented single turbines and windfarms included within the EIA is provided within Technical Appendix A2.3. Technical assessments have been based on this complied list, with those relevant to each technical discipline selected.
- Windfarms that are operational or consented as of May 2019 are also treated as forming part of the existing baseline, except 30. where specific guidance advises to the contrary. Baseline conditions as relevant to each technical area, the identification of any sensitive receptors, and a description of the study areas used, are set out in each of the technical assessment chapters.
- Information gathered on baseline conditions, particularly any sensitive receptors, is used to inform the design process, and inform a constraints mapping exercise. Further detail on the design process adopted for the Development is specified in Chapter 4: Site Selection and Alternative Site Layouts of this ES.

2.3.2.3. Assessment of Potential Effects

- The prediction of potential significant effects comprises of both the initial decommissioning of the Operational Rigged Hill Windfarm and the construction and operation of the Development, Different environmental effects are likely to occur during different stages of the Development, effects taking place during the initial decommissioning and construction are generally considered to be short term and reversible. Those arising as a result of the operation of the Development are generally considered to be permanent but reversible upon future decommissioning of the Development. Effects associated with the final decommissioning phase of the repowered windfarm are considered to be no greater than those effects assessed as part of the combined initial decommissioning and construction phases of the Development. Each technical assessment considers the nature of the effects and includes any possible cumulative effects with other developments where appropriate.
- The significance of effects resulting from the Development will be determined through consideration of a combination of the sensitivity of the receiving environment and the predicted level of change from the baseline state. Environmental sensitivity can be categorised by several aspects including factors such as the transformation of natural landscapes, the protection afforded to and presence of rare or endangered species, land use and soil quality.
- The sensitivity classification of the receiving environment varies between the different technical areas of assessment, e.g., 34. ecology, hydrology, landscape and visual, etc.
- For the purposes of environmental assessment, the magnitude of an 'effect' is generally classified as:
 - No effect no change to the location, environment, species or sensitive receptor;
 - Negligible no detectable 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; and Major- a fundamental change to a location, environment, species or sensitive receptor
- This ES largely follows the above principles in relation to the identification of significant effects; however some technical assessments may adopt an alternative to this process, such as following technical guidance bespoke to that topic for example Chapter 10 Noise, which establishes whether recommended noise limits are identified as being met or not met. The assessment criteria used to determine the significance of effects are made clear in each technical assessment chapter within this ES. Table 2.2 highlights the general framework for assessing the significance of effects. Effects of major or moderate significance are considered to be Significant Effects in the context of EIA Regulations.

Table 2.2: Framework for Assessment of Significance of Effects

Magnitude of	Sensitivity of Receptor										
Effect	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						

2.3.2.4. Mitigation Measures and Residual Effects

- The institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment⁴ explains how EIA is an iterative process rather than a unique, post design, environmental appraisal. In adopting this approach, the outcomes of the technical environmental assessments are used to advise the design of the Development, and hence attain a 'best fit' with the environment. This approach has been adopted in respect of the Development, where potentially significant effects have been identified, their avoidance or reduction has been prioritised at the design stage. This is referred to within this ES as 'embedded mitigation', i.e., mitigation that is implemented within the project designs, and includes best practice in implementing the design as well as design features.
- The design strategy of 'avoidance, reduction and remediation' is a hierarchical one, which seeks to:
 - First, avoid all potential effects;
 - Then, reduce those which remain; and
 - Lastly, where neither of the above measures are possible, to propose compensatory measures.
- All appropriate mitigation measures are discussed within each technical chapter of this ES. 40.

2.3.2.5. Cumulative Effects Assessment

- In accordance with the EIA Regulations, the assessment has considered 'cumulative effects' which by definition, are effects 41. that result from increasing changes caused by past, present or reasonably foreseeable developments together with the Development. For the cumulative assessment, the combined effects of several developments that may on an individual basis be insignificant, but cumulatively may give rise to significant effect, have been considered.
- Cumulative assessment, addresses the combined effects from the addition of the Development to a baseline of identified 42 windfarms and projects on all technical areas addressed by the ES. As discussed in Section 2.3.2.2 a cut-off date of 3 months prior to submission for single turbines and 6 months for windfarms was requested by the Council. This has been supplemented by a final list obtained from the Council in May 2019, of all single wind turbines and windfarms within 5 km of the Site centre.
- Other potential developments which do not currently have sufficient information available in relation to their likely effects to 43. make an informed cumulative assessment, are not considered in detail in this ES.
- The extent of any cumulative assessment is described in each technical assessment chapter of this ES and can include both 44 existing and proposed windfarm developments and other forms of development. The potential landscape and visual effects, for example, which relate to intervisibility of individual windfarms will be much more wide ranging than noise effects which will be limited to receptors in the more immediate vicinity of the developments.

Consideration of cumulative effects has been undertaken for all technical assessments. Where no cumulative effects are 45. probable, this is stated. In relation to some of the technical chapters, specific guidance and policy exits advising that effects associated with existing windfarms should be considered as cumulative effects. Where relevant, these are documented within each chapter.

2.3.2.6. Summary of Effects (Residual Effects)

- 46 measures where relevant.
- Residual effects are identified in each technical assessment and summarised in Chapter 15: Summary of Effects and 47 Mitigation alongside an assessment of whether any residual effects are significant or not in terms of the EIA Regulations. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are highlighted in the light green in Table 2.2.

4.3.3.7 Statement of Significance

The statement of significance draws together the findings of each technical assessment in order to provide an overall conclusion as to the significance of the development under the terms of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017.

2.4. Assumptions and Limitations of this ES

- Several assumptions have been made during the preparation of this ES, as set out below. Assumptions specific to certain environmental aspects are discussed in the relevant Chapters of the ES. The assumptions are:
 - The main land uses adjacent to the Development area remain as they are at the time of submission of the planning effects or as contributing to effects; and
 - producing the ES (2019).
- The EIA has been subject to the following assumptions: 50.
 - operational phases;
 - proposed windfarm developments as of May 2019.
- The information that an application is required to submit as part of the EIA process is presented in this ES. The preparation 51. and production of this ES has been conducted in accordance with relevant regulations and good practice guidance. Relevant legislation, policy and guidance are referred in each technical assessment chapter within this ES. Principal regulation, policy and guidance documents that have been used in preparing this ES are:
 - IEMA Guidelines for Environmental Impact Assessment 2004⁵;
 - IEMA Guidelines for Environmental Impact Assessment Guide to Delivering Quality Development 2016⁶:
 - IEMA Guidelines for Delivering Proportionate Environmental Impact Assessment 20177; •
 - The Planning Act (Northern Ireland) 2011⁸; •
 - The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017⁹; •

⁷ IEMA (2017) Institute of Environmental Management Assessment 2017. Available online at: <u>https://www.iema.net/policy/ia/proportionate-eia-</u> guidance-2017.pdf [Accessed 01/11/2017] ⁸The Planning Act (Northern Ireland) 2011. Available online at: https://www.legislation.gov.uk/nia/2011/25/contents [Accessed 18/10/2017]

⁹ The Planning (Environmental Impact Assessment) Regulation 2017. Available online at: https://www.legislation.gov.uk/nisr/2017/83/note/made [Accessed 18/10/2017]

The residual effects of the development are those that remain, assuming successful implementation of the identified mitigation

application, except in cases where planning permission has already been granted for development. In some cases, it is assumed that the approved development will take place, and these have been treated as receptors for potential

Information provided by third parties, including publicly-available information and databases is correct at the time of

• Baseline conditions have been assumed to be accurate at the time of the physical surveys but, due to the dynamic nature of the environment, conditions may change during the site preparation, decommissioning / construction and

• The assessment of cumulative effects has been reliant on the availability of information on existing, consented and

⁴ IEMA (2016) Environmental Impact Assessment Guide to: Delivering Quality Development. Available online at: https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf [Accessed 18/10/2017] ⁵IEMA (2004) Institute of Environmental Management and Assessment: London. Guidelines for Environmental Impact Assessment, 2004. Available online at: http://bailey.persona-pi.com/Public-Inquiries/Barking%20Riverside/B-Core%20Documents/Category%20D%20National,%20London%20and%20Local%20Policy%20and%20Guidanc%20Documents/D6%20-

^{%20}Evironmental%20Assessment%20Impact.pdf [Accessed 18/10/2017]

⁶ IEMA (2016) Environmental Impact Assessment Guide to: Delivering Quality Development. Available online at: https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf [Accessed 18/10/2017]

- Strategic Planning Policy Statement for Northern Ireland (SPPS), the Northern Irish Government, 2015¹⁰;
- Information Leaflet 5: Environmental Impact Assessment, the Northern Irish Government 2012¹¹; and ٠
- Planning Advice Note (PAN) 10/1999: Environmental Impact Assessment, the Northern Irish Government. 1999¹²; ٠
- This ES reports the findings of the assessment of the potential significant environmental effects of the Development, both in 52. isolation and cumulatively, during the decommissioning of the Operational Rigged Hill Windfarm and the construction and operation of the Development.
- The ES includes chapters covering the following technical areas: 53.
 - Chapter 6: Landscape and Visual Amenity;
 - Chapter 7: Hydrology, Hydrogeology, Geology, Soil and Peat;
 - Chapter 8: Ecology and Fisheries; ٠
 - Chapter 9: Ornithology;
 - Chapter 10: Noise; •
 - Chapter 11: Archaeology and Cultural Heritage;
 - Chapter 12: Access, Transport and Traffic; .
 - Chapter 13: Tourism, Recreation and Socio-Economics; and ٠
 - Chapter 14: Other Issues and Interrelationships.
- Each of the technical chapters follow the broad assessment principles outlined in Section 2.3.2, although each chapter 54. provides information on the assessment undertaken within. Chapter 15: Summary of Effects and Mitigation of this ES presents a summary of the main residual effects of the Development, along with a summary of the main environmental commitments.

2.5. Scoped Out Effects

55.

Following preliminary consultation with key consultees during the scoping process, desk-based assessments, site visits and field surveys, and in line with The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 ('the EIA Regulations'), this ES aims to focus the assessment solely on those elements likely to provide a significant effect. Those topics and factors identified through the scoping process as not likely to have significant effects have not be considered further within this ES. Table 2.3 below provides a summary of topic areas that have been scoped out. This approach to the assessment is supported by the Scoping Opinion received from CCBGC and included in Technical Appendix A2.2 Scoping Opinion.

Table 2.3 Technical Topics scoped out as Not Significant

Technical Area	Elements Scoped Out of the EIA
Landscape and Visual Amenity	 All Landscape Character Areas beyond 15 km of the site; Nine Landscape Character Areas within 15 km of the site; The Giants Causeway and Causeway Coast World Heritage Site; Causeway Coast Area of Outstanding Natural Beauty; Areas of High Scenic Value within Derry / Londonderry area; Registered Gardens and Supplementary Sites beyond 20 km; Eight Registered Gardens and Supplementary Sites within 20 km; Settlements beyond 20 km; Five Settlements within 20 km; Rail and road routes beyond 10 km; and Regional and national cycle routes and links beyond 15 km.
Ecology	 Upland acid grassland and improved grassland habitats; Any rare or protected flora;

¹⁰ Department of the Environment. Strategic Planning Policy Statement for Northern Ireland (SPPS) 2015. Available online at: https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf [Accessed 18/10/2017]

¹¹ Information Leaflet 5: Environmental Impact Assessment. Available online at:

https://www.planningni.gov.uk/index/advice/advice_leaflets/leaflet05.htm [Accessed 07/02/2019]

Technical Area	Elements Scoped Out of the EIA
	 Terrestrial mammals except badgers within the Site; Common lizards and smooth newts; Marsh fritillary butterflies or any other protected / priority invertebrates; and Indirect effects on fisheries and aquatic fauna.
Ornithology	 Collision risk modelling for golden plover; and Effects on curlew populations.
Noise	 Construction Noise; Low Frequency Noise and Infrasound; Vibration; Amplitude Modulation; Noise from Energy Storage Unit.
Archaeology and Cultural Heritage	 Indirect effects on heritage assets not within the Zone of Theoretical Visibility; and All Listed Buildings.
Access, Transport and Traffic	Operational traffic assessment.
Hydrology, Hydrogeology, Geology, Soils and Peat	 Receptors beyond 10 km of the Site; and Contaminated land.
Tourism, Recreation and Socio- Economics	 Direct effects on tourism and recreation receptors (with the exception of the Ulster Cam Forest).
Other Issues	 Turbine reflectivity; Potential interactions with Human Health including Health and Safety best practice lightning strike and structural failures The vulnerability and resilience of the development to climate change effects; and Waste.

¹² The Planning Service. Planning Advice Note 10/1999 Environmental Impact Assessment. Available online at: https://www.planningni.gov.uk/downloads/dcan10-eia.pdf [Accessed 18/10/2017]

ers within the Site; ts; ther protected / priority invertebrates; and quatic fauna.	
plover; and	
pund;	

eation receptors (with the exception of the Ulster Way and

Health including Health and Safety best practice, ice,

3 Development Description

3.1 Introduction

- This Chapter of the Environmental Statement (ES) provides a description of the proposed repowering of the Operational Rigged Hill Windfarm (the Development) which forms the basis of the assessments presented within Chapters 6 to 14. It provides details of the initial decommissioning, construction and operational phases of the Development.
- This Chapter includes an overview of the Development followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Development to reduce effects, also known as 'embedded' mitigation measures, are set out in the following Chapter (Chapter 4: Site Selection and Design Strategy) and, in this chapter. In addition to these embedded mitigation measures, Chapters 6 to 14 present mitigation and enhancement measures where specifically relevant to their assessment topic.
- This Chapter of the ES is supported by the following Technical Appendix documents provided in Volume 3: 3.
 - A3.1: Outline Decommissioning and Construction Environmental Management Plan (DCEMP); ٠
 - A3.2: Draft Habitat Management Plan (Draft HMP); and
 - A7.2: Outline Water Construction Environmental Management Plan (WCEMP). ٠
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

Description of the Development Site and Surrounding Land 3.2

- The Site is located within the Causeway Coast and Glens Borough Council (CCGBC) administrative area. The location of the Site is shown on Figure 3.1 and is approximately 6 km south-east of Limavady in County Derry/Londonderry. The Operational Rigged Hill Windfarm is located within the Site as detailed in the following section and shown in Figure 3.2. A comparison with the Operational Rigged Hill Windfarm layout is shown in Figure 3.3.
- The Site is located on the summit of Rigged Hill, 377 metres (m) above ordnance datum (AOD), which takes the form of a north-south running ridge set between Temain Hill to the south of the Site (376 m AOD) and Boyd's Mountain (329 m AOD) to the north. Elevations of the Site range from approximately 110 m AOD in the west of the Site, to 377 m AOD at the summit of Rigged Hill. The Site is characterised by moorland cover and the steep upper slopes of Rigged Hill, which lead to an elevated plateau, where the Operational Rigged Hill Wind Farm is located.
- The upper areas of the Site are predominantly moorland cover, the main land use, in conjunction with the Operational Rigged Hill Windfarm, is agricultural grazing. There are a number of small unnamed watercourses and man-made open field drains within the Site, most of which drain in a westerly direction into the Castle River 3 km west of the Site, before discharging into the River Roe north of Limavady.
- The historical land ownership pattern of this area is based on the land being divided into small plots. This has led to a dispersed settlement pattern, whereby individual dwellings occur frequently across the landscape, accessed by a network of rural roads. The closest settlements to the Site include the small village of Drumsurn located approximately 3.6 km south-west of turbine 4 and the town of Limavady, 6 km to the north-west of turbine 7.
- A commercial coniferous plantation is located immediately north and west of the Site and three telecommunications masts are 9. located on Temain Hill approximately 900 m to the south of the Site Boundary.
- The Ulster Way Walking Route currently passes through the Site, utilising the Operational Rigged Hill Windfarm access track, 10. as it passes from Temain Hill in the south towards Boyd's Mountain. The route originally ran through the Cam Forest to the east of the Site, however was rerouted to make use of the windfarm access tracks.
- Domestic scale and single wind turbines are a frequent feature in the valley landscape often associated with farmsteads or 11 domestic dwellings. Larger commercial windfarms are also a feature, typically seen on the elevated upland areas broadly to

the north and south of the Site. The closest operational wind farm is the Dunbeg / Dunmore cluster 5 km to the north, while the consented Craiggore Windfarm is 2 km to the south.

Description of the Operational Rigged Hill Windfarm 3.3

- The Operational Rigged Hill Windfarm was developed and constructed by RES and B9 Energy Services in 1995, and then 12 acquired by ScottishPower Renewables (the Applicant) who own and operate the site. The Operational Rigged Hill Windfarm has consent in perpetuity and consists of ten 500 kilowatt (kW) Nordtank turbines with tip heights of 57 m and associated infrastructure including access tracks, substation and a meteorological mast. The ten existing turbines associated with the Operational Rigged Hill Windfarm are located in two north - south orientated rows running roughly in parallel with the ridgeline of Rigged Hill.
- The Operational Rigged Hill Windfarm is currently accessed via a track through Cam Forest. The Applicant has recently submitted a separate application for a new access track to service the Operational Rigged Hill Windfarm approaching the Site from the west with the main Site entrance on Terrydoo Road.
- The Development is for the decommissioning and repowering of the Operational Rigged Hill Windfarm, which will entail 14 replacing the operational wind turbines and infrastructure including the substation and meteorological mast, while existing infrastructure will be re-used insofar as possible. The Development proposes to utilise the recently applied for access from Terrydoo road, this has been assessed as a new track for the purposes of this EIA, as it is not yet consented or built. The substation, together with a number of redundant tracks and hardstanding areas will be removed with materials being reused within the construction processes wherever possible; these areas will then be re-instated in accordance with reinstatement principals outlined within this chapter, the Draft HMP and the Outline DCEMP. The decommissioning of the Operational Rigged Hill Windfarm is an integral aspect of the Development that must occur prior to and in parallel with construction activities, with the potential for in-combination effects, forming part of what is an EIA development, and is therefore assessed within the ES.
- and likely planning conditions associated with any consent. Once these documents are agreed, they set out the controls and processes that are to be adopted to mitigate environmental impacts throughout a project. The Outline DCEMP sets out the Applicants minimum requirements for inclusion within a DCEMP and sets out guidance and best practice for adoption at decommissioning/construction sites, and acknowledges that the document is iterative and will develop throughout the decommissioning/construction programme in line with the specifications of the Principal Contractor.

3.4 Overview of the Development

- The assessment will consider the potential significant effects of the Development during the following phases of the Development:
 - Decommissioning of the Operational Rigged Hill Windfarm (Initial Phase of the Development);
 - Construction of the Development (likely to occur in tandem with the above phase);
 - Operation of the Development; and
 - Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly in tandem and would have a lesser effect than if the two processes were to arise at different times. This represents a worstcase scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development are considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in the assessment chapters.
- The Development will comprise of the following main components:
 - Decommissioning of the existing 10 turbines;
 - Draft HMP:
 - Removal and restoration of other redundant infrastructure in accordance with the Outline DCEMP and Draft HMP:

The Outline DCEMP along with the WCEMP supplements the ES, demonstrating the linkages between the ES, site activities,

Removal and restoration of the existing substation building and compound in accordance with the Outline DCEMP and

- The erection of seven three bladed horizontal axis wind turbines of up to 137 m tip height;
- Turbine foundations;
- Construction of approximately 4.82 km of new access tracks;
- Upgrade of approximately 1.75 km of existing access tracks; ٠
- Construction of temporary and permanent hardstanding areas for each turbine to accommodate turbine component laydown areas, crane hardstanding areas and external transformers and/or switchgears;
- Temporary construction compound/laydown areas (some areas may be reinstated temporarily if required for future operational and decommissioning purposes);
- Turning heads and passing places incorporated within the site access infrastructure;
- New road junction with Terrydoo Road;
- Five new water crossings; •
- Meteorological Mast;
- Buried underground electrical and communication cables;
- Substation, with roof mounted solar panels, and associated compound, including windfarm and grid connection operating equipment;
- Energy Storage Units;
- Removal of self-seeded trees in east of the Site:
- Associated ancillary works; and
- Micrositing allowance of 50m deviation from the indicative design footprint.
- Both decommissioning phases, including for the decommissioning of the Operational Rigged Hill Windfarm and its related infrastructure have been considered within this ES as the Applicant is treating the repowering as a connected and related project and the failure to properly assess both the decommissioning and construction phases would have the potential to understate or avoid the identification of effects.
- The layout of the Development is shown in Figure 3.2 and details of each component are provided below in Table 3.1. The additional land-take for the Development is shown below and compared to that of the Operational Rigged hill Windfarm footprint. The total land-take required for the operational phase of the Operational Phase will require approximately 0.98 ha of redundant land to be reinstated and 8.53 ha of additional land take. Figure 3.3 shows the comparative layouts for both the Operational Rigged Hill Windfarm and the Development.

Table 3.1: Land Take and Re-instatement Areas

Development Element	Existing Site area (ha)	Redundant area to be re-instated (ha)	Additional Land- take for the Development(ha)	Total site area for the Operational Phase (ha)
Turbine Foundations	-	-	0.49	0.49
Crane Hardstandings, including earthworks and verges	Included in access track figure below	-	2.17	2.17
Blade Laydown Areas, including earthworks and verges	-	-	-	-
Access Tracks, including junction improvements	2.11	0.98	2.85	4.96
Substation Compound including Energy Storage Units compound	-	-	0.09	0.09
Windfarm Construction Compound	-	-	0.82	0.82
Total	2.11	0.98	6.42	8.53

3.5 The Development Components

Wind Turbines 3.5.1

21.

Planning permission is being sought for the erection of up to seven three-bladed horizontal axis wind turbines with a maximum height from base to tip that will not exceed 137 m (with the blade in the vertical position). Figure 3.4 illustrates a typical turbine of this type. The blades will be made of fiberglass reinforced epoxy and mounted on a tapered tubular steel, or steel and

concrete tower. The turbines will be of a typical modern, three blade, horizontal axis design, light grey in colour and the finish of the tower and blades will be semi-gloss and semi-matt respectively.

Each of the turbines comprises of the following components Blades:

- A tower:
- A nacelle:
- A hub; and
- An external transformer, and/or external switchgear.
- The final choice of turbines will be guided by an assessment of the wind conditions, this Environmental Impact Assessment 22. (EIA) together with feedback from consultation, and a pre-construction tendering exercise which will take account of the available technology at the time of construction. Currently it is considered likely that turbines with c. 4 MW capacity may be available within the envelope of the proposed physical parameters as defined within Table 3.2. For the purposes of the assessments a "candidate turbine" has been selected based on the precautionary principle of assessing the worst-case scenario.

Table 3.2 Turbine Physical Parameters

Turbine Parameter	Assessment Envelope
Turbine tip height	Up to 137 m
Rotor diameter	Up to 120 m
Tower height	Up to 81 m

- It is industry standard practice to present a range of turbine physical parameters and then to assess the potential worst-case 23. turbine model of that parameter range. This assessment incorporates the worst-case wind turbine parameters, for example, an overall tip height, rotor blade diameter, and turbine noise output. The turbine tip height will not exceed 137 m with the blades in the vertical position. Should a smaller rotor blade be used it is likely that a correspondingly taller tower would be selected in order to maintain the overall tip height. The candidate turbine has therefore been specified as a rotor diameter of 120 m and a tip height of 137 m, as this is deemed to be worst-case scenario.
- ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' ("Good Practice Guide for the Assessment & Rating of Wind Turbine Noise").
- The worst-case scenario for the Landscape and Visual Impact Assessment (LVIA) (Chapter 6) has been determined as being 25. the largest possible diameter of the rotors within the maximum blade tip height parameter. This is considered to be the worst case from the majority of locations as these would have the largest swept area, which makes the biggest contribution to the perceived scale of the turbines. This is particularly the case when compared with other features within the landscape. The choice of specific model would not make any material difference to the effects the turbines would have, such as how they appear.
- 80 m equating to the Development's maximum tip-height of 137 m. This approach is consistent with the guidance of the 'Good Practice Guide for the Assessment and Rating of Wind Turbine Noise' which notes that most windfarm sites at planning stage will not have selected a preferred turbine and therefore a candidate turbine representative of a range of turbines should be selected to provide appropriate noise levels. Once noise levels have been predicted at the potentially affected properties, compliance with noise levels can be assessed and design advice provided if compliance with noise limits is considered unlikely. This is the recognised best practice approach to windfarm noise assessment.
- The assessment of effects of collision risk on birds (Chapter 9) assumes a 120 m rotor diameter, which also represents a 27 worst case. Where effects considered in other assessments could be affected by turbine size, a worst-case approach has been taken, generally based on the candidate turbine dimensions.
- Turbines are typically of a variable speed type, so that turbine rotor speed will vary according to the energy available in the 28 wind. Turbines with parameters similar to those set out in Table 3.2 typically have a rotational speed of between 9 and 19

This approach is supported by nationally accepted windfarm guidance such as the 'Good Practice Guide to the Application of

The candidate turbine utilised for the noise assessment (Chapter 10) is the Vestas V117 4.2 MW which has a hub height of

revolutions per minute (rpm), depending on variations in wind speed, generating power for all wind speeds between c. 4 and c. 25 metres per second (m/s). At wind speeds greater than c. 25 m/s, the turbines will automatically shut down for selfprotection.

- The turbines are computer controlled to ensure that at all times, the turbine faces directly into the wind to ensure optimum 29 efficiency. The rotors of all seven turbines will rotate in the same direction, however the localised wind conditions will determine the orientation of each turbine individually.
- In high wind speeds, the wind turbines will yaw out of the prevailing wind as instructed by their own control software, in an 30. attempt to maintain their operation prior to cutting out should the high wind speed conditions exceed the wind turbine's safe operating limits.
- When operating, the rotational speed of the blades is transferred and increased through the gearbox, to drive the generator. 31. This produces a three-phase power output typically at 690 Volts (V), which is transferred from the generator to the turbine transformer. The turbines will be controlled and monitored from within the proposed substation and will also be remotely monitored from the Whitelee Windfarm Control Centre in Scotland, where performance details and statistical information for each turbine will be recorded. Staff servicing the turbines on a routine basis will be based in Northern Ireland. Table 3.3 details the locations of the turbine bases.

Turbine ID	Co-ordinate (ITM)	Co-ordinate (ITM)			
	Easting	Northing			
1	275417	420790			
2	275450	420290			
3	275581	419544			
4	275166	419361			
5	274994	419813			
6	274906	420334			
7	275017	420957			

Table 2.2: Proposed Turbine Locations

3.5.2 Turbine Foundations and Crane Hardstandings

- A full ground investigation will be completed prior to construction, however, a typical turbine foundation will consist of an octagonal or circular reinforced concrete base approximately 20.8 m in diameter. A typical turbine foundation is shown in Figure 3.5. The area of excavation will be sized accordingly to allow for a stable, clear and safe working area around the concrete turbine foundation. Where possible the areas of the redundant foundations and turbine hard standings which currently form part of the Operational Rigged Hill Windfarm will be re-used to form part of the new hardstanding and laydown areas.
- Construction of the turbine foundations will generally require the excavation of subsoil to expose a suitable formation material. 33. The formation will be levelled off prior to the in-situ casting of a steel-reinforced concrete foundation. It is estimated that each foundation will require approximately 430 cubic metres (m³) of concrete and up to 90 tonnes (t) of steel reinforcement. Various cable ducts and other ancillaries will be installed within and adjacent to the foundation. The area above the foundations will be backfilled using suitable granular fill materials up to the turbine foundation plinth, and will form part of the permanent crane hardstanding area for each turbine. The final foundation design will be specific to the turbine selected and the site conditions as verified during detailed site investigations undertaken prior to construction commencing.
- Each turbine requires an area of hardstanding adjacent to the turbine foundation to provide a stable base on which to site the turbine components and crane for the erection of the turbine. The working area at each hardstanding area will be approximately 65 m x 25 m. However, the final arrangement of the hardstanding will depend on the selected turbine manufacturer and model, the method of erection and exact specification of the cranes chosen by the turbine erection contractor. The hardstandings will be sufficiently level and with a suitable load-bearing capacity to ensure the safe storage of turbine components and operation of the cranes. Turning areas are provided to facilitate the transportation of turbine components, assembly cranes, and construction traffic onsite. A typical hardstanding arrangement is shown in Figure 3.6 and

their indicative location and configuration shown in Figure 3.2. The crane hardstandings and turning areas will remain in place during the lifetime of the Development to facilitate maintenance works

- Surface water and groundwater levels will be managed to ensure that natural drainage patterns are maintained and that water 35. levels within excavations do not rise beyond appropriate and safe limits. Various cable ducts and other ancillaries will be installed within the foundations and under the access track crossing points. Further detail on drainage is included within the Outline DCEMP, in Technical Appendix A3.1.
- The hardstanding pads will be left in place during the operation of the windfarm in case there is a need to repair or replace any 36 blades, the surrounding areas will be reinstated following construction.

3.5.3 Transformers and Cabling

- Depending on the final choice of turbine, transformers will either be located within the nacelle which sits at the top of each turbine tower (with internal switchgear), within the tower itself or externally, close to the base of the tower. An external transformer will normally be placed within steel or glass reinforced plastic (GRP) housing along with an external switchgear, on a concrete foundation pad as allowed for as part of the Development and illustrated in Figure 3.5 and Figure 3.6. The size of transformer and switchgear will depend on the type of turbine selected but in general it will be approximately 4 m by 7 m in plan and 3 m in height above surrounding ground level (Figure 3.4), located adjacent to the turbine within the hardstanding area.
- The transformers will be either oil-filled with a bunded footing to remove any risk of spillage or a solid cast resin type which is 38 effectively non-polluting. The transformers will increase the electrical voltage from 690V to 33 kilovolts (kV).
- Turbines will typically each be connected by 3no, 33 kV single phase power cables which will be laid in shallow trenches 39. alongside the access tracks and areas of hardstanding. The excavated trenches will also include SCADA cables or fibre optic cables. This will allow interrogation and control of individual turbines as well as remote monitoring. A copper cable will also be located in the trench and will be connected to the substation and each turbine to provide an earthing system for protection against lightning strikes and electrical faults. Details of typical trenches are shown in Figure 3.7.

3.5.4 Onsite Substation and Associated Compound

- A new substation will be required as part of the Development. This will be sited within the substation compound and be 40. designed to the standard required by Northern Ireland Electricity (NIE) Networks for the accommodation of substation equipment.
- The compound as shown in **Figure 3.8** is approximately 35 m x 55 m and contains the substation building and ancillary 41 equipment, including the transformers, switch gear, fault protection, metering, energy storage units, component storage, car parking and other ancillary elements necessary for the operation of the Development.
- The approximately 16.5 m x 11.5 m x 5 m (to peak of roof) sized substation building will contain control elements of the 42. windfarm. The control components housed at the substation will include metering equipment, switchgear, the central computer system and electrical control panels. A spare parts store and workshop will also be located in the substation. It will have a suitably sized footpath around it and an adjacent parking area. The appearance and finish of the substation building will be similar to an agricultural building, while the final appearance would be agreed with the CCGBC via the use of an appropriately worded planning condition.
- The wastewater will drain to the septic tank located adjacent to the substation building. If technically feasible, a rainwater 43. harvesting system will be installed as a source of non-potable water for flushing of toilets, etc. Any rainwater not captured by this system will be drained from the substation building compound footprint to a soakaway or a suitable surface water discharge point located in a suitable area nearby. Should oil storage be required, a bunded area will be constructed in a suitable location within the compound. The bund will be designed to have a capacity of 110% of the maximum volume of oil

required to be stored within it, and bund design would meet best practice as set out in Guidance for Pollution Prevention 2 (GPP2¹): Above Ground Oil Storage Tanks.

- The proposed location and indicative layout of the substation compound is shown in Figure 3.2 and Figure 3.8. The indicative 44. elevation drawings and floor plan for the substation building are presented in Figure 3.10 and Figure 3.11, respectively.
- The finishes of the buildings will match the existing agricultural architecture, and by constructing the new substation in a 45. visually enclosed position, close to the Operational Substation, potential environmental effects would be minimised. By locating the Energy Storage Unit alongside the substation, the footprint of the Development is minimised and the Energy Storage Unit is seen in the context of other Development infrastructure. This will limit its additional landscape and visual effects as buildings will not be introduced into areas of the Site where they are less familiar features. Within the Site the electrical cables will run underground, adjacent to the access tracks where possible, to the new substation.

3.5.5 Energy Storage Units

- The Energy Storage Units will be located within the substation compound and are ancillary to the Development. The units will typically consist of containers each approximately 6.1 m x 2.44 m x 2.2 m high. The indicative locations of these units are shown on Figure 3.8 and typical details are included in Figure 3.9.
- The current energy storage technology favoured today is Li-ion batteries. These batteries are used widely due to their fast response time, which makes them preferable for grid-scale deployment. The Li-ion batteries vary in cell chemistries (e.g., Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt Oxide, Lithium Cobalt Oxide, Lithium-Titanate) and cell arrangement (e.g., cylindrical, pouch, prismatic). Chemistry and arrangement will dictate the batteries' performance characteristics. The final selection of energy storage technology used will be based on the latest technology available at the time of construction, and it is requested that final details of this ancillary element be secured via the use of an appropriately worded planning condition.

3.5.6 Grid Connection

- Underground cabling, laid where possible alongside the new access tracks, will link the turbine transformers to the onsite substation building. Where existing track is being re-used, the cables will be laid in a cable trench alongside the existing track. Generally, the redundant cable will be removed and recycled or cut off and left in situ as appropriate and in accordance with the Outline DCEMP and Draft HMP, in order to minimise disturbance to the environment.
- It is envisaged that a new connection to the electrical grid will be required to accommodate this Development. Based on initial discussions with NIE to date, the Applicant is currently investigating connecting to the Agivey 'cluster' substation, which is approximately 9 km south-east of the Site. Although the application for connection of the Development to the electrical grid will fall under a separate consenting regime, a high-level desk based assessment of possible routing options has been undertaken, in order to evaluate the feasibility the of the proposed grid connection. This assessment has been based on a 33 kV overhead wooden pole line. Statutory designations have been plotted and three broad routes, each approximately 1 km in width have been identified (see Figure 3.15). The final route selection will be determined by NIE.

3.5.7 Meteorological Mast

- One permanent meteorological mast is proposed as part of the Development, located at IGR 275407, 419205. This will be used to provide on-going measurement of wind speed to provide information for the control and monitoring of the operation of the Development. The location of the met mast has been selected to provide the best representation of wind speeds across the Site.
- The meteorological mast will be up to 80 m in total height and will be a galvanised steel lattice construction. It will have a concrete foundation with approximate dimensions of 5 x 5 x 0.5 m and erected using an appropriately sized crane. A typical meteorological mast is shown in Figure 3.12. An access track is not required to service the mast, as construction and operation can be undertaken by all-terrain vehicles.

3.5.8 Temporary Decommissioning and Construction Compounds and Laydown Areas

- located in the core area of the Site, adjacent to the substation building straddling the access track, while a smaller compound is located adjacent to the Site entrance. These locations have been selected to minimise environmental effects, particularly on any of the more sensitive peatland habitats. The main compound is split into two areas to the west and east of the access track with approximate dimensions of 110 x 30 m and 90 x 35 m respectively an indicative compound arrangement is shown in Figure 3.13. The main compound lies in part on areas of previously disturbed ground associated with previous operations relating to the Operational Rigged Hill Windfarm. The smaller compound close to the site entrances measures approximately 50 x 50 m.
- The compounds will comprise a hardstanding area for parking and for receipt and storage of plant, equipment and delivered 53. materials. In addition, they will form a laydown area for the decommissioned turbine components prior to their removal from the Site. A waste management area will also be provided along with temporary office and welfare facilities, including Portakabin-style toilets with provision for sealed waste storage and removal. Facilities will be provided for diesel storage and generators and an area designated for re-fuelling. The compounds will be restored following the completion of the decommissioning and construction works.
- The area will be stripped of topsoil and subsoil to expose a suitable formation. The stripped material will be stored close by for 54. future re-instatement. A geosynthetic material base or similar will then be laid, followed by a layer of suitable rock material, and then a further geosynthetic material laid prior to the top surface of blended finer aggregate.
- Following completion of the decommissioning and construction phases, the compound will be removed and the areas 55. restored. These areas may be reinstated in support of any future operational maintenance and decommissioning activity as required.

3.5.9 Access to the Development

- 56 The Operational Rigged Hill Windfarm has historically been accessed through the Cam Forest north of the Site. This operational access is due to be replaced, independently of the Development, with a new access track entering the Site from the west, off Terrydoo Road and extending up Rigged Hill. The access route is considered largely suitable for the new turbines, however minor areas of realignment and junction improvements may be required.
- A transport assessment has been undertaken in support of the application for the Development and this provides details on 57. access route options for decommissioning and construction vehicles and provides an estimate of trip generation during these phases. The transport assessment includes a routing study to establish the feasibility of the access route for turbine delivery from either Belfast or Larne in the east or Derry / Londonderry in the west, to the Site entrance. Details of this and assessment of traffic impacts during the initial decommissioning, construction and operational phases of the Development are provided in Chapter 12: Access, Traffic and Transport.

3.5.10 Onsite Access Tracks

- Where possible the existing spine road and access tracks serving the Operational Rigged Hill Windfarm will be retained, 58 utilised and upgraded as necessary to access the proposed turbine positions as shown in Figure 3.3. Tracks required to access new elements of the Development will be retained throughout the operational life of the Development to enable maintenance of the turbines and replacement of any turbine components. In total, approximately 4.82 km of new access tracks will be required, with 1.75 km of existing track to be upgraded requiring localised widening.
- 59 breeding birds, active peat, sensitive habitats and steep slopes. All tracks are designed to respond to turbine supplier track requirements and will provide a 5 m wide running surface with localised widening on corners or areas of steeper slopes and will enable access to the turbine locations. The track spurs will have 'dead-ends' with turning heads provided where necessary; these turning heads will reuse areas of existing and redundant infrastructure where possible. Tracks will have passing places where necessary.

Two temporary decommissioning and construction compounds are proposed as shown in Figure 3.2. The main compound is

The access track layout has been designed taking into account a range of environmental and technical constraints, including

¹¹ Above ground oil storage tanks: GPP 2, NIEA, SEPA, Natural Resources Wales, Accessed 01/11/2017, http://www.netregs.org.uk/media/1317/gpp-2-pdf-feb-2017.pdf

- Access tracks will be constructed with a 'cut track' design (as shown in Figure 3.14). This construction method will be used as there is less than 1.2 m depth of soft ground in all proposed track locations, and there is no potential peat instability as a consequence of surface loading of the peat. Analysis of peat-depth survey data, collected as part of the EIA process (see Chapter 7: Hydrology, Hydrogeology, Geology and Peat, and Appendix A7.1, Peat Slide Risk Assessment), suggests that the entirety of the proposed new track (4.82 km) is within topsoil or peat of depth less than 1 m (the average depth being less than 0.5 m). In the event that during the construction phase deeper peat is found in isolated pockets, floating road may be considered as an alternative option.
- Access tracks will be constructed with graded stone aggregate won from cut activities, re-use of existing materials from 61 redundant infrastructure or stone imported from local guarries to provide a level surface and will incorporate geosynthetic layers to strengthen the track as necessary. The running surface will be made of a durable surfacing material resistant to crushing, formed from selected crushed and compacted stone.
- Construction of a 'cut track' design involves the topsoil and peat being stripped to expose a suitable formation on which to build the track. The track will then be constructed on the formation by laying and compacting crushed rock to a depth dependent on ground conditions and topography, although generally the surface of the track will be flush with, or raised slightly above, the surrounding ground level. Geosynthetic layers will be incorporated at the formation and/or within the crushed rock as required to minimise the amount of material required. The upper soil/peat horizon, together with any vegetation, will be placed to one side for later reinstatement, if appropriate.

3.5.10.1 Access Track Drainage and Watercourse Crossing

- The areas of new access track have been designed to ensure run-off water is adequately drained by ditches into swales and small ponds if necessary and appropriate in accordance with the Outline DCEMP, in order to attenuate flows and remove sediments before the treated run-off is shed onto vegetation or otherwise re-enters the wider hydrological system. The proposed use of channels at the track edges and the use of a wide arched culvert for the five new watercourse crossings will ensure disruption to the existing drainage regime will be minimised, as described in Chapter 7: Hydrology, Hydrogeology, Geology and Peat.
- The type and design of each watercourse crossing will be dependent on the stream morphology, peak flows, local topography and ecological requirements, and will be chosen so as to avoid or minimise potential environmental effects. Any crossing would be designed in accordance with Construction Industry Research and Information Association (CIRIA) Culvert design and operation guide (C689)², to ensure sufficient capacities and in consultation with Department for Infrastructure Rivers Department.
- The new tracks will have adequate crossfalls or cambers to allow rainwater to be shed and, where gradients are present, 65. lateral drains will intercept flow along the track. A drainage ditch will be formed on the upslope side of new access track where required to collect run off from the upper slopes, with exact arrangements dependent on detailed drainage design.
- Cross pipes will be laid as required on site to permit good track drainage and will be introduced where the position of the 66. access track would cause ponding to one side. As far as possible, these will coincide with naturally occurring drainage channels.
- Where existing tracks are being re-used existing drainage measures will be checked to confirm they are still appropriate and 67. operating successfully. Should this not be the case the drainage measure will be upgraded in line with those proposed for new tracks.
- Features such as silt traps, silt fences and settlement lagoons will be used where necessary to minimise the potential for sediment to enter watercourses, as described in Chapter 7: Hydrology, Hydrogeology, Geology and Peat in accordance with the Outline WCEMP which will be appended to the Outline DCEMP.

² Culvert design and operation guide (C689)

https://www.ciria.org/Resources/Free_publications/Culvert_design_and_operation_guide.aspx (access 21/11/2018)

3.5.11 Site Signage

- During the decommissioning and construction phases, the Site will have suitable signage to protect the health and safety of workers, contractors and the general public.
- During the operational phase, there will be a sign giving the operator's name, the name of the Development and an 70 emergency contact telephone number. On the turbines and the substation, there will be further signs giving information about the component, potential hazards, the operator's name, the location grid reference and the emergency telephone number. The final location and design of the signage will be defined prior to the Development becoming operational.
- The current routing of the Ulster Way passes through the Site, as noted in Section 3.2 the route originally ran through the Cam 71. Forest to the east of the Site, however was rerouted to make use of the access tracks of the Operational Rigged Hill Windfarm. During the decommissioning and construction phases, the right of way will need to be closed for health and safety reasons, and a temporary alternative route provided. Appropriate signage will be put in place to advise users of the Ulster Way of any disruption and details of alternative temporary routeing, During the operational phase of the Development, the intent would be to retain this connectivity and the Applicant will work with CCGBC, with regards to agreeing to locate any interpretive signage, which would support connectivity with the wider network of paths in the area, and in support of helping realise any CCGBC access improvement strategies, within the land which it has control over.

3.5.12 Micro-Siting

- In the event that unsuitable ground conditions are encountered during the construction works, there may be a requirement to 72 micro-site elements of the Development infrastructure in order to further mitigate against any unfavourable ground conditions, or unforeseen environmental constraints. It is proposed that the relocation of turbines and other infrastructure by up to 50 m in all directions may be carried out subject to approval of the Ecological Clerk of Works (ECoW). It is then requested that any relocation of Development components to distances of more than 50 m will require the written approval from the Council.
- The potential for micro-siting was considered when the detailed survey and assessment work was undertaken. For example, 73. the habitat and archaeological surveys covered a wider area than just the footprint of the proposed turbine and access track locations (full details of survey areas can be found in the relevant assessment chapters). Any likely significant effects arising from micro-siting have been considered in the preparation of this ES, and specific areas to be avoided have been identified in technical chapters where necessary.

3.6 Decommissioning and Construction Programme

- The first phase of the Development will comprise the initial decommissioning phase and removal of the existing turbines, external transformers and wind monitoring masts from the Site. It is anticipated that the turbines and external transformers will be carefully dismantled and transported offsite, possibly for resale in the second-hand market. For the purposes of undertaking the EIA, it is assumed that the initial decommissioning and construction phases are likely to commence in 2023. The date can only be confirmed following consent for the Development and confirmation of the grid connection timelines by NIE. It will also be influenced by any prevailing market conditions and requirements.
- The dismantling of the Operational Rigged Hill Windfarm is expected to take approximately two months following an initial period of four weeks during which a temporary decommissioning / construction compound will be constructed and existing tracks and crane hardstandings will be cleared of vegetation and upgraded for use by decommissioning vehicles as required.
- Following initial track construction and upgrade, cranes will be used to split the turbines into suitable sections, which will then be transported from the Site by heavy goods vehicles (HGVs). Following removal of the blades, power cables will be disconnected and lowered with control cables left in place, before the tower sections are lowered.
- In those locations where the areas of the turbine and transformer bases will not form part of the new crane hardstanding and laydown areas, they will be cut to 1 m below the surface and backfilled with suitable topsoil, generated from the construction activities elsewhere in the Site. Those areas of hardstanding and access track which are being reused will be retained, whilst unaffected areas of hardstanding and access track that have already naturally regenerated will either be left in situ, or

removed and reinstated, with materials reused in the construction activities elsewhere on the Site and in accordance with the Draft HMP and Outline DCEMP.

It is expected that the construction phase of the Development will run in parallel with the decommissioning of the Operational Rigged Hill Windfarm and take approximately 8 months in total. This period is somewhat weather dependent and could be affected by onsite conditions. It is envisaged that the decommissioning/construction programme would follow the broad outline as detailed in Table 3.4.

Table 3.4 Indicative Decommissioning / Construction programme

Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Site Establishment								
Decommissioning of existing turbines								
Access road, construction, upgrade, widening, removal and construction								
Substation and Energy Storage Unit construction								
Excavation and construction of turbine foundations and hardstandings								
Cable installation and electrical works								
Turbine delivery and erection								
Turbine commissioning								
Site restoration								

- Whilst the decommissioning/construction programme will be developed taking into account the bird breeding season, should 79. works be required over the summer months, best practice measures will be utilised to avoid disturbance to birds. It is advantageous for works within the peatland areas of the Site to take place at the driest time of year to minimise disturbance to the peatland habitats and minimise any potential peat slide risk and would be undertaken in line with the Construction Mitigation Strategy described in Chapter 9: Ornithology.
- Other benefits of working over the summer months include:
 - Minimising the risks to Site watercourses through the release of sediments during the site excavations, reducing potential risks to downstream watercourses during track construction of upgrade when working in the vicinity of watercourses;
 - Longer daylight hours enable longer days of working and provide significant Health and Safety (H&S) benefits to site workforce as working in low light/night time conditions will be limited;
 - Typically, the spring/summer months exhibit lower wind speeds for turbine erection works, which have positive H&S and programme implications; and
 - Overall quality of works in general is more likely to be negatively impacted outside the spring/summer months, e.g., cold weather concreting in winter, weather downtime during high rainfall/high wind events, restrictions on working at height, etc.

3.6.1 Working Hours

In general, working hours for decommissioning / construction will be from 07:00 to 19:00 throughout the week, with reduced working hours at weekends. It should be noted that during the turbine erection phase, operations may proceed around the clock to ensure that lifting operations are completed safely. Hours of working will be agreed with the Council prior to the commencement of construction. Any extensions to working hours would be agreed in advance with the Council.

3.7 Site Restoration

The outline plan for soil management and restoration includes methods used for reinstatement of both disturbance from the decommissioning and construction activities as well as re-instatement of redundant infrastructure. This forms an integral part of the post-construction restoration programme to be carried out in accordance with the Draft HMP and Outline DEMP. These methods will be agreed with the Council in consultation with relevant statutory bodies prior to the commencement of restoration works.

- Site restoration will involve the restoration of track and hardstanding verges and the temporary decommissioning and construction compounds to provide a natural ground profile with non-geometric surfaces and tie-ins with existing undisturbed ground levels to prevent the collection of surface water where appropriate. Restoration will be undertaken at the earliest opportunity to minimise storage of turf and other materials. The key elements of the restoration plan are, in summary:
 - Track and hardstanding verges on the downhill side will be covered with a layer of turf and associated soil. They will then
 - The decommissioning and construction compounds will be restored with peat / other organic deposits as appropriate capped with a layer of associated turf. Due to the flat nature of the area where the compounds will be located, it is expected that a mixture of marshy grassland, wet heath along with dry heath/acid grassland will develop;
 - lifted as turfs, and replaced after trenching operations, to reduce disturbance;
 - they will provide access for maintenance, repairs and the eventual decommissioning phase;
 - operations, including component replacement as necessary, and the decommissioning phase; and
 - accordance with the Draft HMP and Outline DCEMP.

Should future works be required to maintain the Development, the temporary construction areas may be reused and temporarily reinstated as required for maintenance purposes.

3.8 Decommissioning and Construction Environmental Management Plan

- the decommissioning/construction site (the Contractor). The services of specialist advisors will be retained as appropriate, such as an archaeologist and ecologist, to be called on as required to advise on specific environmental issues. The appointed Contractor will ensure construction activities are carried out in accordance with the mitigation measures outlined in this ES.
- An Outline DCEMP is provided as Technical Appendix A3.1. This sets out SPR's standard outline requirements for inclusion 85. within a detailed DCEMP including guidance and best practice for adoption during the decommissioning and construction phases of the Development. The Outline DCEMP provides an overview of the environmental management and decommissioning and construction best practice designed to reduce the potential for any environmental effects during these phases.
- To ensure that the mitigation and management measures detailed within this ES are carried out, construction personnel and 86. contractors will be required to adhere to the DCEMP which will form an overarching document for all decommissioning and construction site management requirements.
- Contractors will also be required to adhere to the following to minimise environmental effects of the decommissioning and 87. construction processes:
 - Conditions required under the Permission;
 - Requirements of statutory consultees including the Department of Agriculture, Environment and Rural Affairs (DAERA) and the Council;
 - Any other relevant mitigation measures identified in Chapter 15: Summary of Effects and Mitigation, of this ES, including how the Contractor will implement this mitigation and monitor its implementation and effectiveness e.g. the control of noise and dust, and waste;
 - How the contractor will respond to queries raised by members of the public; and
- The DCEMP will be agreed with the relevant statutory bodies prior to commencement of construction, and performance 88. against the DCEMP will be monitored by the Applicant's Construction Project Manager throughout the decommissioning and construction phases.

be left to allow natural succession to take place; this turf will be obtained from areas where shallow organic deposits or otherwise shallower peat deposits ('acrotelmic' peat) have been excavated. A mixture of habitats is expected to develop on track and hardstanding verges on the downhill and uphill sides, because of local variation in soil depth/type and the variety of drainage conditions that will be present, including wet heath, marshy grassland, dry heath and acid grassland;

Cable trenches would be similarly reinstated. Where practicable, vegetation over the width of the cable trenches would be

The upgraded access tracks serving the new turbines will be left in place after completion of the construction phase, as

Hardstanding and turning areas constructed at each turbine location will be retained for use in ongoing maintenance

Redundant infrastructure will be removed, or broken out to depth of 1 – 1.5 m and a number of the areas reinstated in

The Applicant will appoint an Infrastructure Contractor who will have overall responsibility for environmental management on

How the Contractor will abide by all relevant statutory requirements and published guidelines that reflect 'good practice'.

- ^{89.} Particular environmental impacts and associated mitigation measures required to be addressed within the DCEMP are discussed in the relevant sections of this ES. Such as:
 - Noise and vibration;
 - Dust and air pollution;
 - Surface water and groundwater;
 - Ecology and ornithology (including the protection of habitats and species);
 - Cultural heritage;
 - Waste, pollution and incidence response; and
 - Site operations, including working hours and health and safety onsite.
- ^{90.} The DCEMP will work in conjunction with other documents produced prior to construction, whereby there will also be a requirement to manage other aspects of the Development such as the movement of traffic, to and from the site, including for the movement of abnormal loads and daily workers commute, including mitigation for impacts to public transport and local private access arrangements.

3.9 Operational Phase

91. No time limit on the operational lifespan of the Development has been assumed for the purposes of this assessment.

3.9.1 Turbine and Infrastructure Maintenance

- ^{92.} Turbine maintenance will be carried out in accordance with the manufacturer's specification. The following routine turbine maintenance will be undertaken:
 - Initial service;
 - Routine maintenance and servicing;
 - Gearbox oil changes;
 - Blade, gearbox and generator inspections; and
 - Replacement of blades and components as required.
- ^{93.} Operational site inspections will be undertaken by the Applicant's staff, on a weekly basis and the servicing of turbines will be undertaken as per the turbine manufacturers requirements, usually once per year, but with monthly visits by the manufacturer's servicing team.
- 94. Ongoing track maintenance will be undertaken to ensure safe access is maintained to all parts of the Development all year round.
- ^{95.} In common with the wind turbines the Energy Storage Unit will be designed to operate remotely, and only rare maintenance visits would be required once operational.
- ^{96.} It is expected that the Development will continue to employ approximately 3 or 4 people on a permanent basis, for regular operational and maintenance activities.

3.10 Decommissioning

97. In the event that the Development requires to be decommissioned, the process would be similar to the decommissioning of the Operational Rigged Hill Windfarm. Given the fewer number of turbines, the potential effects arising from such decommissioning will be less than the effects arising as a result of the combined initial decommissioning and construction phases described above. These phases combined therefore represent the worst-case parameters for assessment purposes.

4 Site Selection and Alternative Layouts

4.1 Introduction

This chapter of the Environmental Statement (ES) contains a description of the site selection process and design iterations that were undertaken, arriving at the final design of the Development (Figure 3.2) which is described in detail in Chapter 3: **Development Description**.

- This chapter contains the following sections: 2.
 - Site Selection Process; ٠
 - Do Nothing Scenario; ٠
 - Development Brief:
 - Development Design Strategy; .
 - Key Environmental Design Considerations;
 - The Design Iteration Process; and
 - Summary

A glossary of common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

Site Selection Process 4.2

- The Site was considered appropriate for a number of reasons:
 - The Site already contains the Operational Rigged Hill Windfarm which was constructed 1995 and is one of the first • windfarms developed in the UK. From the wind data collated to date, the Site has proven to have good average wind speeds and generation capacity;
 - The existing technology is no longer state-of-the-art, and modern wind turbines are capable of producing more power from a fewer number of turbines (e.g. the Operational Rigged Hill Windfarm has ten turbines with a total installed capacity of 5 Megawatts (MW), compared to the Development's proposed seven turbines and a total installed capacity of around 28 MW);
 - Repowering the Operational Rigged Hill Windfarm increases renewable energy generation capacity (by around 23 MW in this case), and with a focus on utilising as much of the existing infrastructure as possible. This results in a development with fewer environmental effects compared to a similar development on a new, greenfield site, particularly considering effects on landscape/visual receptors and peat;
 - It is a location in which a development can accord with the principles set out in Energy Policy in relation to the need for renewable energy as described in Chapter 1: Introduction;
 - There are no statutory nature conservation designations within, or in close proximity to the Site Boundary;
 - The Applicant has collated an extensive database of information in relation to the Site and its environs through their experience of managing the Operational Rigged Hill Windfarm. This existing information has been utilised during the Development design process. The information collected has allowed the Applicant to consider the use of alternative compatible technologies to improve the overall power output of the site, such as the energy storage aspect of the Development;
 - Alongside the generation of renewable energy, agriculture such as sheep farming is the other principal land use, the use of the Site as a windfarm is and will continue to be a compatible use;
 - The Site is accessible, as assessed in Chapter 12: Traffic and Transport;
 - The Site can positively contribute towards regional and national renewable energy targets; and
 - The Site can provide a series of significant social and economic benefits for the local and regional area as assessed in Chapter 13: Socio Economic.

4.3 'Do Nothing' Scenario

- with an installed generation capacity of 5 MW. The Operational Rigged Hill Windfarm is consented in perpetuity and for the purposes of the baseline scenario it is assumed that the windfarm would continue to operate and be maintained under its current management systems.
- The Applicant has recently submitted an application for a new access track to serve the Operational Rigged Hill Windfarm. If 6 the Development was not to go ahead this access track would still be required to service the Operational Rigged Hill Windfarm.
- In addition to any changes arising from economic and agricultural policies and economic market conditions, it is predicted that 7. biodiversity and the landscape are likely to undergo some level of change, as a result of climate change.
- Owing to the complexities and uncertainties inherent in attempting to predict the nature and extent of such changes to 8. landscape and biodiversity during the lifetime of the Development it has been assumed that the current baseline will subsist. It is considered that this represents a precautionary and appropriate approach for EIA purposes.

4.4 Development Brief

- The purpose of a windfarm development is to harness the power in the wind to generate electricity. The rationale is therefore to locate windfarms in areas exposed to high wind speeds, with turbines arranged in an optimum formation, maximising efficiency and energy output. However, this rationale alone does not take into account the potential environmental effects of a windfarm. The design of a windfarm must therefore be a balance between achieving an acceptable level of environmental effects whilst maximising energy yield.
- 10. **Development Description**).
- 11. optimum fit within the technical and environmental parameters of the Site, whilst maximising the use of existing infrastructure.
- 12 utilise as much of the existing infrastructure as possible, including the new access track route. Where appropriate this ES considers this section of track as 'submitted but not yet constructed', and is assessed as part of this EIA.

4.5 Development Design Strategy

- composition, windfarm design in relation to landscape character and designing for multiple windfarms is set out in the following documents:
 - The Northern Ireland Environment Agency (2010). Wind Energy Development in Northern Ireland's Landscapes¹;
 - Department of the Environment (2009). Planning Policy Statement 18: Renewable Energy²;
 - Supplementary Planning Guidance to accompany Planning Policy Statement 18: Renewable Energy³; and
 - Scottish Natural Heritage (SNH) (2017). Siting and Designing Windfarms in the Landscape⁴.
- 14 Development was the most suitable for the Site:
 - The avoidance of inconsistent turbine spacing leading to relatively large gaps, outliers and excessive turbine overlapping to minimise visual confusion and ensure a balanced/compact array from key views. The distance between turbines is usually a function of rotor diameter and prevailing wind direction;
 - Achieving an appropriate scale of turbine, taking account of the landscape context.

³ Northern Ireland Environment Agency's (NIEA) Wind Energy Development in Northern Ireland's Landscapes: Supplementary Planning Guidance (SPG) to accompany Planning Policy Statement 18 Renewable Energy. ⁴ Scottish Natural Heritage (2017). Siting and Designing Windfarms in the Landscape.

If the Development was not to go ahead, the Operational Rigged Hill Windfarm would continue to operate as it does at present

The development brief also includes the installation of an Energy Storage Unit (further details are provided in Chapter 3:

The development brief is therefore to design a repowered windfarm including ancillary energy storage units that represents an

With regard to the recently submitted Operational Access Track application. The design process for the Development aims to

Current best practice guidance provides a framework for the consideration of key design issues, including turbine size, layout

Northern Ireland Environment Agency (NIEA) (2010). Wind Energy Development in Northern Ireland's Landscapes:

The following principles were adopted which in turn informed the design iterations to ensure that the final design of the

¹ Department of Agriculture, Environment and Rural Affairs (2010). Wind Energy Development in Northern Ireland's Landscapes

² Department of the Environment (2009). Planning Policy Statement 18: Renewable Energy.

- The maintenance of turbine manufacturers recommended spacing between turbines in order to minimise turbulence and turbine fatigue, leading to reductions in energy yield, taking account of the prevailing wind direction for a site.
- The utilisation of existing infrastructure, reuse of existing access roads and utilisation of the same general area/footprint of the Operational Rigged Hill Windfarm.
- Understanding and respecting the ground conditions and topography of the Site, taking account of turbine manufacturer's specifications.
- Retaining a separation from residential dwellings; and
- Respecting other environmental constraints and associated buffers. The Indicative Developable Area shown in Figure 4.1 is based on an initial desk based assessment of these other known constraints.
- The identification of environmental effects is an iterative process, running in tandem with the windfarm design process. An analysis of the key design considerations for each technical discipline is given in Section 4.6 of this Chapter. The layout of the Development has undergone a series of design iterations to avoid or reduce potential environmental effects, (Figure 4.2). This process has resulted in the layout presented and assessed in this ES (Figure 3.2 and Figure 4.2) which represents the optimum fit within technical and environmental parameters considered.
- In addition to the turbine locations, the other elements of the Development as shown in Figure 3.2 which have been designed to minimise environmental effects include access tracks, the substation compound including the co-location of the Energy Storage Units, crane hardstanding areas and temporary construction compounds. The environmental effects of these elements have been minimised through the reuse of existing infrastructure where possible, careful design, siting infrastructure away from residential properties, routing of new access tracks to avoid areas of active peat and best practice construction methods as illustrated by Figure 3.3.

4.6 Kev Environmental Design Considerations

The specific environmental factors considered in the design of the Development are set out in this section for each technical discipline, with their influence on the design discussed.

4.6.1 Landscape and Visual

Landscape and visual effects have been a key consideration in the design of the Development taking account of both turbine positioning and scale. This has been achieved through the identification of a number of key visual receptors / viewpoints.

4.6.1.1 Design Viewpoints

- In order to achieve this, a number of the key viewpoints were selected as design viewpoints, against which to test wirelines for each turbine layout option. Design viewpoints have been selected based on an understanding of where the Development would be visible from, where static views will be gained, such as popular hilltops, or where there is a particular concentration of residential properties. The design viewpoints that were selected and agreed during pre-application discussions with the Council are as follows:
- ES Viewpoint 1 Terrydoo Road;
- ES Viewpoint 2 Temain Road to Aghansillagh and Temain Hill;
- ES Viewpoint 3 Edenmore Road, Limavady;
- ٠ ES Viewpoint 4 Roe Park Resort driveway, Limavady;
- ES Viewpoint 5 Drumsurn, Beech Road; ٠
- ES Viewpoint 6 Ringsend; ٠
- ES Viewpoint 7 Glenullin Bog Viewpoint, Glenullin Resource Centre;
- ES Viewpoint 11 Polly's Brae Road junction with B192; and
- ES Viewpoint 19 B66, west of Ringsend, north of Site. ٠

4.6.1.2 Design Principles

- In order to minimise the effects on landscape and visual receptors, a number of design principles have been considered. 20. These principles have sought to reduce significant effects through alterations to layout, design and siting (insofar as was possible given the other technical and environmental constraints), management practices and mitigation. The landscape and visual design principles are as follows:
 - To consider the latest wind turbine technology available, larger rotor sizes and turbine hub heights to arrive at a turbine tip height considered appropriate for the Site

- To create a visually legible design, insofar as was possible on a Site which is constrained by other environmental and technical issues, and create a simple, positive layout, viewed consistently from different positions;
- To ensure that the views of the Development from the Binevenagh Area of Outstanding Natural Beauty (AONB), in particular those from Viewpoint:13: Binevenagh Mountain, minor road and National Cycle Route (NCR), appear legible and the turbines relate well to a single landform and each other;
- To create as compact a scheme as the technical aspects of the larger turbine spacing allows, which relates to the underlying landform, with turbines laid out to extend along the simple ridgeline created by Rigged Hill;
- To reuse, where possible, areas within the Site that have been altered by the Operational Rigged Hill Windfarm infrastructure, in particular existing tracks and the hard standing/previously disturbed area at the existing control building; To ensure that the requirements for cut and fill are minimised when siting the infrastructure, in particular the new access
- road:
- ٠ Designing the new access road so that the existing landform provides some screening;
- To group turbines to create a balanced and coherent image, avoiding where possible 'stacking' or overlapping of turbine rotors in lines, favouring an evenly spaced and elevated group, that reflects the nature of the undulating landscape; To Site buildings within low lying areas that are on the less visible north-east side of Rigged Hill; and To group the infrastructure in order to limit the number of areas affected.

4.6.2 Hydrology, Hydrogeology, Geology, Soils and Peat

- During the Environmental Impact Assessment (EIA) process, a desktop and site based survey was carried out to inspect and identify all water features with the potential to be substantially affected. The aim of the design process was to achieve a layout that avoids impacts on hydrological sensitive receptors. During design the following hydrological design principles were applied where possible:
 - Avoid areas of peat:
 - Minimise watercourse crossings;
 - Aim to achieve a separation distance of 50 m between construction activity and watercourses (natural) mapped at a • on published mapping;
 - Avoid more hydrologically sensitive parts of the Site; and
 - Utilise existing infrastructure such as access tracks where possible.
- The access tracks will require the installation of five new watercourse crossings across all sections of the Development. 22. Additionally, the upgrade of the existing access tracks which serve the Operational Rigged Hill Windfarm will involve upgrade of the existing watercourse crossings (where necessary).

4.6.3 Peat Depth and Stability

- Peat has been considered to be a key design constraint within the Site, both from an ecological and the closely linked 23 hydrological design objectives. Peat is present at varying depths in various locations within the Site. Peat represents a store of carbon, and can support (and be supported by) bog vegetation on its surface; these are valued habitats, as described in Section 4.6.4.
- Where possible, areas of active peat have been avoided and where this has not been possible, the area has been minimised 24 to for example focusing on the localised widening of the existing access tracks and hard stands to enable the delivery and erection of the larger turbine components. There has been continuous engagement with NIEA, throughout the design process.
- Peat slide is not a substantial risk at the Site at the locations considered for Development components, and hence peat slide 25. risk was not a major factor in the design of the Development layout.

4.6.4 Ecology and Fisheries 4.6.4.1 Active Peat

In recognition of the high importance afforded to active peatland in the Department of the Environment's 'Planning Policy Statement 18: Renewable Energy' (2012) and the 'Strategic Planning Policy Statement for Northern Ireland: Planning for Sustainable Development' (2015, under review), additional assessments were undertaken for any habitats that may qualify as 'active peat'.

1:50,000 scale, and a separation distance of 20 m for anthropogenic drains and smaller natural watercourses not featured

It is acknowledged that the classification of active peat habitats can be quite complex, particularly in disturbed habitats and around the margins of peatland bodies, so a bespoke classification system has been developed for this Development, in order to provide a systematic and transparent approach as described in Chapter 8: Ecology and Fisheries. As discussed in Section 4.6.3 the Applicant worked closely with NIEA, to avoid the areas of active peat and where this was not possible to consider areas of the Site where turbines and tracks could be located in areas of previously disturbed ground and where the peat has been historically cut over and the peat has degraded. Avoidance of these sensitive habitats was a key influence on selecting turbine locations and the alignment of access tracks.

4.6.4.2 Bats

- The Site is used by Leisler's bats on a regular basis during the mid-summer period. Activity levels of this species appear to 28 follow certain temporal patterns, both for months of the year, and for times of the night, and appear to be strongly influenced by weather conditions. However, there does not appear to be a consistent spatial pattern in its use of the Indicative Developable Area, so it is assumed to forage relatively evenly over all areas. Common pipistrelle and soprano pipistrelle bats were rarely recorded on the site in significant numbers, and there did not appear to be a consistent temporal or spatial pattern in their activity. No other species were recorded in significant numbers.
- As there is no spatial pattern to the use of the site by bats this was not a factor in the design evolution of the Site, with 29 mitigation for any effects on bats being provided through a Bat Mitigation Strategy (Technical Appendix A8.3) which provides for temporal periods when turbines would be shut down during peak times of bat activity.

4.6.5 Ornithology

- Potential ornithological constraints to the design of the Development were identified from the baseline surveys and 30. assessment and the objective in the design process was to avoid or minimise these effects:
 - Disturbance and displacement to breeding birds; and ٠
 - Collision risk during operation.
- The key ornithological receptors are defined as species occurring within the zone of influence of the development upon which likely significant effects may arise (500 m, 800 m, 2 km and 5 km survey areas were used). Baseline field surveys were carried out between March 2014 and April 2019 and consisted of site walkovers and vantage point surveys during both breeding and non-breeding seasons.
- The majority of key target breeding species as described in Chapter 9: Ornithology, have been avoided by applying 32. appropriate buffers informed by baseline survey findings and informed by a gualified ornithologist. It was interesting to note that several priority species were identified in close proximity to the Operational Rigged Hill Windfarm showing a level of habituation, with locations changing over the several years of survey. These species include for snipe, hen harrier, long-eared owl, merlin, kestrel, buzzard, sparrowhawk and raven).
- Key potential effects on birds that were specifically taken into account relate to the positioning of turbines T3 and T7. In order 33. to avoid disturbance to a number of the priority species identified, appropriate buffers were applied around nest locations, as agreed with NIEA. This resulted in a minor relocation of T7 producing Layout 3 (see Section 4.7.1 for layout details).
- Habitat management measures are proposed for the restoration and reinstatement of priority habitats (Technical Appendix 34. A3.2 Draft HMP). The Draft HMP aims to improve the condition of the grassland, bog and peatland habitat with further measures outlined to mitigate and benefit species such as snipe, hen harrier, kestrel, meadow pipit, and a range of other species and small passerines.

4.6.6 Noise

A key factor in the initial selection of the Site was the distance that could be achieved between properties, turbines and Energy Storage Units to minimise the effects of noise from the Development. A key factor in the initial selection of the Site was the distance that could be achieved between properties and turbines to minimise the effects of noise from the Development. Four properties were identified as potential receptors, while all other properties lie beyond the predicted 35 dB noise contour plot and are unlikely to be significantly affected by noise from the Development.

It is of critical importance that the layout of turbines, using a turbine model within the range of sizes under consideration for the Development, can meet the noise limit requirements of ETSU-R-97 and the Good Practice Guide, published by the Institute of Acoustics at every residential property. Noise was therefore an important consideration in each design iteration.

4.6.7 Archaeology and Cultural Heritage

heritage features within the Site and no significant direct and indirect effects likely upon known and unknown features in the surrounding historic environment from the Development. As such, cultural heritage features formed little constraint in terms of layout evolution.

Other Topics influencing the design 4.6.8 4.6.8.1 Telecommunications

- Due to the size and nature of wind turbines, they have the potential to interfere with electromagnetic signals passing above 38. ground during operation, or existing infrastructure buried below ground during construction. Infrastructure affected can include telecommunication links, microwave links, television reception and overhead and underground utility cables.
- Temain Hill to the south of the Site is a key location in terms of telecommunications with three masts located in close proximity 39. to each other. From the information gathered from the telecoms providers a large number of links radiate from the masts on Temain Hill, with the majority radiating in an easterly direction.
- It is likely that the presence of the Operational Rigged Hill Windfarm has meant that as the telecoms industry has developed and links have been added to the masts at Temain Hill, no links have passed in close proximity to the existing turbines, with the exception of those serving the windfarm itself. The current links which serve the Operational Rigged Hill Windfarm will be decommissioned and new links will be constructed as required.
- Buffers have been agreed with the various telecoms providers and these have constrained the positioning of the turbines in 41. both an easterly and westerly direction. Where initial buffers have been impinged upon, detailed discussions have been undertaken with link operators to arrive at a layout with is acceptable to the telecommunication stakeholders, this is discussed further in Chapter 14: Other Issues.
- No other infrastructure is likely to be significantly affected and as such did not form a significant constraint in the design 42 evolution.

4.7 The Design Iteration Process

- The layout of the Development has evolved throughout the EIA process. This iterative approach has allowed the findings of 43 the public consultation exercise, along with the EIA, to guide the evolution of the Development and has allowed the design to be modified in order to avoid and mitigate against environmental effects where possible. This process led to the Design Principles set out in Section 4.6.1.1.
- This was achieved through preliminary assessments of the environmental effects, consideration of the identified spatial 44. constraints combined with consideration of the appearance of the Development from the design viewpoints to take account of landscape and visual considerations. Two design workshops involving the project team were held to inform the design process:
 - The first workshop was held at the beginning of the process to inform the initial design based on constraints know at the time and considered appropriate turbine heights and dimensions. This is the layout on which the first round of public consultation was based; and
 - months of new wind data. This workshop informed the 'interim design freeze' layout.
- Following the 'interim design freeze', further ground condition survey work was undertaken with particular regard to peat, in order to locate the turbines in areas where peat depths were shallow, the peat is not classified as active (wherever possible) and to consider and inform any micro siting tolerance allowance requested. The ability to micro site will allow for the further avoidance /mitigation at the time of construction, of any localised effects which might only become apparent during the decommissioning and construction phases.

A desk-based assessment and archaeological walkover was undertaken as part of the EIA. There are no designated cultural

The second workshop followed receipt of the Scoping Opinion, the completion of all baseline surveys, and gathering of 12

Following completion of the ground condition survey work, the layout was adjusted and the final layout presented in Figure 4.2 was reached.

4.8 Layout Evolution

- The initial layouts considered turbines up to a maximum of 150 metres (m) to blade tip. Following the analysis of the layouts against the landform, tip heights of this size were deemed too great for this Site.
- For the purposes of Scoping, indicative 135 m turbine tip heights were referred to. Subsequent design workshops, together with consideration of the latest wind turbine technology, and further landscape and visual assessment, have informed a final decision on a turbine tip height of up to 137 m. This tip height is considered to be appropriate for this Site.
- It is also important to note that the most suitable turbine model for a particular location can change with time, and as a result of 49. developments in wind turbine technology, and therefore, a final choice of turbine for the Development has not yet been made, although the turbine parameters described in Chapter 3: Project Description would not be exceeded.

4.8.1.1 Layout 1a (1st Round Public Consultation Layout)

- Layout 1a was initially informed by landownership boundaries. Constraints were then identified from preliminary site surveys, the ongoing bird surveys and desk-study information, primarily from Ordnance Survey of Northern Ireland (OSNI) mapping, and included the following parameters:
 - Minimum 60 m oversail buffer of the Site Boundary; •
 - Minimum 50 m buffer of watercourses that could be identified on the 1:50,000 OSNI map; •
 - Minimum 20 m buffer around natural drains; ٠
 - Minimum 50 m buffer of public roads, which represented the topple height of the turbines plus 10%; ٠
 - Minimum An exclusion of areas likely to be active peat; ٠
 - Minimum 750 m buffer for residential properties, to minimise potential noise effects and ensure that turbines are located sufficiently far from properties, so as not to appear dominant in views; and
 - Areas where the topography of the ground represented a slope greater than 20%, which have the potential to give rise to technical constraints for access, and construction on steep slopes.
- Bird surveys were also underway, and although not complete, the preliminary information provided, identified no constraints at 51. this stage.
- The first phase of peat probing undertaken, consisted of a 50 m grid across the Site to gain a reasonable level of 52. understanding of the depth and nature of the peat present.
- The minimum desirable distance between wind turbines and occupied buildings is calculated on the basis of expected noise 53. levels and likely visual impacts, this distance will be greater than that necessary to meet safety requirements. Topple distance (i.e. the height of the turbine to the tip of the blade) plus 10% is often used to inform what would be considered to be a minimum safe separation distance from occupied buildings. Taking account of these factors a buffer distance of 750 m around residential dwellings was utilised at this stage of the design process.
- These constraints were mapped and appropriate turbine technical spacing (4 x 6 rotor diameters between the turbines) was 54. applied to ensure minimum overlap taking into account the predominant south-westerly wind direction. This resulted in the seven-turbine layout presented in Layout 1a (see Figure 4.2). This layout was also used to inform the first round of Public Consultation events held in August 2017.

4.8.1.2 Layout 1b Alternative Layout

- Layout 1b was based on the same environmental constraints as Layout 1a and formed an alternative layout for consideration. However, different technical constraints were applied in the form of smaller separation distances between the turbines, resulting in a layout consisting of a single row of six turbines with the turbines spaced at a distance of 3 rotor diameters apart. Whist this is a less traditional approach in the UK where clustering of turbines is usual, it is one that is commonly used elsewhere in Europe.
- This layout was subsequently dropped following wind data analysis. It was also felt that progressing such close spacings on this site would be visually incongruous with other cumulative windfarm developments set within the landscape.

4.8.1.3 Layout 2 (Interim Design Freeze)

- The presence of peat within the Site on the eastern part of the ridge has been the key design constraint, particularly with regard to accessing the turbine positions. The overarching design aim has been to avoid the areas of deep and active peat whilst also minimising the amount of new track as far as reasonably practical by re-using the existing tracks. The presence of the telecommunication masts on Temain Hill and the microwave links radiating out from these masts limits the extent of unconstrained land on which to place turbine positions in the south and west of the Site, these constraints lead to a preference for Layout 1a with some minor modifications.
 - T2 relocated south west into an area of shallow and previously disturbed peat adjacent to existing turbine position;
 - T3 relocated south towards existing track and out of peat area; and
 - T4 and T5 relocated to ensure separations distances between turbines are maintained.

4.8.1.4 Layout 3

- Two hen harrier nests were found to be present to the north and east of the existing turbines. In order to avoid disturbance of these nests, a turbine buffer has been placed around the nest locations and resulted a minor relocation of T7 producing Layout 3.
- Following the "interim design freeze', the first iteration of tracks were designed to access the turbines and currently links both 59. the existing operational access track and the proposed new operational access track.
- The amount of new access track required has been kept to a minimum by locating the turbines relatively close to the existing 60. access tracks for the Operational Rigged Hill Windfarm where possible, in order to minimise the environmental impact associated with this element of infrastructure. Where new access tracks are required to access the Development turbines, these have been designed in a similar way to the existing tracks, avoiding peat deposits where possible and being located within the less sensitive habitats.

4.8.1.5 Layout 4 (the Final Layout)

- and the Site in order to ensure that effects on peat, and in particular active peat and valued habitats, were minimised. Given the constraint active peat has the potential to poses onsite in terms of location of infrastructure, ongoing consultation with the NIEA throughout the full design process has been important.
- Changes to the Final layout include: 62.
 - Reduction in size and alteration to the shape of the temporary construction / decommissioning compound near the existing substation building in order to avoid pockets of active peat;
 - Minor alterations to the track between T5 and T6 to avoid an area of deeper peat; and
 - Minor movements to the positions of T4 and T5 to provide an increased buffer from a proposed telecoms link.
- The Final Layout is shown in Figure 4.2 and Figure 3.2, for comparison with the other layout iterations. 63.

4.8.2 Infrastructure Design Evolution 4.8.2.1 Access Tracks

- As described in Section 4.3, a new access track has recently been submitted to provide ongoing service provision for the Operational Rigged Hill Windfarm. Traffic accessing the Development will utilise this track with minor alterations as a result of the larger turbine geometry including upgrading the junction from that currently proposed.
- The amount of new access track required has been kept to a minimum by locating the turbines relatively close to the existing 65 access tracks for the Operational Rigged Hill Windfarm where possible, in order to minimise the environmental impact associated with this element of infrastructure. This minimised the environmental effects associated with this element of infrastructure. Where new access tracks are required to access the Development turbines, these have been designed in a similar way to the existing tracks, avoiding localised peat deposits where possible and being located within the less sensitive habitats.

The Final Layout, including all infrastructure, was designed following further peat probing and 3-D analysis of the Development

4.8.2.2 Temporary Decommissioning and Construction Compounds

Two temporary decommissioning and construction compounds are proposed as shown in **Figure 3.2**. The main compound is located in the core area of the Site, adjacent to the substation building straddling the access track, while a smaller compound is located adjacent to the site entrance. These locations have been selected to minimise environmental effects, specifically by avoiding areas of peat and being located on ground which has already been disturbed. Relatively level areas of the Site have been chosen, with one located closer to the Site entrance in order to control decommissioning and construction traffic entering and leaving the Site, with a larger compound located on level at an appropriate distance from residential properties to minimise disturbance from these activities, and both respecting separation distances from any identified environmental constraints, in line with the Design Principles set out in **Section 4.6**.

4.8.3 Meteorological Mast

^{67.} One permanent meteorological mast is proposed as part of the Development, located at IGR 275407, 419205. This will be used to provide on-going measurement of wind speed to provide information for the control and monitoring of the operation of the Development. The location of the met mast has been selected to provide the best representation of wind speeds across the Site.

4.8.3.1 Substation Compound and Energy Storage Unit

^{68.} The location of the substation compound and Energy Storage Unit is driven by a number of factors, including:

- The likely grid connection point;
- A location close to the existing Operational Substation position on previously disturbed ground;
- Located beyond topple distance from the Development turbine positions taking account of the health and safety of site operatives during the operational phases of the Development; and Maximising the separation distance from residential properties so as to avoid any exceedances of the recognised noise limits as covered within **Chapter 10: Noise**.
- ^{69.} By constructing the new substation in a visually enclosed position, close to the existing Operational Substation, potential environmental effects would be minimised. By locating the Energy Storage Unit alongside the substation, the footprint of the Development is minimised and the Energy Storage Unit is seen in the context of other Development infrastructure. These aspects are in line with the Design Principles set out in **Section 4.6**.

4.9 Summary

- The final Development layout has been informed by a robust design iteration process, achieving a layout which balances the various economic, technical and environmental constraints, and requirements, whilst achieving a best fit design for the Site, which respects the landform.
- 71. Throughout the design process, there were four main design iterations, informed by baseline data, review of visualisations from key design viewpoints, the results of ongoing impact assessment, wind yield optimisation, taking cognisance of best practice guidance and consultation.
- The final Development layout, and its scale has been designed to maximise renewable energy generation from the Site, whilst minimising any resulting environmental effects to an acceptable level. The ES is based on the final development layout presented in Figure 3.2 and described in detail in Chapter 3.

5 Planning

5.1 Introduction

- This chapter describes the legislative planning and policy background to the application. The legislative basis for a decision by Causeway Coast & Glens Borough Council (the Council) is set out, and an overview of planning policy at a local level and at a regional level is provided. The chapter also identifies other material considerations that will inform the planning application determination process. This chapter does not assess the accordance of the Development against planning policy, a separate Planning Statement has been prepared to support the application and should be referred to for a detailed planning policy appraisal.
- A glossary of common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.
- In 2010, the Department for Enterprise, Trade and Investment (DETI) published the Strategic Energy Framework (SEF)¹ which detailed NI's energy future over the next ten years and set the renewable electricity targets for 2020, identifying that 40% of electrical energy supply needs to be sourced from renewables by 2020.
- The 2010 SEF notes that electricity generated by onshore windfarms is the most established large-scale source of renewable 4. energy in Northern Ireland. It also states that onshore windfarms will play a vital role in meeting the new renewable electricity target.
- The Northern Ireland Investment Strategy 2011-20212 highlights the importance of renewable sources in electricity 5. generation. The long-term targets are emphasised, underlining that the UK Climate Change Act 2008 legislated for an 80% mandatory cut in the UK's carbon emissions by 2050 (compared to 1990 levels), with a target of 35% by 2025.
- The Onshore Renewable Energy Action Plan 2013-2023 considers the contribution of onshore renewable technologies to the 40% renewable energy target by 2020 and recognises the impact that onshore wind has on the electricity network in Northern Ireland.
- The Development, which will have an output c. 28-29 MW will contribute towards meeting the Northern Irish renewable targets through the repowering of the Operational Rigged Hill Windfarm and will result in an increased overall generating capacity, as well as securing continuity of renewable energy provision.

5.2 Planning Legislative Context

Table 5.1 outlines the Northern Ireland planning legislative context (primary legislation and subordinate legislation) for the Development. Subject to the provisions of Part 25(1)(b) of the Planning Act (Northern Ireland) 2011 and the 'Schedule'- Major Threshold Developments of 'The Planning (Development Management) Regulations (Northern Ireland) 2015', the Development is considered a 'major development' but not 'regionally significant.' since it falls below the 30 MW 'regionally significant' threshold. Therefore, the Application is submitted to Causeway Coast & Glens Borough Council for determination.

Table 5.1: Northern Ireland Planning Legislation Context

Northern Ireland Planning Legislation				
Primary Legislation				
The Planning	The Planning Act (NI) 2011 Act provides the legislative basis for the Northern Ireland planning system			
Act (Northern	Act (Northern including the development management systems, development plan preparation, planning appeals and			
Ireland) 2011 enforcement and the way in which these functions are delivered.				
Subordinate Legislation				

¹ Department of Enterprise, Trade and Investment (2010). Strategic Energy Framework. Available online at: <u>https://www.economy-</u> ni.gov.uk/publications/energy-strategic-framework-northern-ireland [Accessed on 07/07/2017]

Northern Ireland Planning Legislation

	The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017	The legislative framework for EIA is set out by requirements of the EIA Directive in NI are tra Regulations (NI) 2017 (the EIA Regulations). granting planning permission for a development likely significant effects on the environment by assessment to assess such effects.
	The Planning (General Development Procedure) Order 2015 (as amended 2016)	 The main purpose of the Planning (General D transfer the necessary powers required to op Planning (General Development) Order 1993 new provisions, namely: Design and Access Statements for major Non-material changes to a previous gram Publicity of applications for planning perr Changes to the statutory consultation pro
- 	The Planning (Development Management) Regulations (Northern Ireland) 2015	The Planning (Development Management) Re development management process in relation community consultation, pre-determination he transitional provision.
	The Planning (Fees) Regulations (Northern Ireland) 2015 (as amended)	The effect of the Planning (Fees) Regulations the processing of a planning application.

5.2.1 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017

Statement is informed by an EIA Scoping Response (Technical Appendix 2.1: Scoping Report and Technical Appendix 2.2: Scoping Opinion) provided by the Council (EIA Scoping Reference No.LA01/2017/1084/DETEIA) as per the provisions of 'The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017.'

Planning Policy Context- Northern Area Plan 2016 5.3 Section 45 of the Planning Act 2011 states:

"45.-(1) Subject to this Part and section 91(2), where an application is made for planning permission, the council or, as the case may be, the Department, in dealing with the application, must have regard to the local development plan, so far as material to the application, and to any other material considerations....."

- 11. the current statutory Local Development Plan (LDP) for the Council area. The NAP 2016 comprises:
 - Volume 1- Plan Strategy & Framework; and
 - Volume 2- Proposals.

10

³ Department of Enterprise, Trade and Investment (2013). Onshore Renewable Electricity Action Plan. Available online at: https://www.economy-ni.gov.uk/articles/onshore-renewable-electricity-action-plan [Accessed on 07/07/2017]

by the EIA Directive (European Directive 2014/52/EU²). The ansposed by the Planning (Environmental Impact Assessment) The EIA Directive aims to ensure that a planning authority ent proposal makes its decision with the full knowledge of any by setting out a procedure known as environmental impact

Development Procedure) Order 2015 (as amended 2016) is to erate the planning system (previously contained within the 3) to the councils in Northern Ireland. It also introduces some

applications; nt of planning permission: nission; and ocess.

egulations (NI) 2015 sets out the details of key elements of the on to the new hierarchy of development, pre-application earings and schemes of delegation, while also making a

(NI) (as amended) is to provide for the charging of a fee for

The Development is classified as 'Schedule 2' development as detailed in the EIA Regulations 2017. The Environmental

In this legislative context regard must be had to the Northern Area Plan 2016. The Northern Area Plan 2016 (NAP 2016) is

² Northern Ireland Executive (2015). Investment Strategy for Northern Ireland 2011 – 2021. Available online at: <u>https://www.infrastructure-</u> ni.gov.uk/publications/investment-strategy-northern-ireland-2011-2021 [Accessed on 07/07/2017]

- Volume 1 Plan Strategy & Framework sets out the background to the preparation of the Plan, defines its Aim, Objectives and Plan Strategy, and, with reference to the regional policy context, sets out the Strategic Plan Framework comprising allocations, policies, and designations relating to the Plan Area as a whole. Despite the relative recent adoption date of the NAP 2016 in Sept 2015, the NAP 2016 has a protracted history. The draft NAP was published in July 2005 with progress delayed due to a judicial challenge in relation to its Strategic Environmental Assessment which was considered by NI High Court and the European Court of Justice. The PAC undertook the 'independent examination' of the Draft NAP in September 2010 (strategic objections) and January 2012 (site specific objections). The former Department of Environment (DoE) received the PAC report in June 2014 with the NAP 2016 being adopted in September 2015. The publication of the Draft NAP 2016 and associated adoption of the NAP 2016 policy predates the adoption of the Strategic Planning Policy Statement (SPPS) discussed at Section 5.4.2 below.
- The NAP 2016 does not include specific renewable energy policy provision or planning policy relating to energy storage development, however Table 5.2 below outlines the relevant NAP 2016 planning policy of relevance to the Development.

Table 5.2 Relevant Policies from the Northern Area Plan 2016

The Northern Area Plan 2016	
Environment and Conservation	Policy ENV 2- Sites of Local Nature Conservation Importance
Open Space, Sport and Outdoor Recreation	Policy OSR 1- Public Rights of Way and Permissive Paths
Countryside and Coast	Policy COU 2- The Giant's Causeway and Causeway Coast World Heritage Site
Countryside and Coast	Policy COU 4The Distinctive Landscape Setting of the Giant's Causeway and Causeway Coast World Heritage Site

5.3.1 Northern Area Plan 2016

This section of the chapter provides a summary description of the relevant local development plan policies identified in Section 5.3.2 to 5.3.9. Policy summaries are presented under ES topic subheadings. Individual policies are not quoted in full (for full policy wording please refer to the respective NAP 2016 document).

5.3.2 Renewable Energy

The NAP 2016 does not have specific planning policy relating to renewable energy development proposals. Renewable energy is referenced in the context of 'Public Services & Utilities.' The 'Public Services & Utilities' section of NAP references prevailing regional planning policy, namely Planning Policy Statement 18 Renewable Energy (PPS18) as relevant to renewable energy infrastructure development. In the absence of relevant local renewable energy policy, both PPS18 and the SPPS will inform planning application material considerations.

5.3.3 Ecology, Fisheries & Ornithology

The NAP 2016 (Environment & Conservation) states that Planning Policy Statement 2: Planning and Nature Conservation (PPS2), sets out the current regional policy for the protection of conservation interests. Policy provision of PPS2 is discussed in Section 5.5.3 of this chapter. The NAP references the sites protected at a European level (Special Protection Areas (SPA) and Special Areas of Conservation (SAC)) and national level (Areas of Special Scientific Interest (SSI) and Nature Reserves). The River Roe and Tributaries SAC is located 3.1 km north of the Development, Cam / Glenshane Pass SAC is 9.1 km to the south, Binevenagh SAC is 9.2 km north and the River Foyle SPA is 11 km to the north-west, which are all designated sites protected at a European level.

5.3.4. Landscape & Visual Amenity

The NAP 2016 (Countryside and Coast) states that PPS 2: Natural Heritage sets out the Department's planning policies for the conservation, protection and enhancement of our natural heritage, which is defined as 'the diversity of our habitats, species, landscapes and earth science features'. Further planning policy relating to the protection of landscape settings is provided, however this specifically relates to the protection of the 'The Giants Causeway & the Causeway Coast World Heritage Site.'

5.3.5 Hydrology, Hydrogeology, Geology, Soils & Peat

regional planning policy documents outlined at Section 5.5.5, namely the SPPS, PPS2, PPS18 and PPS15 will inform the planning application determination as material considerations.

5.3.6 Noise

19 The NAP 2016 does not include specific noise planning policy and notably there is no noise planning policy relating to renewable energy proposals. Therefore, the regional planning policy documents outlined at Section 5.5.6, namely the SPPS and PPS18 will inform the planning application determination as material considerations.

5.3.7 Archaeology & Built Heritage

20. Addendum: 'Areas of Townscape Character' set out the current regional policy for the protection of archaeology and built heritage interests. The NAP 2016 does not contain local archaeology and built heritage policy, rather it references regional planning policy. Therefore, the regional planning policy documents outlined at Section 5.5.7, namely the SPPS and PPS6 will inform the planning application determination as material considerations.

5.3.8 Access, Transport & Traffic

The NAP 2016 states that transport and traffic planning policy is provided for by the Planning Policy Statement 3 Access, 21. Movement and Parking (PPS 3), and Planning Policy Statement 13 Transportation & Land Use (PPS13). There is no specified transport and traffic planning policy in the LDP. Therefore, the SPPS, PPS 13 and PPS 3 should inform the planning application determination as material considerations.

5.3.9 Tourism. Recreation and Socio-Economics

The NAP 2016 states that Planning Policy Statement 16: Tourism (PPS 16) provides planning policy for the safeguarding of 22 tourism assets from development likely to impact adversely upon the tourism value of the environmental asset. Furthermore, the NAP 2016 outlines that prevailing regional planning policy provides the framework for identifying appropriate development opportunities and safeguarding tourism assets from harmful development. Therefore, in the absence of specific local tourism planning policy, the planning policy provisions of the SPPS and PPS16, as outlined in Section 5.5.9 should inform the planning application determination as material considerations. Policy OSR1 of the NAP 2016 seeks to protect the route, character, function or recreational value of the Ulster Way, the National Cycle Network, public rights of way or permissive paths and should therefore inform planning policy at local level.

5.4. Material Considerations – Regional Planning Policy & Guidance 5.4.1 Regional Planning Policy & Guidance: Regional Development Strategy for Northern Ireland 2035 (RDS)

The Regional Development Strategy 2035 (RDS 2035) strategic guidance actively promotes the shift to a lower carbon 23. economy, the adaptation to climate change and the delivery of a secure and sustainable energy supply. One of the eight key aims of the RDS 2035 is to:

"Take action to reduce our carbon footprint and facilitate adaption to climate change."

The RDS 2035 regional guidance for the economy prioritises a secure energy supply stating: 24

"RG5: Deliver a sustainable and secure energy supply."

- Supplementary guidance within the RDS 2035 seeks to: 25.
 - "Increase the contribution that renewable energy can make to the overall energy mix:
 - Strengthen the grid:
 - Provide new gas infrastructure: •
 - Work with neighbour's: •
 - Develop "Smart Grid" Initiatives:4"

⁴ Section 3.8, RDS 2035

The NAP 2016 does not have specific hydrology, hydrogeology, geology or soils and peat planning policy. Therefore, the

The NAP 2016 states that 'Planning Policy Statement 6: Planning, Archaeology and the Built Heritage' (PPS6) and PPS 6

Regional guidance for the environment at policy RG9 prioritises the need to reduce NI's carbon footprint and the adaption of the region to climate change:

> "RG9: Reduce our carbon footprint and facilitate mitigation and adaptation to climate change whilst improving air quality."

- The RDS 2035 notes that climate change is "increasingly seen as one of the most serious problems facing the world" and 27. outlines that "consideration needs to be given on how to reduce energy consumption and the move to more sustainable methods of energy production." The RDS 2035 identifies climate change mitigations measures which include those to:
 - "Increase the use of renewable energies;
 - Utilise local production of heat and/or electricity from low or zero carbon energy sources⁵"
- The RDS 2035 outlines key climate change adaption measures including: 28.
 - "Re-use land, buildings and materials; •
 - Minimise development in areas at risk from flooding from rivers, the sea and surface water run-off; •
 - Protect soils:
 - Protect and extend the ecosystems and habitats that can reduce or buffer the effects of climate change"

5.4.2 Regional Planning Policy & Guidance: Strategic Planning Policy Statement for Northern Ireland (SPPS)

- The SPPS is the regional planning policy document for Northern Ireland. It contains a suite of planning policy and is a material planning consideration in the assessment of all planning applications in NI.
- Section 3.3 of the SPPS states that "planning authorities should deliver on all three pillars of sustainable development in formulating policies and plans." In terms of the environment, this is stated as:

"Protecting and enhancing the built and natural environment (including our heritage assets, landscape and seascape character); seeking to ensure the planning contributes to a reduction in energy and water usage, helping to reduce greenhouse gas emissions by continuing to support growth in renewable energy sources......"

- Section 3.7 further expounds that "furthering sustainable development also means ensuring the planning system plays its part in supporting the Executive and wider government policy and strategies in efforts to address any existing or potential barriers to sustainable development. This includes strategies, proposals and future investment programmes for key transportation, water and sewerage, telecommunications and energy infrastructure (including the electricity network)."
- Section 3.13 indicates that the planning system should help to mitigate and adapt to climate change by measures which include:
 - "shaping new and existing developments in ways that reduce greenhouse gas emissions and positively build community resilience to problems such as extreme heat or flood risk;
 - promoting sustainable patterns of development, including the sustainable reuse of historic buildings where appropriate, which reduces the need for motorised transport, encourages active travel, and facilitates travel by public transport in preference to the private car;
 - avoiding development in areas with increased vulnerability to the effects of climate change, particularly areas at • significant risk from flooding, landslip and coastal erosion and highly exposed sites at significant risk from impacts of storms;
 - considering the energy and heat requirements of new developments when designating land for new residential, commercial and industrial development and making use of opportunities for energy and power sharing, or for decentralised or low carbon sources of heat and power wherever possible;
 - promoting the use of energy efficient, micro-generating and decentralised renewable energy systems;

- 33. Section 6.214 highlights that NI has significant renewable energy resources and a vibrant renewable energy industry while Section 6.216 states that:
 - benefitting our health and well being, and our quality of life."
- Section 6.218 outlines that the "aim of the SPPS in relation to renewables is to facilitate the siting of renewable energy 34. 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."
- Section 6.219 details the regional strategic development objectives for renewable energy which are to: 35.
 - energy development are adequately addressed;
 - a target for a reduction in greenhouse gas emissions by at least 35% on 1990 levels by 2025. 91
 - and promote greater application of the principles of Passive Solar Design
- Regarding Local Development Plans and renewable energy, section 6.221 states: 36.
 - renewable energy development whilst LDPs are being prepared or updated are not appropriate."
- The pertinent SPPS planning policy is referenced in respect of the relevant chapters in the ES. The Planning Statement submitted as part of this planning application provides an assessment of the Development against the relevant policy provision of the SPPS.

Table 5.3: Northern Ireland Planning Policy Context – Strategic Planning Policy Statement Strategic Planning Policy Statement for Northern Ireland 2015 (SPPS)

The Archaeology and Built Heritage section (Para 6.6-6.27) provides planning policy on the following topics (i) world heritage sites (ii) archaeology (iii) listed buildings (iv) conservation areas (v) areas of townscape character (vi) nondesignated heritage assets (vii) enabling development.

The Development in the Countryside section (Para 6.61-6.78) provides planning policy on the following topics; (i) Residential Development and Non-residential development, (ii) Farm diversification, iii) Agricultural and forestry development, and (iv) The conversion and re-use of existing buildings for non-residential use.

The Flood Risk section (Para 6.99- 6.132) provides planning policy on; (i) Development in River (Fluvial) and Coastal Flood Plans (ii) Development at Surface Water (Pluvial) Flood Risk outside Flood Plains, (iii) Development in Proximity to Reservoirs, (iv) Protection of Flood Defence & Drainage Infrastructure, and (v) Artificial Modification of Watercourses.

The Natural Heritage section (Para 6.168- 6.198) provides planning policy on; (i) international designations, (ii) protected species, (iii) national designations including Areas of Special Scientific Interest, Nature Reserves or National Nature Reserves, Marine Conservation Zones, and (iv) Local Designations including Local Nature Reserves and Wildlife Refuges and 'Other Habitats, Species or features of National Heritage Importance

⁵ Section 3.26, RDS 2035

"Renewable energy reduces our dependence on imported fossil fuels and brings diversity and security of supply to our energy infrastructure. It also helps Northern Ireland achieve its targets for reducing carbon emissions and reduces environmental damage such as that caused by acid rain. Renewable energy technologies support the wider Northern Ireland economy and also offer new opportunities for additional investment and employment, as well as

ensure that the environmental, landscape, visual and amenity impacts associated with or arising from renewable

ensure adequate protection of the region's built, natural, and cultural heritage features; and 50 The PfG contains facilitate the integration of renewable energy technology into the design, siting and layout of new development

"Councils 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

Strategic Planning Policy Statement for Northern Ireland 2015 (SPPS)

The Renewable Energy section (Para 6.214- 6.234) provides planning policy on; (i) siting of renewable energy proposals within designated landscapes which include Areas of Outstanding Natural Beauty and World Heritage sites (ii) (a) impacts upon public safety, human health, or residential amenity (b) visual amenity and landscape character (c) biodiversity, nature conservation or built heritage assets (d) local natural resources, such as air quality, water quality or quantity and (e) public access to the countryside, (iii) Active Peatland, and (iv) Separation distances between windfarm development and occupied properties.

Telecommunications and other Utilities (Para 6.235- 6.250) provides planning policy in respect of the (i) impact of new telecommunications/ other utilities impact on visual amenity and on environmentally sensitive features and locations (ii) ICNIRP public exposure to electromagnetic fields (iii) protection of airport public safety zones

Tourism (Para 6.251- 6.266) provides planning policy for (i) tourism proposals within settlements (ii) tourism proposals in the countryside (iii) protection of tourism assets including built and natural heritage assets and safeguarding from unnecessary and inappropriate development.

Transportation (Para 6.293- 6.30) provides planning policy in respect of the requirements for planning applications and associated Department's published guidance namely the requirement for a Transport Assessment and inclusion of mitigation measures, where appropriate.

5.4.3 Regional Planning Policy & Guidance: Northern Ireland Planning Policy Statements

- The suite of existing planning policy statements are material planning considerations in the determination of planning applications. There is currently a transitional period in planning policy terms that will operate until such time as the Local Development Plan 'Plan Strategy' for the Council has been adopted, in the context of the provisions of The Planning (NI) Act 2011. During the transitional period planning authorities will apply existing retained policy (including PPSs) together with the SPPS. Relevant supplementary and best practice guidance will also continue to apply. Where a Council adopts its Plan Strategy, existing policy retained under the transitional arrangements shall cease to have effect in the district of that council and shall not be material from that date, whether the planning application has been received before or after that date. The NAP 2016 predates the enacting of The Planning (NI) Act 2011 and therefore the transitional provisions outlined by the SPPS apply until the updated Council Local Development Plan Strategy is adopted. Refer to section 5.7 of this chapter for the timetable for the Council Local Development Plan preparation.
- Any conflict between the SPPS and any retained policy (PPS) must be resolved in favour of the provisions of the SPPS. For example, where the SPPS introduces a change of policy direction and/or provides a policy clarification that would conflict with the retained policy the SPPS should be accorded greater weight in the assessment of individual planning applications. However, where the SPPS is silent or less prescriptive on a particular planning policy matter than retained policies this should not be judged to lessen the weight afforded to the retained policy. PPS 18 and its associated best practice guidance (BPG) and supplementary planning guidance (SPG) are retained as regional planning policy.
- Policy RE1 of PPS 18 and the SPPS differ in how they describe the weight that should be attached to the renewable energy 40 project's wider environmental, economic and social benefits. The SPPS states that these are material considerations that will be given appropriate weight in determining whether planning permission should be granted whereas Policy RE1 states that they should be accorded significant weight. The policy provision of the SPPS should be accorded greater weight in the determination of individual wind energy planning applications.
- 41. Table 5.4 below provide an overview of the Planning Policy Statements and their respective policy provision.

Table 5.4: Planning Policy Statements Planning Policy Statements

Planning Policy Statement 2- Natural Heritage

Policy NH1 - European and Ramsar Sites - International Policy NH2 - Species Protected by Law Policy NH3 - Sites of Nature Conservation Importance - National

Planning Policy Statements

Planning Policy Statement 2- Natural Heritage

Policy NH4 - Sites of Nature Conservation Importance - Local Policy NH5 – Habitats, Species or Features of Natural Heritage Policy NH6 – Area of Outstanding Natural Beauty

Planning Policy Statement 3 Access, Movement and Parki

Policy AMP 1 - Creating an Accessible Environment Policy AMP 2 - Access to Public Roads Policy AMP 3 - Access to Protected Routes (as updated in PP Policy AMP 6 - Transport Assessment Policy AMP 7 - Car Parking and Servicing Arrangements Policy AMP 8 - Cycle Provision Policy AMP 9 - Design of Car Parking Policy AMP 10 - Provision of Public and Private Car Parks Policy AMP 11 - Temporary Car Parks

Planning Policy Statement 6 - Planning, Archaeology & the

Policy BH1 - Preservation of Archaeological Remains of Regio Policy BH2 - The Protection of Archaeological Remains of Loca Policy BH3 - Archaeological Assessment & Evaluation Policy BH4 - Archaeological Mitigation

Policy BH6 - The Protection of Parks, Gardens & Demesne's c Policy BH11 - Development affecting the Setting of a Listed Bu

Planning Policy Statement 10 Telecommunications

Policy Tel 2 - Development and Interference with Television Br

Planning Policy Statement 13 Transportation & Land Use

General Principle 3 – The process of Transport Assessment. General Principle 5 - Developers should bear the cost of transp

Planning Policy Statement 15 Planning and Flood Risk

Policy FLD1 - Development and Fluvial (River) and Coastal Flo Policy FLD3 - Development and Surface Water (Pluvial) Flood Policy FLD4 – Artificial Modification of Watercourses

Planning Policy Statement 16 Tourism

Policy TSM 8 - Safeguarding of Tourism Assets

Planning Policy Statement 18 Renewable Energy

Policy RE1- Renewable Energy.

Planning Policy Statement 21- Development in the Country

Policy CTY 1 - Development in the Countryside Policy CTY 13 - Integration & Design of Buildings in the Count

5.4.4 Regional Planning Policy & Guidance- Other Considerations

- 42. document intended to supplement planning policy (PPS18 & the SPPS).
- 43 of the BPG provides guidance on wind energy development. The BPG is a guidance document which is supplementary to planning policy.

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PPS 18 is supported by a supplementary planning guidance document entitled 'Supplementary Planning Guidance - Wind Energy Development in NI's Landscapes' (SPG). The SPG provides broad, strategic guidance in relation to the visual and landscape impacts of wind energy development. The SPG document includes general guidance on siting and design within Northern Ireland's landscapes and advice on the landscape assessment of proposed developments. The SPG is a guidance

PPS18 is also supported by a best practice guidance document entitled 'PPS 18 - Best Practice Guidance (BPG). Section 1.0

5.5 Regional Planning Policy & Guidance- Review

This section of the chapter provides a summary description of the relevant regional planning policies of relevance to the Development, identified in Section 5.5.1 and 5.5.9 by topic. In addition, the relevant content of the SPG and BPG (referenced in Section 5.4.4 of this chapter) are also provided. Policy summaries are presented under ES topic subheadings. Individual policies are not quoted in full (for full policy wording please refer to the respective regional planning policy documents).

5.5.1 Renewable Energy

- SPPS planning policy outlines that renewable energy development proposals will be permitted where the proposal will not result in an unacceptable adverse impact on; (i) public safety, human health, or residential amenity, (ii) visual amenity and landscape character, (iii) biodiversity, nature or built heritage assets, (iv) local natural resources, such as air quality, water quality or quantity, and (v) public access to the countryside. The SPPS espouses a cautious approach for renewable energy proposals within designated landscapes such as AONBs and World Heritage Sites. SPPS policy states that the wider environmental, economic and social benefits of renewable energy proposals are material considerations that will be given appropriate weight in the planning application determination process. Policy also provides that renewable energy proposals will not be permitted unless there are imperative reasons of over-riding public interest as defined under 'The Conservation Regulations (NI) 1995', as amended. Regarding separation distances between windfarms and occupied properties, a separation distance of 10 times rotor diameter with a minimum distance of not less than 500m will generally apply. There is no planning policy relating to energy storage.
- Retained PPS18 planning policy (Policy RE1) aligns with the SPPS renewable energy policy insofar as it propagates that renewable development proposals will be permitted provided the proposal will not result in an unacceptable adverse impact upon; (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. Notably PPS 18 policy states that the wider environmental, economic and social benefits of renewable energy proposals will be given significant weight in the determination of planning applications. Section 1.3 of PPS 18 details that the "varied nature of renewable energy technologies presents the potential to develop an indigenous renewable energy industry" providing for a range of opportunities to support the NI economy which include; (i) direct and indirect employment opportunities, (ii) revenue to landowners, and (iii) an improved source of electricity in remote areas. As noted in paragraph 38 of this chapter the policy provision of the SPPS should be afforded greater weight in the assessment of individual wind energy planning applications, where a conflict between the SPPS and the retained PPS18.
- Policy RE1 specifies additional provision noting that wind energy proposals will be required to demonstrate that; (i) the 47. development will not have an unacceptable impact on visual amenity and landscape character, (ii) that the development has taken into consideration the cumulative impact of existing and approved turbines, (iii) that it 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 communication installations, (v) that the development will not have an unacceptable impact on rails, roads or aviation safety, (vi) that the development will not cause significant harm to the safety or amenity of sensitive receptors and that (vii) aboveground redundant plant and associated infrastructure shall be removed and the site restored.
- Policy RE1 specifies that development on active peatland will not be permitted unless there are imperative reasons of overriding public interest. This is consistent with SPPS policy. Policy RE1 recommends a separation distance of 10 times rotor diameter to occupied property with a minimum separation distance of not less than 500m between windfarms and occupied properties will generally apply, again consistent with policy direction in the SPPS. Similarly to the SPPS, Policy RE1 does not make provision for Energy Storage.

5.5.3 Ecology, Fisheries & Ornithology

SPPS planning policy outlines that planning permission will only be granted for a development proposal that, either individually or in combination with existing and/or proposed plans or projects, is not likely to have a significant effect on a European site (Special Protection Area, proposed Special Protection Area, Special Areas of Conservation and Sites of Community Importance) or a listed or proposed Ramsar site. A development which could adversely affect the integrity of a European or Ramsar site may only be permitted in exceptional circumstances as laid down in relevant statutory provisions. The SPPS also details that planning permission will only be granted for a development proposal that is not likely to have an adverse effect on the integrity of 'Areas of Special Scientific Interest', 'Nature Reserves or National Nature Reserves' and "Marine Conservation Zones.' The SPPS specifies that development proposals within AONBs must be sensitive to the distinctive special character of the area and quality of their landscape.

- The SPPS states that planning permission will only be granted for a development proposal that is not likely to harm European protected species except in exceptional circumstances. Exceptional circumstances are defined as 'there are no alternative solutions' and 'it is required for imperative reasons of over-riding public interest' and 'there is no detriment to the maintenance of the population of the species at favourable conservation status'; and 'compensatory measures are agreed and fully secured.' SPPS policy states that planning permission will only be granted for a development proposal that is not likely to harm other statutorily protected species. The SPPS details that planning permission should only be granted for development proposals which are not likely to give rise to unacceptable adverse impact on; (i) priority habitat, (ii) priority species, (iii) active peatland, (iv) ancient and long established woodland, (v) features of earth science conservation importance, (vi) features of the landscape which are of importance for wild flora and fauna, (vii) rare or threatened native species, (viii) wetlands (including river corridors) or, (ix) other natural heritage features worthy of protection, including trees and woodland. Planning permission will only be granted for a development proposal that is not likely any other statutorily protected species and which can be adequately mitigated or compensated against.
- 51. development that is not likely to have, or in combination with existing and/or proposed plans or projects likely to have, a significant effect on a designation European site (SPA, proposed SPA, SAC, candidate SAC and Sites of Community Importance) or a listed or proposed Ramsar site. If a development proposal is likely to have significant effect or reasonable doubt remains, the Department shall make an appropriate assessment of the implications for the site in view of the site's conservation objectives. In exceptional circumstances a development which could adversely affect the integrity of a European or Ramsar site may only be permitted where there are no alternative solutions and the proposed development is required for imperative reasons of over-riding public interest and compensatory measures are agreed and fully secured. As part of the consideration of exceptional circumstances, where a European or Ramsar site hosts a priority habitat or priority species listed in Annex I or II of the Habitats Directive, a development proposal will only be permitted when it is necessary for the reasons of human health or public safety or there is a beneficial consequence of primary importance to the environment or the proposal has been agreed in advance with the European Commission.
- PPS2 Policy NH 2: 'Species Protected by Law', outlines the policy protection for European protected species and national protected species. Planning permission will not be granted for a development proposal that is likely to harm a European protected species except in exceptional circumstances. The exceptional circumstances are defined as there being no alternative solutions, the development proposal is required for imperative reasons of over-riding public interest, there is no detriment to the maintenance of the population at favourable conservation status and compensatory measures are agreed and fully secured. Regarding national protected species, planning permission will only be granted for a development proposal where said proposal is not likely to harm the protected species and which can be adequately mitigated or compensated against.
- PPS2 Policy NH5: 'Habitats, Species or Features of Natural Heritage Importance', outlines planning policy in respect of protected habitats and species. The policy prescribes that planning permission will only be granted for a development proposal which is not likely to result in the unacceptable adverse impact or damage to know (i) priority habitats (ii) priority species (iii) active peatland (iv) ancient and long-established woodland (v) features of earth science conservation importance (vi) features of the landscape which are of major importance for wild flora and fauna (vii) rare or threatened native species (viii) wetlands or (ix) other natural heritage features worthy of protection. A development proposal which is likely to result in an unacceptable adverse impact on, or damage to, habitats, species or features may only be permitted where the benefits of the proposed development outweigh the value of the habitat, species or feature. In such cases, appropriate mitigation and/or compensatory measures will be required.
- Planning policy in the SPPS aligns with the policy provision in PPS2. 54

5.5.4. Landscape & Visual Amenity

planning policy relating to the Development is specified in Policy RE1 of PPS18 and renewable energy policy in the SPPS. The SPPS provides that renewable energy proposals will be permitted where the proposal will not result in an unacceptable adverse impact on visual amenity and landscape character. The SPPS states "it will not necessarily be the case that the extent of visual impact or visibility of windfarm development will give rise to negative effects; windfarm developments are by their very nature highly visible yet this in itself should not preclude them as acceptable features in the landscape. The ability of the landscape to absorb development depends on careful siting, the skill of the designer, and the inherent characteristics of the landscape such as landform, ridges, hills, valleys, and vegetation."

PPS 2 Policy NH1: European & Ramsar Sites (International) prescribes that planning permission will only be granted for a

The SPPS does not have specific planning policy pertaining to landscape and visual impact. Rather the landscape and visual

- The SPPS specifies that the supplementary guidance 'Wind Energy Development in Northern Ireland's Landscapes' and other relevant practise notes should be taken into account in assessing all wind turbine proposals including the 'PPS 18 Best Practice Guidance Note.'
- PPS 18 Policy RE1 provides that permission will not be granted for renewable energy proposal that will have an unacceptable adverse impact upon visual amenity and landscape character. Additionally, wind energy proposals will have to demonstrate that the development will not have an unacceptable impact on visual amenity or landscape character through the number, scale, size and siting of the turbines. Policy REI specifies that the supplementary planning guidance 'Wind Energy Development in Northern Ireland's Landscapes' will be taken into account in assessing all wind turbine proposals.

5.5.5 Hydrology, Hydrogeology, Geology, Soils & Peat

- The SPPS section entitled 'Development at Surface Water (Pluvial) Flood Risk Outside Floodplains' requires that all development proposals that exceed 1 hectare will require the submission of a 'Drainage Assessment' (DA) as part of the planning application. Development requiring a DA will be permitted where it is demonstrated through the DA that adequate measures will be put in place so as to effectively mitigate the flood risk to the proposed development and from development elsewhere. Regarding the 'Artificial Modification of Watercourses', the SPPS prescribes that Planning Authorities should only permit the artificial modification of a watercourse in the exceptional circumstance where the culverting of a short length of watercourse is necessary to provide access to a development site (or part thereof), or where such operations are necessary for engineering reasons unconnected with the development proposal.
- The SPPS (Natural Heritage) states that planning permission will only be granted which is not likely to result in an unacceptable adverse impact on 'active peatland.' The SPPS further states that development likely to result in an unacceptable adverse impact to active peatland may only be permitted where the benefits of the development outweigh the value of the 'active peatland.' In these cases, appropriate mitigation and/ or compensatory measures will be required. However, the SPPS (Renewable Energy) states that renewable energy development on active peatland will not be permitted unless there are imperative reasons of public interest as defined under 'The Conservation (Natural Habitats) Regulations (NI) 1995, as amended. Notably the renewable energy planning policy sets a stricter criterion for development than the natural heritage planning policy.
- PPS 15 'Planning & Flood Risk', Policy FLD3' 'Development and Surface Water (Pluvial) Flood Risk Outside Flood Plains' states that all development proposals that exceed 1 hectare will require the submission of a 'Drainage Assessment' (DA) as part of the planning application. FLD 1 further states that drainage assessments will be required where surface water run-off from the development may adversely impact upon other development or features of importance to nature conservation, archaeology or the built heritage. Policy FLD4- Artificial Modification of Watercourses states that the artificial modification of a watercourse, including culverting or canalisation operations, will only be permitted in exceptional circumstances which include where the culverting of short length of a watercourse is necessary to provide access to a development site or part thereof or and where it can be demonstrated that a specific length of watercourse needs to be culverted for engineering reasons and that there are no reasonable or practicable alternative courses of action.
- PSS18 RE1–Renewable Energy Development states that any development on active peatland will not be permitted unless there are imperative reasons of overriding public interest. PPS 2 Policy NH 5 - Habitats, Species or Features of Natural Heritage Importance provides that planning permission will only be granted for a development proposal which is not likely to result in the unacceptable adverse impact on active peatland unless the benefits of the proposed development outweigh the loss of the active peatland. This policy inconsistency between natural heritage policy and renewable energy policy aligns with the inconsistency in the SPPS.

5.5.6 Noise

- The SPPS states that renewable energy proposals will not be permitted where the development will result in an unacceptable adverse impact upon public safety, human health or residential amenity. It further states that proposal will be assessed in accordance with normal planning criteria including noise considerations.
- 63. PPS 18 Policy REI states that renewable energy developments will be permitted provided that the development will not result in an unacceptable adverse impact upon, public safety, human health or residential amenity. PPS 18 further explains that wind energy developments will be required to demonstrate 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.

64 impact. The BPG references 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97)' as a framework for the measurement of wind farm noise and gives indicative noise levels calculated to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development. The report presents the findings of a cross-interest Noise Working Group and makes a series of recommendations that can be regarded as relevant guidance on good practice. Since the publication of ETSU-R-97 a further noise guidance was issued by the Institute of Acoustic Engineers entitled 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment & Rating of Wind Turbine Noise' which provides further detailed guidance on the application of ETSU.

5.5.7 Archaeology & Built Heritage

- 65 & Archaeological Objects (NI) Order 1995. Developments which would adversely affect the integrity of scheduled monuments or the integrity of their setting will only be permitted in exceptional circumstances Development proposals which would adversely affect archaeological remains of local importance or their settings should only be permitted where the planning authority considers that the need for the proposed development or other material considerations outweigh the value of the archaeological assets or their setting. The SPPS recommends that planning authorities should seek necessary information from applicants in making well informed judgements and in the event where an applicant has failed to provide a suitable assessment/ evaluation upon request that a precautionary approach should be followed, and planning permission should be refused. Where a planning authority is minded to granted planning permission for development which will affect sites known or likely to contain archaeological remains, it should ensure that appropriate measures are taken for the identification and the mitigation of archaeological impacts of the development. Appropriate mitigation options include preservation of remains in situ, licensed excavation or recording examination and archiving of the archaeology by way of planning condition.
- 66. regard to their intrinsic value and for their contribution to the character and quality of the settlements and the countryside. Due regard should also be paid to the rarity of the type of structure and any features of special architectural or historic interest which it possesses. The SPPS outlines that planning permission for developments that would lead to the loss of, or cause harm to, the overall character, principal components or setting of 'Historic Parks, Gardens & Demesnes' will not be permitted. In assessing applications for development in or adjacent to 'Historic Parks, Gardens & Demesnes', particular account should be taken of the impact of the proposal on the archaeological, historical or botanical interest of the site.
- PPS 6 'Planning, Archaeology & the Built Heritage' Policy BH1 'Preservation of Archaeological Remains of Regional 67. Importance and their Setting' outlines that Development which would adversely affect scheduled monuments, or the integrity of their settings will not be permitted unless there are exceptional circumstances. In assessing the integrity of a scheduled monument Policy BH1 details the integrity of the setting as the assessment of critical views of and from the monument; the access and public approaches to the monument; and the understanding and enjoyment of the monument by visitors. Policy BH 2 - The Protection of Archaeological Remains of Local Importance' outlines that 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 & Evaluation, explains that if the impact of a development proposal on important archaeological remains is unclear, or the relative importance of such remains is uncertain, that the planning authority will normally require applicants to provide further information in the form of an archaeological assessment or an archaeological evaluation. Policy BH4 - Archaeological Mitigation states that 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 BH6 - The Protection of Parks, Gardens & Demesne's of Special Historic Context' outlines that planning permission will not be granted for proposals which would lead to the loss of, or cause harm to, the character, principal components or setting of parks, gardens and demesnes of special historic interest.
- Policy BH11 'Development Affecting the Setting of a Listed Building' outlines that 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.

PPS 18 Best Practice Guidance (BPG) provides further guidance on the assessment of wind energy developments and noise

The SPPS details that scheduled monuments benefit from statutory protection under the provisions of the Historic Monuments

Planning applications which have the potential to impact upon listed buildings and their settings should be assessed, having

The planning policy provisions of PPS 6 and the SPPS are consistent. PPS6 Policy BH1 provides clarification on the assessment of impact on the setting of scheduled monuments and lists the criteria to be assessed/ reviewed.

5.5.8 Access, Transport & Traffic

- The SPPS states that in assessing development proposals, planning authorities must apply the Department's published guidance and recommends that planning authorities should require the submission of a Transport Assessment (TA) for proposals that are likely to generate a significant volume of traffic. The TA should include a full assessment of the transport impact and should include mitigation measures where appropriate.
- PPS 13 Transportation & Land Use identifies general principles which apply to the planning and delivery of transportation and 71 development. General Principle 3 outlines that the process of Transport Assessment (TA) should be employed to review the potential transport impacts of a development proposal. General Principle 5 outlines that developers should bear the costs of transport infrastructure necessitated by their development.
- PPS 18- Policy RE1 outlines that all planning applications for wind energy development will be required to demonstrate that no 72 part of the development will have an unacceptable impact on roads, rail or aviation safety.

5.5.9 Tourism, Recreation and Socio-Economics

- The SPPS highlights the importance of built and natural heritage of Northern Ireland regarded as tourism assets, citing 73 examples such as historical and archaeological sites, certain beaches and AONBs. SPPS planning policy states that planning permission should not be granted for development that would, in itself or in combination with existing and approved development in the locality, have an adverse impact on a tourism asset, such as to significantly compromise its tourism value. Regarding renewable energy, the SPPS outlines that renewable energy proposals will be permitted where, amongst other planning considerations, the development will not result in an unacceptable adverse impact on public access to the countryside which arguably could be interpreted as a tourism asset.
- PPS16- Tourism Policy 'TSM 8- Safeguarding of Tourism Assets', notes 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 impact on a tourism asset such as to significantly compromise its tourism value. This policy provides for the safeguarding of all tourism assets, including those which are subject to protection for other reasons under other legislative or policy provision and those which are not subject to such protection. 'Tourism assets' are defined by PPS 16 as "any feature associated with the built or natural environment which is of intrinsic interest to tourists." PPS18 Policy RE1 states that that renewable energy proposals will be permitted where, amongst other planning considerations, the development will not result in an unacceptable adverse impact on public access to the countryside which arguably could be interpreted as a tourism asset.
- The tourism policy provision of the SPPS and PPS16 is largely consistent. PPS 16 provides clarification on the definition of 'tourism assets' while the SPPS does not provide the same clarification.
- The SPPS renewable energy policy states that the wider environmental, economic and social benefits of all proposals for 76. renewable energy projects are material considerations that will be given appropriate weight in determining whether planning permission should be granted. The SPPS further states that consideration of all renewable energy proposals will take account of their contribution to the wider environmental benefits arising from a clean, secure energy supply, reductions in greenhouse gases and other polluting emissions, and contributions towards meeting Northern Ireland's target for use of renewable energy sources.
- PPS 18- Policy RE1 states that the wider environmental, economic and social benefits of all proposals for renewable energy 77 projects are material considerations that will be given significant weight in determining whether planning permission should be granted. PPS 18 further states that the planning authority will support renewable energy proposals unless they would have unacceptable adverse effects which are not outweighed by the local and wider environmental, economic and social benefits of the development. This includes wider benefits arising from a clean, secure energy supply; reductions in greenhouse gases and other polluting emissions; and contributions towards meeting Northern Ireland's target for use of renewable energy sources.
- There is a policy difference between the SPPS and PPS18 in the consideration of the material weight that should be given to 78. the wider environmental, economic and social benefit considerations in the determination of renewable energy planning

applications. The SPPS specifies that 'appropriate weight' should be given to the wider environmental, economic and social benefits of all proposals, while the PPS18 states that 'significant weight' should be afforded to the same considerations.

Regional Planning Policy & Guidance: Strategic Planning Policy Statement Strategic Planning Policy Review 5.6 for Onshore Renewable Energy Development

A review of planning policies on renewable energy was announced in September 2016. The strategic review is being undertaken by Element Consultants on behalf of the Department for Infrastructure (DfI). The completion of the strategic review and associated DfI recommendations have been delayed by the absence of the NI Executive. DfI Planning Policy unit advised they are not in a position to provide a timeframe for the completion of the strategic review process.

5.7 Preparation of New Local Development Plan for Causeway Coast & Glens Borough Council

At the time of preparation of this ES, the Council are in the process of preparing their Local Development Plan for the Council 79 Area - Causeway Coast & Glens Local Development Plan 2030 (LDP)- refer to Table 5.5 below for the Local Development Plan timetable (indicative). The Council published their Preferred Options Paper in Summer 2018. It is anticipated that the draft Plan Strategy will be published in Autumn / Winter 2019 with the independent examination due to take place in Spring/ Summer 2020. The target date for adoption of the Plan Strategy is Summer/ Autumn 2021.

Table 5.5: Causeway Coast & Glens Local Development Plan Indicative LDP Timetable **Causeway Coast & Glens Local Development Plan Indicative LDP Timetable**

Robust Evidence Gathering	Spring- Winter 2016
Publish Plan Timetable & Statement of Community Involvement	Winter 2016
Publish Preferred Options Paper Publish Preferred Options Paper (12 week consultation period)	Spring/Summer 2018
Publish Draft Plan Strategy (8 week consultation period)	Autumn/Winter 2019
Independent Examination of Draft Plan Strategy	Spring/Summer 2020
Adopt Plan Strategy	Summer/Autumn 2021
Publish Draft Local Policies Plan (8 week consultation period)	Autumn 2022
Independent Examination of Draft Local Policies Plan	Spring 2023
Adopt Local Policies Plan	Winter 2023
Monitoring & Review of Plan	Ongoing

6 Landscape and Visual Impact Assessment

Introduction 6.1

- This Chapter of the Environmental Statement (ES) evaluates the effects of the Development on the landscape and visual resource. This assessment was undertaken by Optimised Environments Limited (OPEN). The assessment considers the potential significant effects of the Development during the following phases of the Development:
 - Decommissioning of Operational Rigged Hill Windfarm (initial phase of the Development);
 - Construction of the Development (likely to occur in tandem with the above phase);
 - Operation of the Development; and
 - Decommissioning of the Development (final phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly 2. in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worstcase scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase of the Development has not been considered further in this assessment.
- This Chapter of the ES is supported by the following Technical Appendix provided in Volume 3 Technical Appendices:
 - A6.1: Methodology
- This Chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Survey Methodology;
 - Baseline Description;
 - Assessment of Potential Effects;
 - Mitigation and Residual Effects;
 - Cumulative Effects Assessment;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary.

Legislation, Policy and Guidance 6.2

The following guidance, legislation and information sources have been considered in carrying out this assessment:

https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/derry2011-adopted-plan.pdf [Accessed on 10/07/2017]; ⁴ Department of the Environment (2015). Magherafelt Area Plan . Available online at:

https://www.planningni.gov.uk/index/policy/development plans/devplans az/magherafelt web2.pdf [Accessed on 10/07/2017];

⁵ Department of the Environment Northern Ireland (revised 2007). Register of Parks, Gardens and Demesnes of Special Historic Interest Northern Ireland

⁷ Department of Agriculture, Environment and Rural Affairs (2000) The Northern Ireland Landscape Character Assessment

⁸ Northern Ireland Environment Agency (2010) Wind Energy Development in Northern Ireland's Landscapes

⁹ Department of Agriculture, Environment and Rural Affairs (2000) The Northern Ireland Landscape Character Assessment

¹⁰ Department of the Environment (2009) Planning Policy Statement 18: Renewable Energy

- Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper¹; Department of the Environment Northern Ireland (2013). Planning Policy Statement 2 Natural Heritage.; Department of the Environment Northern Ireland (1999). Planning Policy Statement 6 Planning, Archaeology and the Built Heritage²: Department of the Environment (2011). Derry Area Plan³. Department of the Environment (2015). Magherafelt Area Plan⁴. Department of the Environment Northern Ireland (revised 2007). Register of Parks, Gardens and Demesnes of Special Historic Interest Northern Ireland⁵. Department for Regional Development (March 2012) Regional Development Strategy 2035⁶; Department of Agriculture, Environment and Rural Affairs (2000) The Northern Ireland Landscape Character Assessment⁷: Northern Ireland Environment Agency (2010) Wind Energy Development in Northern Ireland's Landscapes⁸; Department of Agriculture, Environment and Rural Affairs (2000) The Northern Ireland Landscape Character Assessment⁹: Department of the Environment (2009) Planning Policy Statement 18: Renewable Energy¹⁰; Landscape Institute and Institute of Environmental Management & Assessment (2013) Guidelines for Landscape and Visual Impact Assessment: Third Edition' (GLVIA3)¹¹: Northern Ireland Environment Agency (NIEA) (2009) Wind Energy Development in Northern Ireland's Landscapes -Supplementary Planning Guidance to accompany Planning Policy Statement 18 Renewable Energy¹²; Scottish Natural Heritage (SNH) (2017) Siting and Designing Windfarms in the Landscape¹³; SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments¹⁴; SNH (2017) Visual Representation of Windfarms: Version 2.2¹⁵; Landscape Institute (2011) Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment16:
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- Countryside Agency and SNH (2002) Landscape Character Assessment Guidance for England and Scotland¹⁸; and
- Countryside Agency and SNH (2002) Landscape Character Assessment Guidance Topic Paper 6: Techniques and Criteria for Judging Sensitivity and Capacity¹⁹.

Assessment Methodology and Significance Criteria 6.3 6.3.1 Scoping Responses and Consultations

Consultation for this ES topic was undertaken with the organisations shown in Table 6.1.

Table 6.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Causeway Coast & Glens Borough Council	Scoping Response LA01/107/1107 DETEIA 26/01/2018	The Council is content with the proposed Study Areas for the LVIA and cumulative LVIA. The Council is content with the aspects proposed to be scoped out of the LVIA.	Study Areas are described in Section 6.3.4. Aspects scoped out of the assessment are set out in section 6.3.3. Viewpoints are set at section 6.5.6. Cumulative windfarms are set out in section 6.5.7.

¹¹ Landscape Institute and Institute of Environmental Management & Assessment (2013) Guidelines for Landscape and Visual Impact Assessment: Third Edition' (GLVIA3)

Planning Guidance to accompany Planning Policy Statement 18 Renewable Energy ¹³ Scottish Natural Heritage (SNH) (2017) Siting and Designing Windfarms in the Landscape

- ¹⁴ SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments
- ¹⁵ SNH (2017) Visual Representation of Windfarms: Version 2.2
- ¹⁶ Landscape Institute (2011) Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment ¹⁷ Landscape Institute (31 March 2017) Technical Guidance Note 02/17 Visual representation of development proposals ¹⁸ Countryside Agency and SNH (2002) Landscape Character Assessment Guidance for England and Scotland ¹⁹ Countryside Agency and SNH (2002) Landscape Character Assessment Guidance Topic Paper 6: Techniques and Criteria for Judging

- Sensitivity and Capacity

Landscape Institute (31 March 2017) Technical Guidance Note 02/17 Visual representation of development proposals¹⁷;

- ¹² Northern Ireland Environment Agency (NIEA) (2009) Wind Energy Development in Northern Ireland's Landscapes Supplementary

¹ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper

² Department of the Environment Northern Ireland (1999). Planning Policy Statement 6 Planning, Archaeology and the Built Heritage ³ Department of the Environment (2011). Derry Area Plan . Available online at:

⁶ Department for Regional Development (March 2012) Regional Development Strategy 2035

Consultee	Type and Date Summary of Consultation Response		Response to Consultee		
		The Council is content with the proposed viewpoints but would advise that this does not preclude the case officer or the Council Committee from seeking additional viewpoints. The Council considers that the information proposed is adequate but again this does not preclude the case officer or Consultees from seeking additional information. Council is content with the proposed cut-off date for compiling of the cumulative list and would advise that there are no windfarm proposals going forward which need to be considered within this submission.			
Department of Agriculture, Environment and Rural Affairs (DAERA) Response Planning Team	Scoping Response 17/01/2018	NIEA may need to comment on proposals with the potential to significantly affect an Area of Outstanding Natural Beauty (AONB).	The potential effects on the Sperrin AONB and the Binevenagh AONB are assessed in sections 6.7.5.2.4 and 6.2.5.2.5.		
DAERA Northern Ireland Environment Agency (NIEA) Natural Heritage Division Countryside Coast and Landscape Protected Landscapes Team	14/09/2017 email response to letter.	Declined to respond on the scope of the LVIA.			
Ministry of Defence	Scoping Response 27/09/2017	Structures to be fitted with aviation warning lights	It is understood that the warning lights would be infra-red and therefore would not give rise to night time lighting effects.		
Causeway Coast and Glens Borough Council	Pre-Application Meeting / 24/04/18	Council agreed in respect of the cumulative developments to be considered, that a cut of date of 6 months prior to submission for single turbines, and 3 months for windfarms was appropriate.	Cumulative information has been updated in May 2019 following input from CCGBC and is presented in Technical Appendix TA 2.3. This is within 3 months of the anticipated submission date in July 2019.		

6.3.2 Scope of Assessment

The key issues for the assessment of potential landscape and visual effects relating to the Development are:

- Temporary effects arising from the decommissioning construction phase such as the removal or alteration of landscape elements and features, reconfiguration of landform, introduction of a construction compound, use of machinery, task and security lighting and the building of the components of the Development themselves;
- Permanent and potentially reversible effects on landscape and visual amenity including cumulative; and • Indirect effects on landscape and visual amenity – including cumulative. •

6.3.3 Elements Scoped Out of Assessment

- The Scoping Request set out those landscape and visual receptors that do not have potential to undergo significant effects and the findings of this have been agreed with the consultees. Since the Scoping was submitted the design of the Development has been advanced and finalised, and therefore a further review of the Scoping assumptions has been undertaken to ascertain if there would be any material change to the effects that would require receptors to be scoped back into the LVIA. There are no instances where this would be the case and therefore Table 6.2 sets out the landscape and visual receptors that are scoped out of the LVIA.
- Further to the Scoping Request being submitted it has come to light that the Knockan/Ash Park Registered Site (RS) contained in the Register of Parks, Gardens and Demesne of Special Historic Interest²⁰ (RPGDSHI) was omitted. The houses in the RS are private however the gardens are open by arrangement. A preliminary assessment of the RS indicated that the RS is located entirely within the ZTV as shown on Figure 6.9. However, its location at a distance of approximately 16 km to the south-west of the closest turbine of the Development and the extent of enclosing and intervening woodland ensures that whilst there may be some visibility of the Development on the hill ridge from open areas of the RS these would be peripheral and would not materially alter the setting of the RS. Existing views will include the Operational Rigged Hill Windfarm in the same part of views. In addition, a review of aerial photography showing the RS indicates that there are not defined views or focal points that would direct views towards the Site, and this diminishes the importance of the Development as part of the wider context. This RS has therefore been scoped out of requiring further assessment in the LVIA as no significant effects would occur.

Table 6.2: Receptors to be Scoped out of the LVIA

	Receptor	Reason for being scoped out
	Landscape Character Areas	
	Landscape character areas beyond 15 km radius	Due to the distance to the Deve particular the fact that there is a baseline character and has an i Character Areas (LCA). Other of an influence on these LCAs.
	Magilligan Lowlands	Limited extents of Zone of Theo influence on LCA is coast and E
	Garvagh Farmland	ZTV shown across northern par trees and other features within t context contributing little to char
	Loughermore Hills	ZTV shown generally across ea more with Site located on other windfarms located within this LC the Development.
	Lough Foyle Alluvial Plain	ZTV shown across much of this location and views across Loug Extensive boundary planting reg
	Lower Bann Floodplain	ZTV shown across much of this boundary trees and other featur landscape context contributing
	Coleraine Farmland	ZTV shown across much of this trees and other features such a results in wider landscape conte

elopment and the landscape character of the Study Area. In an operational windfarm on the Site, which is part of the influence on other views towards it from other Landscape operational and under construction windfarms also often have

oretical Visibility (ZTV) at a range of 10.5 km or more. Key Binevenagh Mountain which are located at closer proximity.

rt of LCA at a range of 6.8 km or more. Extensive boundary the LCA and intervening areas results in wider landscape racter of this LCA.

ast facing slopes only. Part of LCA at a range of 7.9 km or side of Roe Basin. Altahullion, Glenconway and Monaboy CA and have a greater influence on landscape character than

low-lying area. However, LCA is characterised by its coastal h Foyle rather than views to the south-east towards the Site. gularly obscures views in this direction.

s low lying LCA at a range of 9.7 km or more. Extensive res within the LCA and intervening areas results in wider little to character of this LCA.

LCA at a range of 10.8 km or more. Extensive boundary as urban areas located within the LCA and intervening areas ext of Site contributing little to character of this LCA.

²⁰ Department of the Environment Northern Ireland (revised 2007). Register of Parks, Gardens and Demesne of Special Historic Interest

Receptor	Reason for being scoped out
Sperrin Foothills	ZTV shown mainly across northern-eastern part of LCA at a range of 11.7 km or more. Closest parts of LCA in ZTV are not in AONB designation. Site located on other side of Roe Basin from this LCA, which would be characterised by closer proximity Altahullion and Glenconway windfarms.
Sperrin Mountains	LCA coincides with AONB designation. ZTV shown to occur from areas of high elevation only within this LCA at a range of greater than 12.9 km. From these locations there are numerous influences on views across the wider landscape which include the operational and under construction windfarms of Altahullion, Glenconway and Smulgedon at closer range than the proposed Development so that it would have a limited effect on character as part of this context.
Lower Bann Valley	ZTV shown across much of this LCA at a range of 13.3 km or more. Extensive boundary trees and other features such as settled areas located within the LCA and intervening areas results in wider landscape context of the Site contributing little to character of this LCA.
Landscape Planning Designation	ations
Causeway Coast Area of Outstanding Natural Beauty (AONB)	Limited extent of ZTV at a ranges of over 22.1 km. Character of landscape is derived from its coastal location and associated with the sea. Development may have an influence on elevated areas, however such areas would be influenced by numerous other elements within the wider context – including urban areas and trees.
Giant's Causeway and Causeway Coast World Heritage Site	Very limited extent of ZTV within this area. Character of landscape is derived from its coastal location and association with the sea. Development may have an influence on elevated areas, however such areas would be influenced by numerous other elements within the wider context – including urban areas and trees.
Areas of High Scenic Value within the Derry / Londonderry area	Distances of greater than 25 km. Limited areas lie within ZTV.
Registered Site (RS) and Supplementary Sites (SS) beyond 20 km radius	Due to the distance to the Development and the landscape character of the intervening parts of Study Area. In particular, the fact that there is an operational windfarm on the Site, which is part of the baseline character and views towards it. Other operational and under construction windfarms also often occur within a similar part of long-range views.
Roe Valley Park SS	Limited extents of ZTV at 6.5 km over higher areas (not within valley) only. Areas of ZTV coincide with wooded areas.
Downhill RS	Very limited extent of ZTV at range of 13.6 km and separated from Site by intervening high ground and forestry.
Anderson Park RS	Limited extent of ZTV at range of 14.9 km. Separated from Site by intervening urban area of Coleraine.
Guy Wilson Daffodil Park RS	Limited extent of ZTV at range of 15.9 km. Separated from Site by intervening urban area of Coleraine.
Walworth RS	Only part open to public is walled garden. Views are assumed to be contained by garden walls.
O'Hara Brook RS	House private with gardens open to public on special days. In ZTV at a range of 17.2 km to west-south-west. However, key views from property orientated to the south-south-west with views in the direction of the Site largely screened and filtered by intervening trees.
Leslie Hill RS	No public access. Heritage Farm Park closed to public in 2013.
Knockan/Ash Park RS	Public access to gardens by arrangement. In ZTV at range of 16 km. Actual visibility limited by intervening woodland.

²¹ Northern Ireland Environment Agency's (NIEA) Wind Energy Development in Northern Ireland's Landscapes: Supplementary Planning Guidance (SPG) to accompany Planning Policy Statement 18 Renewable Energy.

Receptor	Reason for being scoped out
Principal visual receptors	
Settlements beyond 20 km range	Distance to Development. Opera views. Foreground screening an within the intervening area.
Greysteel	Limited parts of settlement within km.
Castlerock	Not in ZTV.
Maghera	Not in ZTV.
Draperstown	Not in ZTV.
Claudy	Not in ZTV.
Rail and road routes beyond 10 km (except for the North Sperrins Scenic Driving Route)	Distance to Development. Trans under construction windfarms in of a range of urban and landscap
National Cycle Routes and Links beyond 15 km radius	Distance to Development. Trans under construction windfarms in of a range of urban and landscap
National Cycle Route 93 where it passes through Coleraine	Limited extents lie within ZTV. A area of town.
B190	Limited extents lie within ZTV. A
Regional Cycle Routes beyond 15 km radius.	Distance to Development. Trans under construction windfarms in of a range of urban and landscap
Lower Bann Cycleway National Cycle Network Link within 15 km radius.	In ZTV at a range of greater than Development due to intervening

6.3.4 Study Area / Survey Area

- The initial step in the LVIA is the establishment of the Study Area for the assessment. An area with a radius of 30 km from the 10. nearest turbine in the Development is defined as the Study Area and this has been agreed with the consultees through the scoping process. This aligns with guidance presented in the SPG²¹ which accompanies Planning Policy Statement 18 which states "For turbines of medium or large commercial height we would generally recommend a radius of 20-30 km". A ZTV analysis has been carried out for this area, as has mapping of landscape character, designations and principal visual receptors. This Study Area is shown on **Figure 6.1**.
- The Study Area is not intended to provide a boundary beyond which the Development would not be seen, but rather to define 11. the area within which it may have a significant landscape or visual effect. A significant effect is, in reality, very unlikely to occur towards the edges of the Study Area due to a combination of factors such as distance from the Development, which ensures that the turbines would appear as minor features in views and would affect a very limited proportion of the wider views available; and screening by intervening buildings and vegetation.
- The cumulative landscape and visual assessment also covers a Study Area of 30 km from the nearest turbine. Due to the 12. nature of the Development as a repowering of an operational windfarm and the cumulative windfarm context within the local area, significant cumulative effects would not arise beyond this and are likely to be substantially more localised. Single turbines of less than 50 m to tip are shown within a 5 km radius of the Development. Beyond a 5 km radius, only turbines that are greater than 50 m are included. This is with the exception of single turbines which are located at such close range to a viewpoint that they may have a material influence on the cumulative effect of the Development. Where this is the case these

ational and under construction windfarms in similar part of id influence of a range of urban and landscape features

TTV located on far side of settlement. At a range of over 17

ient rather than static nature of viewers. Operational and similar part of views. Foreground screening and influence pe features within the intervening area.

sient rather than static nature of viewers. Operational and similar part of views. Foreground screening and influence be features within the intervening area.

Actual visibility reduced and influenced by intervening urban

ctual visibility reduced by intervening forestry.

ient rather than static nature of viewers. Operational and similar part of views. Foreground screening and influence pe features within the intervening area.

n 14.7 km. Limited actual opportunity for views towards the properties and planting.
have also been included in the mapping and cumulative wirelines. Cumulative Windfarms are shown in Figure 6.12. A cut-off date of 3 months prior to submission for single turbines and 6 months for windfarms was requested by CCGC, in respect of the collation of cumulative data. The final update of both sets of data was carried out in May 2019, 2 months prior to the anticipated submission date in July 2019. Design Parameters

The LVIA has been based on a turbine with a maximum tip height of 137 m and a maximum rotor diameter of 120 m. These turbine dimensions have been selected from a list of potential candidate turbines following consideration of what a worst-case scenario would be in relation to landscape and visual effects. It has been assessed that the largest rotor diameter on a 137 m high turbine would have the greatest effect due to its scale.

6.4 Baseline Survey Methodology

- The assessment was initiated through a desk study of the Site and 30 km radius Study Area. This study has identified aspects of the landscape and visual resource that would need to be considered in the landscape and visual assessment, including landscape-related planning designations, landscape character typology, and potential cumulative windfarms, routes (including roads, railway lines, National Cycle Routes and long distance walking routes), and settlements.
- The desk study has also utilised Geographic Information System (GIS) and Resoft Windfarm software to explore the potential visibility of the Development. The resultant ZTV diagrams (Figures 6.6 to 6.11) and wirelines used in the field have provided an indication of which landscape and visual receptors are likely to be key sensitivities in the assessment. Figure 6.11 illustrates the difference in the extent of the theoretical visibility of the Operational Rigged Hill Windfarm compared to the theoretical visibility of the Development, illustrating the limited increase which the Development would give rise to.
- Field surveys have been carried out throughout the 30 km radius Study Area, although the focus has been on the Site and those areas that are shown on ZTVs to gain theoretical visibility of the Development. The baseline field survey has four broad stages:
 - A preliminary familiarisation around the Study Area in order to visit landscape and visual receptors that have been identified through the desk study and verify their existence and importance. Important features and characteristics that have not become apparent through the desk study are also identified, and particularly sensitive receptors have been noted in order to inform the design process;
 - A visit in the vicinity of the Site, in order to establish the potential of the Site for windfarm development and identify the most suitable areas for development in landscape and visual terms, along with any constraints that may restrict the developable area;
 - Further field survey around the Study Area, concurrent with the design process for the Development, to identify those receptors that are likely to be important in the assessment and inform the layout design, possible turbine height, and the extent of the Development; and
 - The identification of representative viewpoints to include in the landscape and visual assessment, including a wide range of visual receptors and landscape receptors as well as directions and distances from the Development.
- The taking of baseline photography for the viewpoints has been undertaken in accordance with SNH's Visual Representation of Windfarms: Version 2.2.

6.4.1 Methodology for the Assessment of Effects

- The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect. The full methodology for the assessment of effects is presented in Technical Appendix A6.1. The assessment has been carried out with Operational Rigged Hill Windfarm considered as an established part of the baseline, with the assessment of sensitivity, magnitude of change and significance, for each receptor, assessed against this baseline.
- OPEN's LVIA methodology accords with the guidance set out in the GLVIA3. Where it diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is as follows:
- GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are 20. combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. This approach is to be applied in respect of both landscape and visual receptors with reference made in paragraphs 5.48, 5.50-5.52, 6.38 and 6.40-6.41 of GLVIA3.

- OPEN considers that the process of combining all three considerations in one rating can distort the aim of identifying significant effects in respect of large scale developments. For example, an increased magnitude of change, based on size or scale and geographical extent, may be reduced to a lower rating if it occurs for a short duration. This might mean that a potentially significant effect would be overlooked if impacts are diluted down due to their limited duration or reversibility. Conversely, a magnitude of change rating may be increased to a higher level if for a longer duration and may lead to a significant effect despite the size or scale and geographical extent of the impact being relatively small.
- OPEN has chosen to keep the consideration of duration and reversibility separate, by basing the magnitude of change on size 22 or scale and geographical extent to determine where significant and not significant effects occur, and then describing their duration and reversibility separately.
- The significance of the potential effects of the Development has been classified through professional judgement of the sensitivity of the receptor and the magnitude of the potential effect.

6.4.1.1 Categories of Landscape and Visual Effects

- The LVIA is intended to determine the effects that the Development would have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into four categories:
- Physical effects: physical effects are restricted to the area within the Site and are the direct effects on the existing fabric of the Site. This category of effects is made up of landscape elements, which are the components of the landscape such as rough grassland and moorland that may be directly and physically affected by the Development.
- Effects on landscape character: landscape character is the distinct and recognisable pattern of elements that occurs 26. consistently in a particular type of landscape and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements or through visibility of the Development that may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors, which fall into two groups; landscape character areas and landscape-related designated areas.
- Effects on views: the assessment of the effects on views is an assessment of how the introduction of the Development would affect views throughout the Study Area. The assessment of effects on views is carried out in two parts:
 - An assessment of the effects that the Development would have on a series of viewpoints around the Study Area; and
 - relevant key settlements and routes found throughout the Study Area.
- Cumulative effects: cumulative effects arise where the Study Areas for two or more windfarms overlap so that both of the 28 windfarms are experienced at a proximity where they may have a greater incremental effect, or where windfarms may combine to have a sequential effect. In accordance with guidance, the LVIA assesses the effect arising from the addition of the Development to the cumulative situation.

6.4.1.2 Assessment of Effects

- The objective of the assessment of the Development is to predict the likely significant effects on the landscape and visual resource. In accordance with planning regulations, the LVIA effects are assessed to be either significant or not significant. The LVIA does not define intermediate levels of significance as the regulations do not provide for these.
- The previous section of this chapter describes how the LVIA is carried out in four categories: the assessment of physical effects; the assessment of effects on landscape character; the assessment of effects on views; and the assessment of cumulative effects. The broad principles used in the assessment of significance of these categories are the same and are described below.
- 31. The significance of effects is assessed through a combination of two considerations: the sensitivity of the landscape or visual receptor and the magnitude of change that would result from the addition of the Development.
- The LVIA would follow the OPEN methodology devised specifically for the assessment of windfarm developments and generally accords with 'GLVIA3.

An assessment of the effects that the Development would have on views from principal visual receptors, which are

6.4.1.3 Sensitivity

- The sensitivity of a landscape or visual receptor is determined by a combination of the value of the receptor and the susceptibility of the receptor to the change that the Development would have on the landscape character or the view.
- The sensitivity of the landscape or visual receptor is evaluated as high, medium-high, medium, medium-low or low by 34 combining the value of the receptor and its susceptibility to change. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor.
- The criteria used to assess value and susceptibility in respect of landscape and visual receptors differs slightly as described 35 below.

6.4.1.3.1 Value

- The value of a landscape character receptor is determined through its importance in terms of any designations that may apply as well as its scenic quality, sense of place, rarity and representativeness. The value is also determined by the experience of the landscape in relation to perceptual responses, cultural associations, its iconic status, its recreational value, and the contribution of other values such as nature conservation or archaeology.
- The value of a view is a reflection of the recognition and importance attached either formally through identification on mapping 37. or being subject to planning designations, or informally through the value which society attaches to the view(s).
- The value of the landscape or visual receptor is evaluated as high, medium-high, medium, medium-low or low. The basis for 38. the assessments is made clear using evidence and professional judgement in the evaluation of each receptor.

6.4.1.3.2 Susceptibility

- Susceptibility relates to the ability of the landscape or visual receptor to accommodate the changes that would occur as a 39. result of the addition of the Development to the baseline situation.
- In respect of landscape receptors, considerations include the specific nature of the Development, e.g. its size, scale, location, 40. context and characteristics; the degree to which the receptor may accommodate the influence of the Development; and the extent to which it would influence the character of the landscape receptors across the 30 km Study Area.
- In respect of visual receptors, considerations include the nature of the viewer experiencing the view and how susceptible they 41. are to the potential effects of the Development. Professional judgement is used based on the occupation or activity which viewers are engaged in at the viewpoint or series of viewpoints. The principal visual characteristics, e.g. those features which define the view, and the viewer's experience of the visual receptor in relation to the extent to which their focus is directed towards the view, the duration and clarity of the view and whether it is a static or transitory view, is also considered
- The susceptibility of the landscape or visual receptor is evaluated as high, medium-high, medium, medium-low or low. The 42. basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor.

6.4.1.4 Magnitude of Change

The magnitude of change, in respect of the LVIA, differs in respect of landscape and visual receptors. The differences are set out below.

6.4.1.4.1 Landscape Receptors Magnitude of Change

- The magnitude of change on landscape character receptors is an expression of the scale of the change that would result from the Development, and is dependent on variables relating to the size or scale of the change, and its geographical extent.
- The basis for the appraised level is made clear using evidence and professional judgement, based on the following criteria: 45.
 - The extent of existing landscape elements that would be lost and their ability to be reinstated, the proportion of the total this represents as well as the contribution of that element to the character of the landscape;
 - The degree to which the pattern of elements that makes up the landscape character would be altered by the Development, i.e. by removal or addition of elements in the landscape;
 - The extent to which the effects change the key characteristics of the landscape as identified in the baseline study, which may be critical to the distinctive character of the landscape;

- The distance between the landscape character receptor and the Development. Generally, the greater the distance, the lower the scale of change; and
- The proportion of the Development that would be seen.
- Intermediate levels may also be included such as medium-high or medium-low, where the change falls between the definitions.

6.4.1.4.2 Visual Magnitude of Change

- The magnitude of change to views is made clear using evidence and professional judgement, based on the following criteria:
 - The distance between the visual receptor and the Development. Generally, the greater the distance, the lower the magnitude of effect;
 - the landscape, the existing land use and vegetation cover, and the type and form of development seen in the baseline view would all be relevant:
 - The extent of the Development that would be seen. Visibility of the Development may range from the full height of the turbines to just the upper parts;
 - The position of the Development in relation to the principal orientation of the receptor. If the Development is seen in a specific, directional vista from a receptor the magnitude of effect would generally be greater; and
 - a view that is affected, the higher the magnitude of effect.
- Intermediate levels may also be included such as medium-high or medium-low, where the change falls between the 48. definitions

6.4.1.4.3 Cumulative Magnitude of Change

- The cumulative magnitude of change is an expression of the degree to which landscape character receptors and visual receptors would be changed by the replacement of Operational Rigged Hill Windfarm with the Development in the context of other schemes that are already operational or proposed. The main assessment considers the effects of the Development in addition to a number of operational or under construction windfarms within the close to medium range and therefore the following criteria are taken into account in the main assessment as well as the cumulative assessment:
 - The location of the Development in relation to other developments. If the Development is seen in a part of the view that is not affected by another development, this would generally increase the cumulative magnitude of change as it would the context of other developments, or as a replacement to an existing development, then the cumulative magnitude of change may be lower as it is not extending development to undeveloped parts of the outlook. This is particularly true where the scale and layout of the Development is similar to that of the other sites, as where there is a high level of integration and cohesion with an existing site, the various developments may appear as a single site.
 - The extent of the developed skyline. If the Development would add notably to the developed skyline in a view, the both views and landscape receptors.
 - separate developments that are visible, the higher the cumulative magnitude of change would be. The addition of the Development to a view where a greater number of smaller developments are apparent would usually have a higher cumulative magnitude of change than a view of one or two large developments, as this can lead to the impression of a less co-ordinated or strategic approach.
 - The scale comparison between developments. If the Development is of a similar scale to other visible developments, have more integration with the other sites and would be less apparent as an addition to the cumulative situation.
 - the Development is likely to be lower if its turbine height, arrangement and layout design are broadly similar to other landscape.

The scale and character of the context within which the Development would be seen. This would determine the degree to which the Development can be accommodated in the existing outlook. The scale of the landform/buildings, the patterns of

• The width of the view available and the proportion of the view that is affected by the Development. Generally, the more of

extend the influence of development into an area that is currently unaffected. Conversely, if the Development is seen in

cumulative magnitude of change would tend to be higher, as the appearance of the skyline has a particular influence on

The number and scale of developments seen simultaneously or sequentially. Generally, the greater the number of clearly

particularly those seen in closest proximity to it, the cumulative magnitude of change would generally be lower, as it would The consistency of image of the Development in relation to other developments. The cumulative magnitude of change of developments in the landscape, as they are more likely to appear as relatively simple and consistent components of the

- The context in which the developments are seen. If developments are seen in a similar landscape context, the cumulative magnitude of change is likely to be lower due to visual integration and cohesion between the sites. If developments are seen in a variety of different landscape settings, this can lead to a perception that development is unplanned and uncoordinated, affecting a wide range of landscape characters.
- The distance of the Development from the viewpoint or receptor. As in the assessment of the Development itself, the greater the distance, the lower the cumulative magnitude of change would tend to be.
- The magnitude of change of the Development as assessed in the main assessment. The lower this is assessed to be, the lower the cumulative magnitude of change is likely to be. Where the Development itself is assessed to have a negligible magnitude of change on a view or receptor there would not be a cumulative impact as the contribution of the Development would equate to the 'no change' situation.

6.4.1.5 Assessment of Significance

Table 6.2: Significance Matrix

The significance of effects is assessed through a combination of the sensitivity of the landscape or visual receptor, and the magnitude of change that would result from the addition of the Development. While OPEN's methodology is not reliant on the use of a matrix to arrive at the conclusion of a significant or not significant effect, a matrix is included below in Table 6.3 to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. The matrix also gives an understanding of the threshold at which significant effects may arise.

Magnitude Sensitivity	High	Medium-High	Medium	Medium-Low	Low	Negligible	
High	Significant	Significant	Significant	Significant / Not Significant	Not Significant	Not Significant	
Medium-High	Significant	Significant	Significant / Not Significant	Significant / Not Significant	Not Significant	Not Significant	
Medium	Significant	Significant / Not Significant	Significant / Not Significant	Not Significant	Not Significant	Not Significant	
Medium-Low	Significant / Not Significant	Significant / Not Significant	Not Significant	Not significant	Not Significant	Not Significant	
Low	Significant / Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	

- Effects within the green boxes in the matrix are considered to be significant in terms of the EIA Regulations. Effects within the 51. light grey boxes may be significant or not significant, depending on the specific relevant factors that arise at a particular landscape or visual receptor. Effects in the white boxes are considered not significant. In accordance with GLVIA3, experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings of each case.
- The geographic extent over which the landscape and visual effects would be experienced is also assessed, which is distinct 52. from the size or scale of effect. This evaluation is not combined in the assessment of the level of magnitude but instead is used in determining the extent in which a particular magnitude of change is experienced and the extent of the significant and non-significant effects. The extent of the effects would vary depending on the specific nature of the development proposed and is principally assessed through analysis of the geographical extent of visibility of the Development across the visual receptor.
- The extent of effects on views is based on the following factors: 53.
 - The extent of a receptor (a road, footpath or settlement, for example) from which the Development may be seen; and
 - The extent to which the change would affect views, whether this is unique to a particular viewpoint or if similar visual changes occur over a wider area represented by the viewpoint.
- The duration and reversibility of effects on views are defined based on the period over which the Development is likely to exist 54. and the extent to which the Development can be removed with consideration given to the whether its effects can be reversed.

Duration and reversibility are not incorporated into the overall magnitude of change, and may be stated separately in relation to the assessed effects.

- GLVIA3 defines 'significance' as "a measure of the importance or gravity of the environmental effect, defined by significance 55. criteria specific to the environmental topic" (GLVIA3 glossary). It does not define what may constitute a 'significant' effect or provide thresholds that indicate where effects would become significant rather than not significant, but states that "there are no hard and fast rules about what effects should be deemed 'significant'" (paragraph 3.32). This is further expanded upon in paragraph 5.54 (in relation to landscape effects), which states that "significance can only be defined in relation to each Development and its specific location. It is for each assessment to determine how the judgements about the landscape receptors and landscape effects should be combined to arrive at significance and to explain how the conclusions have been derived".
- GLVIA3 also states that the assessment of significance is "an evidence-based process combined with professional judgement" 56. (paragraph 3.23). Professional judgement is, as acknowledged in GLVIA3, a very important aspect of LVIA, and it is important to remember that "even with qualified and experienced professionals there can be differences in the judgements made. This may result from using different approaches or different criteria, or from a variation in judgements based on the same approach and criteria" (GLVIA3 paragraph 2.25).
- In OPEN's methodology, a significant effect occurs where the Development would provide a defining influence on a landscape 57. element, landscape character receptor or view. A not significant effect occurs where the effect of the Development is not material, and the baseline characteristics of the landscape element, landscape character receptor, view or visual receptor continue to provide the definitive influence. In this instance, the Development may have an influence but this influence would not be definitive. Significant cumulative landscape and visual effects arise where the addition of the Development to other windfarms leads to windfarms becoming a prevailing landscape and visual characteristic.
- It is important to remember that the assessment of significance in LVIA terms, as required by The Planning (Environmental 58. Impact Assessment) Regulations (Northern Ireland) 2017 and set out in GLVIA3, does not provide any indication of the 'acceptability' of the Development, and that the occurrence of significant effects does not in any way imply that a Development would be 'unacceptable'. As stated in GLVIA3 (page 153), the LVIA text should "be impartial and dispassionate, presenting information and reasoning accurately and in a balanced way, and making clear where statements are based on the author's judgement."
- It is widely acknowledged that commercial-scale windfarm development would almost inevitably give rise to effects that are assessed as being significant in EIA terms, and this does not render this type of development unacceptable. Planning Policy Statement 18 acknowledges the nature of landscape and visual effects of windfarms (paragraph 4.14), stating that "of all renewable technologies, wind turbines are likely to have the greatest visual and landscape effects" and that "the Department recognises that the impact of turbines on the landscape will vary according to the size and number of turbines and the type of landscape involved, and that some of these impacts may be temporary if conditions are attached to planning permissions which require the future decommissioning of turbines." Operational Rigged Hill Windfarm has been present in this landscape for nearly 25 years, with consent to operate in perpetuity.

6.4.1.6 Nature of Effects

- The 'nature of effects' relates to whether the effects of the Development are positive, neutral or negative. Guidance provided in GLVIA3 states that "thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity", but does not provide an indication as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and reasoned professional opinion.
- In relation to many forms of Development, the ES would identify positive or negative effects under the term nature of effect. 61. The landscape and visual effects of windfarms are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which these effects can be measured as being categorically beneficial or adverse. For example, in disciplines such as noise or ecology it is possible to identify the nature of the effect of a windfarm by objectively quantifying its effect and assessing the nature of that effect in prescriptive terms. However, this is not the case with landscape and visual effects, where the approach combines quantitative and qualitative assessment.
- OPEN defines positive, neutral and negative effects as follows: 62

- Positive effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The removal of undesirable existing elements or characteristics can also be positive, as can their replacement with more appropriate components;
- Neutral effects occur where the Development neither contributes to nor detracts from the landscape and visual resource and is accommodated with neither positive nor negative effects, or where the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation; and
- Negative effects are those that detract from or weaken the landscape and visual resource through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.
- OPEN generally adopts a precautionary approach which assumes that significant landscape and visual effects would be weighed on the negative side of the planning balance, although positive or neutral effects may arise in certain situations.

6.4.1.7 Duration and Reversibility of Effects

- The effects of the Development are of variable duration, and are assessed as either short-term or long-term and permanent or reversible. The turbines, meteorological mast, Site access tracks, substation and Energy Storage Unit would be present for the operational life, and these effects are considered to be permanent, but reversible upon decommissioning.
- Other infrastructure and operations such as the decommissioning and construction processes and plant, (including tall cranes 65. for turbine erection) and construction compounds would be apparent only during the initial decommissioning and construction period of the Development and are considered to be short-term effects.
- The reversibility of effects is variable. The most apparent effects on the landscape and visual resource, which arise from the 66. presence of the turbines, are reversible as the turbines can be removed, as can the substation and meteorological mast. The effects of the tall cranes and heavy machinery used during the decommissioning and construction periods are also reversible.
- The access tracks for the Operational Rigged Hill Windfarm would be reused as far as possible, or would otherwise be 67. regraded and reinstated with local vegetation. It has been assumed that turbine foundations and underground cabling would in most cases be left in-situ below ground with no residual landscape and visual effects Detail on the decommissioning of Operational Rigged Hill Windfarm and construction of the Development is set out in Chapter 3 Development Description. Some areas will require bespoke consideration, and will be driven by the Outline DCEMP, and the requirements set out in the Draft HMP which are presented in Technical Appendix TA3.1 and TA3.2 respectively.

6.4.2 Assessment Limitations

Photographs and other graphic material such as wirelines and photomontages used in the assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what would be apparent to the human eye. The assessment itself is carried out from observations in the field and therefore may include elements that are not visible in the photographs. A particularly pertinent example of this is that the Rigged Hill operational wind turbines are often more apparent in the field than they are in photographs or prints.

6.4.2.1 Zone of Theoretical Visibility (ZTV)

There are limitations in the theoretical production of ZTVs, and these should be borne in mind in their consideration and use:

- Ordnance Survey (OS) Northern Ireland and OS Ireland 10 m Digital Terrain Model (DTM) has been used to generate the ZTV's. The analysis is based on visibility at points on a 10 m grid and does not take into account local, small-scale landform changes in analysing theoretical visibility.
- The ZTVs illustrate the 'bare ground' situation, and do not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility;
- The ZTVs do not indicate the decrease in visibility that occurs with increased distance from the Development. The nature of what is visible from 3 km away would differ markedly from what is visible from 10 km away, although both are indicated on the ZTVs as having the same level of visibility; and
- It is important to remember that there is a wide range of variation within the visibility shown on the ZTV. For example, an area shown on the blade tip ZTV as having visibility of all of the turbines may gain views of the smallest extremity of blade tips, or of full turbines. This can make a considerable difference in the effects of the Development on that area.

These limitations mean that while the ZTVs are used as a starting point in the assessment, providing an indication of where the Development would theoretically be visible, the information drawn from the ZTVs is not completely relied upon to accurately represent visibility of the Development.

6.4.2.2 Visualisations

- productions, and these should be borne in mind in the consideration and use of the wireline images. Firstly, the wireline illustrates the 'bare ground' situation, not taking into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility. Secondly, the wireline is based on OS 10 m DTM, so there may be local, smallscale landform variations that are not reflected in the wireline but may alter the actual visibility of the proposed development, either by screening theoretical visibility or revealing parts of the proposed development that are not theoretically visible. Thirdly planning conditions are likely to allow the locations of the turbines to be horizontally micro-sited by up to 50 m and the levels of the turbine bases have not yet been established in detail as this would be determined through site investigations and engineering design. Both of these factors may alter the base and therefore the tip heights of the turbines above ground level from those that are assumed in the assessment and shown in figures. Such variation may also affect ZTVs to a minor degree.
- Where descriptions within the assessment identify the numbers of turbines visible, this refers to the theoretical wireline 72 illustrations generated and therefore the reality may differ to a degree from these illustrations. These factors are unlikely to make a material difference to the outcome of the assessment.
- Not all parts of the 30 km Study Area are publicly accessible and this has limited the specific assessment of views from 73. residential and other properties. Not all parts of the Study Area have been visited due to time and accessibility constraints. Notwithstanding these limitations, the assessors consider that there is sufficient information available, from publicly accessible viewpoints, to form a competent assessment of the likely landscape and visual amenity effects.

6.5 **Baseline Description** 6.5.1 Site

- The Operational Rigged Hill Windfarm occupies the summit of Rigged Hill (377 m AOD), which takes the form of a north south 74. running ridge. The operational turbines and tracks form part of the baseline conditions considered in the assessment. This includes 10 Nordtank turbines of a 39 m hub height, 37 m rotor diameter and 57 m blade tip height, which have been operational since 1994. The existing windfarm access track approaches the turbines from the B66 to the north, passing through the forest to the east of Boyds Mountain.
- The land cover of the Site consists of rough unimproved grasses, giving the upper elevations of the hill an open moorland 75. character. Hill sheep farming is the principle land use, alongside the generation of renewable energy. The lower slopes comprise improved fields of pasture grazed by sheep and cattle. Other developments on the flatter western part of the Site include two large farmsteads with tracks leading to these from the minor roads.

6.5.2 Site Context

- The ridge of Rigged Hill is set between Temain Hill (376 m AOD) to the south and Boyd's Mountain (329 m AOD) to the north. Donald's Hill (399m AOD) is located further south and is the most prominent of the hills on this upland area due to its distinctive landform, whilst Tibaran Mountain (303 m AOD) extends the upland area further to the east. The western slopes of the upland rise steeply and relatively evenly from the pastoral low-lying area to the west with the steepest of these forming the western flank of Donald's Hill. The rising land has dictated a transition in land-use and landscape pattern from small pastoral/arable fields in the low-lying areas to larger pastures extending up the hill slopes and becoming gradually less fertile. The upper grass moorland areas have little in the way of subdivision. To the east of Rigged Hill, the slopes are gentler and less even.
- Beyond the Site, coniferous forestry covers large parts of the north-easterly upper slopes. There are two telecommunications 77. masts located near to Temain Hill and a minor road which passes over the upland. Open-cast guarrying is also a feature of this upland area.
- The land to the west and east of the Site is low lying. The River Roe runs in a south to north direction to the west, draining into 78. Lough Foyle. The River Bann runs broadly north to south in the east between Lough Neagh and the coast near Coleraine. The low-lying areas are generally settled with agricultural subdivision and scattered urban areas connected by numerous roads forming a fine network. The main roads through the area are the A2 between Derry / Londonderry, Limavady and Coleraine

The visualisations are based on theoretical visibility from 1.5 m above ground level. There are limitations in these theoretical

and along the coast to Ballycastle and the A6 between Derry / Londonderry and Antrim through the Sperrin Mountains. Emanating from Coleraine, there is also the A37 to Limavady, the A29 which extends north to the coast and south to Cookstown, the A54, which runs south to the A6 near Magherafelt and the A26 which runs south-east to Ballymena.

- A railway line runs along the coast from Derry / Londonderry to Coleraine and Portrush and southwards to Ballymena. 79
- The nearest large settlement is Limavady, which is located approximately 6.2 km west-north-west from the Development. 80. Coleraine and Macosquin are located approximately 13.2 and 10.5 km to the north-east respectively, whilst Garvagh is approximately 8.9 km to the south-east and Dungiven 11.3 km to the south-west. Derry / Londonderry lies to the west on the edge of the 30 km Study Area. The village of Drumsurn lies at a distance of approximately 3.5 km to the south-west, and Rigsend is approximately 4.5 km to the east-north-east. The historical land ownership pattern of this area is based on the land being divided into small plots. This has led to a dispersed settlement pattern, whereby individual dwellings occur frequently across the landscape in scattered farmsteads and residences with small clusters and ribbon development along the many roads.
- The Sperrin Mountains lie to the south and south-west of the Site, with moderately high ground extending northwards from the 81 Sperrin Mountains to Binevenagh Mountain in the north of the Study Area near the coast. The higher ground provides visual containment, skyline features and vantage points from which views over the wider area can be experienced. The land use pattern changes from a predominance of arable farmland to a predominance of commercial forestry and open moorland. The forestry encloses large parts of this landscape such that there is little inter-visibility or association between one area and the next.
- The North Sperrins Scenic Route is located to the south of the Site and would obtain views towards it at distances of around 4 km at its closest point. There is a viewpoint at Legavannon Pot which looks in the direction of the Development. A further viewpoint and parking area is located further north on the B180.
- The Ulster Way Walking Route runs through the Operational Rigged Hill Windfarm and generally runs north to south through 83 the Study Area and then west to east through the Sperrins.
- The north-western part of the Study Area is formed by Lough Foyle with the Inishowen peninsula of the Republic of Ireland 84. (Rol) beyond.
- In addition to the influence of the Operational Rigged Hill Windfarm, the higher areas of land to the west and north of the Development are characterised by large scale windfarm development. Two further windfarms are under construction to the south and a further four new windfarms and one extension have been consented to the east, south-east and south of the Site. Also, within the lower lying areas there are numerous moderately large single turbines and other smaller turbines often associated with farmsteads, industry or domestic dwellings.

6.5.3 Landscape Character

- Policy RG11 of the Regional Development Strategy²² notes the importance of landscape character in planning:
- "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."
- Landscape character information is based on the landscape character areas (LCAs) that are described in the Supplementary 88. Planning Guidance (SPG) document entitled 'Wind Energy Development in Northern Ireland's Landscapes^{23'}. This 2010 report

in turn draws from the LCAs that were originally identified in The Northern Ireland Landscape Character Assessment (NILCA) 2000²⁴. The Northern Ireland landscape was subdivided into 130 different landscape character areas, each with a distinctive character. Causeway Coast and Glens Borough Council comprises 24 Landscape Character Areas (LCAs), some of these are shared with neighbouring districts. The NILCA also identifies Areas of Scenic Quality which represent a second tier (below AONBs) in the hierarchy of landscape classifications.

- The lower Bann Valley is the only Area of Scenic Quality within the 30 km Study Area, and this has been incorporated into the 89 Binevenagh AONB.
- The Northern Ireland Environment Agency prepared and signed Northern Ireland's Landscape Charter²⁵ in 2014 in response 90. to the European Landscape Convention²⁶. It advises the following:
- 'The European Landscape Convention is not just about designating special landscapes but putting a value on people's 91. perception of place: where they live, work and enjoy themselves.
- Today, doing nothing is no longer an option. This Landscape Charter calls on us to act. The pace of change in our landscape can be gradual and incremental or increasingly sudden and dramatic, accelerated by new technologies. In order to value the asset that is our landscape, built or natural, we must understand both the value of the asset and the forces for change so that we can make informed decisions. This would be even more important after April 2015 when these decisions would be made by new councils with new spatial planning powers under the Review of Public Administration.
- 93. As our first commitment to the Northern Ireland Landscape Charter, the Northern Ireland Environment Agency shall be renewing the Landscape Character Assessment for Northern Ireland in time for this change in local governance and in line with best practice elsewhere in the United Kingdom.'
- In 2015 the Northern Ireland Regional Landscape Character Assessment²⁷ (NIRLCA) was prepared for the Northern Ireland Environment Agency by LUC in association with Mullin Design Associates and Julie Martin Associates. A final version of the Background Report is dated 9 July 2015. The information presented consists of a Background Report and web-based mapping and viewer. It has been issued in this way to reflect the dynamic nature of the landscape and it is proposed that it would be updated as the landscape evolves.
- The NIRLCA 'provides a strategic overview of the landscape, which can be complemented by more detailed local studies in 95. future'. In relation to the earlier NILCA it states that:
- "there has been a substantial phase of building and other development in both urban and rural areas of Northern Ireland since its publication, such as housing or renewable energy, which has affected the character of many of our landscapes. The purpose of the NIRLCA is not to replace, but to complement, the earlier NILCA 2000, though further work to update and it is intended that the strategic view supplied by the NIRLCA would be complemented by more detailed landscape character assessment at a local scale.
- This finer grained layer of assessment should pick up more local issues and would inform local planning, where the NIRLCA meshes with regional planning. It is essential that future local assessments are carried out in a systematic and consistent way across all of Northern Ireland's new local authority areas, and NIEA would actively encourage this process. Until the new local assessments are in place, the earlier Northern Ireland Landscape Character Assessment 2000 (NILCA), comprising 130character areas, would continue to be applied."
- At the time of writing this LVIA (early 2019) there have been no further 'finer grained' landscape character assessments undertaken to inform local planning and therefore the NILCA forms the basis of the baseline landscape characterisation. However, the character descriptions have also been informed by the descriptions contained in the NIRLCA web-based viewer, providing an update to the local character. This is the approach that was agreed through the scoping process.

²² Department for Regional Development (2010). Regional Development Strategy 2035

²³ NIEA (2010). Wind Energy Development in Northern Ireland's Landscapes Supplementary Planning Guidance to Accompany Planning Policy Statement 18 'Renewable Energy'

²⁴ Department of the Environment (2000). Northern Ireland Landscape Character Assessment 2000.

²⁵ Northern Ireland Environment Agency (2014). Northern Ireland's Landscape Charter.

²⁶ Council of Europe (2000). European Landscape Convention. ²⁷ LUC in association with Mullin Design Associates and Julie Martin Associates on behalf of Northern Ireland Environment Agency (2015) Northern Ireland Regional Landscape Character Assessment. https://daerani.maps.arcgis.com/apps/MapJournal/index.html?appid=dee491ff43c0415fbb986f74c92f39a9.

- In 2018 the Causeway Coast and Glens Borough Council published its Local Development Plan 2030 Preferred Options Paper, Discussion Paper 4: Landscape Character²⁸. It sets out the history and relevance of landscape characterisation within Northern Ireland since 2000. It references the Consultation Draft version of the NIRLCA dated April 2015 and states that:
- 'The aim of the NIRLCA is provide information which can be used by planners, developers and the public. The Assessment would provide an evidence base to make informed decisions about the management of Northern Ireland's Landscapes."
- However, it also acknowledges that 'The NIRLCA acts on a strategic level and advises that it can be complemented by more detailed local studies in the future'.
- Therefore, although this Paper has been published since the scoping process was undertaken it is considered that the agreed 102. approach remains appropriate to the scale of windfarm development and planning.
- The LCAs that cover the Study Area shown in relation to the ZTV in Figure 6.6b and 6.8. Through the Scoping process it has been agreed that no significant effects on landscape character would arise beyond a 15 km radius from the Development. In addition, it was agreed that the effects on the Magilligan Lowlands, Garvagh Farmland, Loughermore Hills, Lough Foyle Alluvial Plain, Lower Bann Floodplain, Coleraine Farmland, Sperrin Foothills; Sperrin Mountains and Lower Bann Valley LCAs can be scoped out of the LVIA for the same reason.
- The landscape of the area is characterised by north to south running swathes of broadly similar landscapes following the pattern of the landform and valley structure. There are some pockets of differing character and a transition into different areas as one moves from north to south through changes in elevation.
- The immediate landscape setting of the Development and the wider area to the north, east and south is covered by the 105. Binevenagh LCA which is a north to south running area that runs from the coast in the north to near the Glenshane Pass in the south.
- The Key Landscape and Visual Characteristics and Values are identified in SPG²⁹. In relation to windfarm development the document advises that the overall sensitivity is "High to medium" and provides the following advice:

"Much of this landscape is of extreme sensitivity due to its iconic, landmark character and very wide visibility. However lower and less prominent sections of the escarpment, and areas where there is extensive forestry, might be somewhat less sensitive to wind energy development."

- The Site is located within this lower, less prominent section of the escarpment where there is also extensive forestry cover.
- In relation to the location, siting, layout and design considerations the following information is provided: 108.

"The relatively large scale and strong horizontal form of the escarpment means that certain locations in this LCA may be well suited to wind energy developments. The lower central section of the LCA may be better suited to wind energy development in landscape and visual terms than other areas. Siting in association with forestry may be beneficial.

Care should be used to avoid adverse impacts on the extremely sensitive northern or southern ends of the escarpment. Particular care should be taken 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.

At the time of assessment there was one operational wind farm in this LCA, at Rigged Hill (10 turbines of 60m). In addition there were operational and consented wind farms at Altahullion (total 24 turbines) around 15km south-west of Rigged Hill. Further wind energy development (unless closely associated with existing sites) could give rise to issues of cumulative impact. Transboundary wind farms in County Donegal are 30km or more away and unlikely to give rise to major landscape issues here. There may be seaward issues to consider in future."

- These considerations indicate that the Development, which is clearly associated with an existing wind energy development site, is located on the lower central section of the LCA and is associated with adjacent forested areas may be better suited to wind energy development in landscape and visual terms than other areas. It is also sited within a landscape that is described as being 'relatively large scale and strong horizontal form of the escarpment' which are characteristics that tend to indicate increased capacity to accommodate wind farm development.
- To the east of the Binevenagh LCA is the Eastern Binevenagh Slopes LCA with the Glenshane slopes LCA extending further to the south. These are transitional areas between the higher moorland/forestry and the lower more settled land to the east. The eastern part of the Study Area, lying within 15 km of the Development and beyond, is covered by the more settled, agricultural and populated landscape of the Coleraine Farmland LCA in the north and the less settled Garvagh Farmland further south. The LCAs of the Lower Bann Floodplain and Lower Bann Valley sit to the south and east of these respectively. They are relatively flat with linear roads through them and ribbon development in the south with a more dispersed settlement pattern in the north within the Floodplain.
- The lower lying area to the west of the Binevenagh LCA is the Roe Basin LCA, which also forms part of the immediate landscape setting for the Development (within 2 km). This is a broad, predominately agricultural valley with some larger settlements. The SPG23 notes that the " LCA is strongly influenced by prominent west-facing skylines of basalt escarpment, notably at Binevenagh, Keady Mountain, Donald's Hill and Benbradagh and by Sperrin Mountain tops south of Dungiven. Important internal skyline south of Limavady where land rises to over 100m. Setting of Limavady includes deep wooded section of River Roe while Dungiven is surrounded by attractive glens that also form the setting to the Sperrin AONB."
- Further west from north to south are the Loughmore Hills, the Sperrin Foothills and the Sperrin Mountains LCAs. These 112. elevated areas provide containment and enclosure to the Roe Basin to the east and the further areas beyond.
- 113.
- Detailed descriptions of the baseline landscape character of receptors to be included in the assessment are included alongside the assessment of effects in Section 6.7.4 of the LVIA.

6.5.4 Landscape Planning Designations

115. include Areas of Outstanding Natural Beauty (AONBs) and Historic Parks, Gardens and Demesnes included in the RPGDSHI³⁰ as a RS or SS. These are shown in Figure 6.4 and are as set out below. Figures 6.9 and 6.6b illustrate the Landscape Planning Designations with ZTV. Detailed descriptions of the baseline landscape character of the landscape planning designations to be included in the assessment are included alongside the assessment of effects in Section 6.6.

6.5.4.1 Areas of Outstanding Natural Beauty (AONB)

- 116. in the LVIA:
 - Binevenagh AONB
 - Sperrin AONB
- Causeway Coast lies at a greater distance of 22.1 km to the north-east. The Sperrin AONB covers an extensive upland area that spans across much of the south-western part of the Study Area. The Binevenagh AONB is smaller and covers an upland area that is strongly associated with the coast and Lough Foyle.
- The AONB designation aims to protect and enhance the landscape quality of the area as well as to promote enjoyment of the landscape by the general public. Whilst views from these locations would be of heightened sensitivity, windfarm development has not been prohibited from occurring within AONBs in Northern Ireland. Operational windfarms are located in both of these AONBs.

Policy Statement 18 'Renewable Energy'.

The coastal landscape around Lough Foyle is covered by the Lough Foyle Alluvial Plain and the Magilligan Lowlands LCAs.

The Site does not lie within any landscape planning designations. The Landscape Designations which occur in the Study Area

It has been agreed with consultees through the Scoping process that the effects on the following AONBs should be assessed

The Development lies between the Sperrin AONB to the south (5.8 km) and Binevenagh AONB in the north (2.2 km). The

³⁰ Department of the Environment Northern Ireland (revised 2007). Register of Parks, Gardens and Demesne of Special Historic Interest

²⁸ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030 Preferred Options Paper, Discussion Paper 4: Landscape Character

²⁹ NIEA (2010). Wind Energy Development in Northern Ireland's Landscapes Supplementary Planning Guidance to Accompany Planning

- The Site lies close to the southern boundary of the Binevenagh AONB, and this designation also covers part of the local landscape setting (between 2 km and 5 km from the nearest turbine), parts of the landscape setting (between 5 km and 15 km from the nearest turbine), and very limited parts of the broad landscape context (between 15 km and 30 km from the nearest turbine) to the north of the Development.
- 120. The Sperrin AONB lies to the south of the Site and covers part of the landscape setting and the broad landscape context.
- AONBs are designated by the Department of the Environment for Northern Ireland (DoENI) and are of national importance. The policy context for AONBs is described in 'Planning Policy Statement 2 Natural Heritage³¹', which states that AONBs are designated "primarily for their high landscape quality, wildlife importance and rich cultural and architectural heritage." Policy NH 6 is specifically worded for AONBs, and states that:

"Planning permission for new development within an Area of Outstanding Natural Beauty would only be granted where it is of an appropriate design, size and scale for the locality and all the following criteria are met:

- the siting and scale of the proposal is sympathetic to the special character of the Area of Outstanding Natural Beauty a) in general and of the particular locality: and
- it respects or conserves features (including buildings and other man-made features) of importance to the character, b) appearance or heritage of the landscape; and
- the proposal respects: C)
 - local architectural styles and patterns;
 - traditional boundary details, by retaining features such as hedges, walls, trees and gates;
 - and local materials, design and colour."
- Explanatory text for this policy goes on to say the following:

"This policy requires development proposals in Areas of Outstanding Natural Beauty (AONB) to be sensitive to the distinctive special character of the area and the quality of their landscape, heritage and wildlife.

The quality, character and heritage value of the landscape of an AONB lies in their tranquillity, cultural associations, distinctiveness, conservation interest, visual appeal and amenity value."

- In assessing proposals, account would be taken of the Landscape Character Assessments and any other published guidance such as countryside assessments produced as part of the development plan process, as well as AONB Management Plans and local design guides.
- The above policy predates the adoption of the Strategic Planning Policy Statement (SPPS). The SPPS is the regional planning 124. policy document for Northern Ireland. The SPPS does not prohibit renewables development within AONBs, The SPPS espouses a cautious approach for renewable energy proposals within designated landscapes such as AONBs and World Heritage Sites.
- 125. It should be noted that the Development does not lie within an AONB and therefore only has potential to affect the character through its visibility from within any adjacent AONB. Despite the Development being located relatively close to the AONB boundaries, visibility of the turbines across the wider AONB areas (as shown on Figure 6.6b and 6.9) is restricted to the closer slopes facing towards the Development and higher landform beyond. In views from both of the AONBs, operational (or under construction) windfarms, located within the intervening areas, are seen at closer ranges. Figure 6.6b illustrates that much of the area that is shown to have theoretical visibility of the Development, also currently has visibility of the Operational Rigged Hill Windfarm, such that the extents of theoretical visibility would not notably increase.

6.5.4.2 Areas of High Scenic Value (AoHSV)

- These areas are designated through policies contained in the Derry Area Plan³² and the Magherafelt Area Plan³³. 126.
- 127. Around Derry / Londonderry the Area Plan identifies Areas of High Scenic Value on both banks of the Foyle north and south of the City and the Faughan Valley south east of Drumahoe to Burntollet Bridge. The policy which provides protection for these areas is ENV 1: Areas of High Scenic Value (AoHSV), which states that:

"Proposals for development which would adversely affect or change either the quality or character of the landscape within the Areas of High Scenic Value would not normally be permitted."

- 128. Areas of High Scenic Value within the Magherafelt area are designated on the West Lough Neagh Shores and the Slieve Gallion Slopes.
- Policy CON 1: Areas of High Scenic Value within the Magherafelt Area Plan provides the protection for these areas as follows: 129.

"Within designated Areas of High Scenic Value planning permission would not be granted to development proposals that would adversely affect the quality and character of the landscape. A Landscape Analysis must accompany development proposals in these areas to indicate the likely effects of the proposal on the landscape. Planting and retention of indigenous tree species must be an integral part of these proposals and the Site must be large enough to accommodate any mitigation measures identified. Where feasible the reuse of traditional buildings would be required."

This policy provides protection only from development proposals located within the AoHSV and not development occurring beyond its boundaries, therefore, these policies are not considered further.

6.5.4.3 Parks. Gardens and Demesnes

- The effects on visual amenity from publicly accessible Registered Sites (RS) and Supplementary Sites (SS) Historic Gardens 131 contained in the Register of Parks, Gardens and Demesnes of Special Historic Interest (2007) would be considered within the LVIA with the baseline description being alongside the assessment of effects contained in Section 6.7. The effects on the Parks, Gardens and Demesnes, as a cultural heritage asset, are assessed in Chapter 11: Archaeology and Cultural Heritage.
- 132. to the Development are Drenagh (or Fruithill), Roe Valley Park and Dog Leap. The RS and SS have been further considered in relation to distance, potential visibility and their potential for access by the public.
- All of the RS and SS lying beyond a 20 km range have been scoped out of the LVIA as agreed through the Scoping process. Within a 20 km radius Dog Leap is the only Registered or Supplementary Site that has been scoped in to the assessment.

6.5.5 Principal Visual Receptors

- A number of visual receptors such as settlements and travel routes will be considered in the assessment where they have not 134. been scoped out through consultation, as views from them may be affected by the Development. It is not possible to consider every potential visual receptor in the Study Area due to the extent of ground that it covers; therefore, the assessment concentrates on the 'principal' visual receptors that may gain visibility of the Development. Principal visual receptors are shown in relation to the ZTV on Figures 6.6b and Figure 6.10.
- More detailed descriptions of the receptors to be assessed in detail are contained alongside the assessment of effects in 135 Section 6.6.

6.5.5.1 Settlements

The settlements considered in this assessment are drawn from the Settlement Development Limits (SDLs) dataset as provided by the Northern Ireland Statistics and Research Agency (NISRA). SDLs are a statistical classification and

There are 12 RS and SS within 15 km of the Development and a further 29 in the 15 to 30 km range. The closest RS and SS

³¹ Department of the Environment Northern Ireland (2013) Planning Policy Statement 2 Natural Heritage. Available online at: https://www.planningni.gov.uk/index/policy/planning_statements/pps2.htm

³² Department of the Environment (2011). Derry Area Plan

Available online at: https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/derry2011-adopted-plan.pdf [Accessed on 10/07/2017]

³³ Department of the Environment (2015). Magherafelt Area Plan. Available online at: https://www.planningni.gov.uk/index/policy/development_plans/devplans_az/magherafelt_web2.pdf [Accessed on 10/07/2017]

delineation of settlements in Northern Ireland as defined by the Planning Service. SDL boundaries are available for settlements with a population of greater than 1,000; therefore, the settlements included in this assessment are generally those that have a population of over 1,000 people. These are shown on Figures 6.5 and 6.10.

- ^{137.} It has been agreed with consultees through the Scoping process that the following settlements should be assessed in the LVIA:
 - Drumsurn village;
 - Ringsend village;
 - Limavady;
 - Garvagh;
 - Dungiven;
 - Ballykelly;
 - Coleraine;
 - Kilrea;
 - Ballymoney; and
 - Port Stewart.

6.5.5.2 Routes

^{138.} Routes include roads, railway lines, national walking routes and national cycle routes. Routes included as principal visual receptors in the assessment are determined by four criteria:

- The proximity of the route to the Development;
- The extent to which the route traverses the Study Area or extends across a notable part of it;
- The importance of the route in terms of recognition, volume of users and usage; and
- The potential for the Development to contribute to cumulative effects along the route.

^{139.} It has been agreed with consultees through the Scoping process that the following route sections should be assessed in the LVIA as principal visual receptors:

- B66 (Limavady to Aghadowey);
- B64 (Dungiven to Garvagh);
- B68 (Limavady to Dungiven);
- B70 (Garvagh to Ringsend);
- The North Sperrins Scenic Driving Route;
- National Cycle Network routes and Links within 15 km radius; and
- The Ulster Way Long Distance Route.

^{140.} This list includes the closest and most sensitive routes to the Development where there is the greatest possibility of significant visual effects arising.

6.5.6 Viewpoints

Table 6.4 presents the list of viewpoints. These have been identified through reference to the ZTV with viewpoints shown in Figures 6.6a and b and have been agreed with the Council during pre-application discussions. In selecting viewpoints, a range of receptor types and distances has been sought. LVIAs for other windfarms in the area (Smulgedon and Glenconway) have also been reviewed in order to ascertain viewpoints that have been approved previously and that may also give rise to cumulative effects. Since Scoping a further viewpoint has also been added in order to illustrate the view from the B66 to the north of the Site (Viewpoint 19) and the locations of Viewpoints 5 and 8 have been re-sited to positions that better represent the visibility of the Development.

^{142.} Those viewpoints marked with an asterisk (*) are those considered to be most important in relation to the design of the Development layout since most represent static and/or close range receptors.

Table 6.4: Representative Viewpoints

No.	Viewpoint	Grid Reference		Distance (km) from Development Turbines	Representative
1*	Terrydoo Road (closest)	273397	420868	1.60	Representative of residents, pedestrians and road-users.
2*	Temain Road to Aghansillagh and Temain Hill	272999	419369	2.04	Representative of residents, pedestrians and road-users.
3*	Edenmore Road, Limavady	268900	421597	6.14	Representative of residents, pedestrians and road-users.
4*	Roe Park Resort driveway, Limavady	266793	421882	8.26	Representative of views from hotel and golf resort, pedestrians and road-users. Used in Smulgedon LVIA. Cumulative windfarms.
5*	Drumsurn, Beech Road	271934	417210	3.88	Representative of residents, pedestrians and provides a clear view aligned towards the Development. Cumulative windfarms.
6*	Ringsend	279888	422143	4.67	Representative of residents, road users. Cumulative windfarms.
7*	Glenullin Bog Viewpoint, Glenullin Resource Centre	280756	412824	8.48	Representative of residents, Glenullin resource Centre users, close to North Sperrins Scenic Route. Cumulative windfarms.
8	Magheramore Road, south-west of Garvagh	282978	413855	9.34	Scattered settlement residential receptors and road-users. Alternative to location on A29 south of Garvagh as no visibility of the Development from there or town itself. Cumulative windfarms.
9	Legavallon Road	270151	411067	9.69	Representative of residents, pedestrians and road-users on North Sperrins Scenic Route. Cumulative windfarms.
10	Benbradagh Mountain	272190	411328	8.57	Representative of hill top view in Sperrin AONB. Used in Smulgedon LVIA. Cumulative windfarms.
11*	Polly's Brae Road junction with B192	267353	418263	7.80	Representative of residents, pedestrians and road-users. Used in Smulgedon LVIA. Cumulative windfarms.
12	A2, north of Limavady	268001	426443	8.91	Representative of road-users. Used in Glenconway LVIA. Cumulative windfarms.
13	Binevenagh Mountain, minor road and NCR	270648	428765	8.95	Representative of road users, users of National Cycle Router. Visitors to Binevenagh AONB. Cumulative windfarms.
14	Wheatsheaf Road, Coleraine	283344	433021	14.58	Representative of residents and road-users.
15	A26 near Seacon (Ballymoney)	289546	429280	16.48	Representative of road users and residents. Cumulative windfarms.
16	Garvagh Road, Dungiven	269327	409822	11.18	Representative of road users and residents. Cumulative windfarms.
17	Scotchtown Road, Magilligan	264604	430308	14.00	Car park at southern end of strand, within Binevenagh AONB with view of Binevenagh

No.	Viewpoint	Grid Reference		Distance (km) from Development Turbines	Representative
					escarpment. Used in Smulgedon LVIA. Cumulative windfarms.
18	Greenbank Church, Quigley's Point, Republic of Ireland	250935	430600	25.92	Representative of residents, pedestrians and road-users. Inishowen 100 scenic driving route, gathering point for receptors near community facility. Used in Smulgedon LVIA. Cumulative windfarms.
19*	B66, west of Ringsend, north of Site	274395	423267	2.39	Representative of residents and pedestrians.

6.5.7 **Cumulative Windfarms**

- The cumulative context comprises other commercial windfarms of various scales, as well as single turbines. The windfarms are shown on Figure 6.12 with single turbines of less than 50 m mapped where they lie within or close to a 5 km radius of the Development. A cumulative Study Area radius of 30 km has been agreed with statutory consultees through the Scoping process.
- Dunmore and Dunbeg operational windfarms lie to the north at distances of approximately 7 and 6 km respectively. Their location within a lower lying area between Binevenagh Mountain and Keady Mountain means that their visibility is not widespread but they are more prominent in the north of the Study Area. They are located within the Binevenagh AONB. Glenconway and Altahullion are approximately 13 km from the Development turbines and a key characterising feature in views to the west. The Brockaghboy Windfarm is operational further to the south-east within the Sperrin AONB.
- 145. It is understood that the Smulgedon Windfarm has begun construction at approximately 4 km to the south of the Development. Again, higher land to the north and south limit its visibility. However, no turbines are apparent on the site and the construction has not continued following its initial start a number of years ago. A web search has indicated that this may have been due to a dispute regarding the grid connection which was the subject of a complaint to the utility regulator in 2016. It also appears that the development has recently changed ownership and that it is expected that the project will be connected and operational by early 2021.
- Whilst it is normal for OPEN to consider an under-construction site as part of the baseline the delay to the progress of 146 Smulgedon Windfarm calls into question whether or not it should be considered as part of the baseline. This is important as it could alter the assessment findings due to its proximity to the Development and visual interaction with it. In this instance, due the uncertainty surrounding the windfarm, the potential for the Smulgedon Windfarm to form part of the cumulative context is assessed along with the windfarms within the consented cumulative scenario.
- If the consented Craiggore and Upper Ballyrogan windfarms are constructed, they will be apparent at approximately 2 km to the south and 4 km to the south-east of the Development respectively. The Development's interaction with these windfarms in views will be key in defining where significant cumulative effects may arise.
- Both SNH and the Landscape Institute/IEMA advise in their guidance³⁴³⁵ that the assessment of the cumulative impacts associated with the Development should encompass the effects of the proposal in combination with existing, under construction, consented and application stage wind farms awaiting determination. Schemes that are at the pre-planning or scoping stage are generally not considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. The list of proposals presented in SNH guidance (SNH, 2012, p7) is as follows:
 - 'existing development, either built or under construction;

- approved development, awaiting implementation; and
- design information may be deemed to be in the public domain once an application has been lodged, and the decisionmaking authority has formally registered the application.'
- 149. A total of 63 cumulative windfarms or single turbines lie within a 30 km radius of the Development. A further four single turbines are listed and mapped but are not included in the assessment as their consents may have lapsed. If all or some of these were to be constructed and become operational it is considered that it would not alter the cumulative baseline materially so that the cumulative effects assessed for the Development would become significant. This is due to their relatively small scale and separation from the Development, within a different part of the landscape. Sites that lie beyond a 30 km radius of the Development have been discounted with agreement from the consultees through the Scoping process due to their distance from the Development which ensures that either one or both will be seen from a considerable distance away and therefore will have a very limited effect. Through the Scoping process it was agreed that turbines of less than 50 m to tip would only be included in the assessment within a 5 km radius of the Development turbines. In some instances, single turbines of less than 50 m are included where they are close to particular viewpoints.
- The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application 150 windfarms are changed. It is therefore necessary to set a cut-off date when the sites and layouts to be included are fixed. This has been set at May 2019. Any changes in the cumulative situation after this date are not incorporated in the assessment.
- The developments to be included within the Cumulative LVIA (CLVIA) are set out in Table 6.5 below. As stated in guidance (SNH, 2012, p15)³⁶ 'At every stage in the process the focus should be on the key cumulative effects which are likely to influence decision making, rather than an assessment of every potential cumulative effect'.
- Table 6.5 indicates whether or not cumulative windfarms are included in the LVIA and to what degree. Their separation 152 distance from the Development, turbine height and number are the key reasons for excluding sites within the cumulative context as they are considered to not have the potential to contribute to the Development having a significant cumulative effect. A key consideration here, with the Development constituting the repowering of the Operational Rigged Hill Windfarm is that the visual and landscape character interaction between a windfarm on the Rigged Hill Site and the operational, consented and application stage windfarms is already part of the cumulative situation. The potential for a cumulative effect to arise as a result of this change is considered further in Section 6.8.
- The baseline presented in the LVIA would be altered by the introduction of further windfarms and this is assessed in the 153. CLVIA.

able 0.5: Cumulative Windlarms within a 50 km radius							
Name	No. Of turbines	Blade Tip (m)	Distance to Development (km)	Included in LVIA?			
Operational							
Terrydoo Road (34)/1	1	45	0.90	Yes			
Terrydoo Road (34)/2	1	45	1.03	Yes			
Kilhoyle Road (60)	1	55	2.83	Yes			
Ballyavelin Road (61)	1	55	4.43	Yes			
Belraugh Road (7)/1	1	46	4.52	Yes			
Betts Road (28)	1	54.5	4.57	Yes			
Craigmore Road	1	42.3	5.12	No – due to very limited cumulative interaction with Development			
Edenmore Road (67)	1	25	5.53	No – due to very limited cumulative interaction with Development			
Dunbeg	14	125	5.69	Yes			

³⁶ SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments

proposals awaiting determination within the planning process with design information in the public domain. Proposals and

³⁴ SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments

³⁵ Landscape Institute and Institute of Environmental Management & Assessment (2013) Guidelines for Landscape and Visual Impact Assessment: Third Edition' (GLVIA3)

Name	No. Of Blade Distance to		Distance to	Included in LVIA?	
,	turbines	Tip (m)	Development (km)		
Dunmore	7	125	6.95	Yes	
Legavallon Road (132)	1	45	8.73	Yes - Viewpoint 9 only	
Tirkeeran Road	1	46	8.75	Yes – Viewpoint 8 only	
Seacoast Road (16)	1	45	9.22	Yes – Viewpoint 12 only	
Brockaghboy	15	125	9.87	Yes	
Brockaghboy Extn.	4	125	11.38	Yes	
Glenconway	20	115	12.91	Yes	
Churchland Lane (20)	1	54	12.92	Yes	
Greenhall Highway (60)/2	1	46.5	13.51	Yes – Viewpoint 14 only	
Altahullion II	9	80	13.58	Yes	
Altahullion I	20	80	13.76	Yes	
Greenhall Highway (60)/1	1	46.5	13.84	Yes – Viewpoint 14 only	
Monnaboy	4	121	18.00	Yes	
Magherafelt	1	102	23.41	No – due to very limited cumulative interaction with Development	
Garves	5	125	23.67	Yes	
Long Mountain	12	100	24.19	Yes	
Glenbuck II	3	109	24.98	Yes	
Glenbuck	1	120	25.54	Yes	
Cloonty	4	110	25.60	No – due to very limited cumulative interaction with Development due to scale and distance.	
Eglish Mountain	6	107	28.47	No - due to very limited cumulative interaction with Development at close range. See Figure: 6.19	
Slieve Kirk	12	106.2	28.79	No - due to very limited cumulative interaction with Development at close range. See Figure: 6.19	
Draperstown (Brackagh)	3	110	29.36	No – due to very limited cumulative interaction with Development due to scale, distance and intervening landform screening.	
Under Construction					
Smulgedon	7	120	4.44	Yes	
Consented					
Temain Road (37)	1	58.5	0.37	Yes	
Craiggore	10	125	2.22	Yes	
Cloghan Road (16)	1	55	2.71	Yes	
Belraugh Road (25)	1	61	4.07	Yes	
Upper Ballyrogan	5	120	4.24	Yes	
Cam Quarry	1	76	4.30	Yes	
Drumhappy Road (31)	1	59.5	4.32	Yes	
Dunbeg Quarry	1	61	4.94	Yes	
Dunbeg Extn.	3	120	5.52	Yes	
Dunmore Extn.	8	126	7.02	Yes	
Cam Burn	6	120	7.29	Yes	
Evishagaran	14	125	8.64	Yes	
Ballyhanedin	8	126	18.29	Yes	

Name	No. Of turbines	Blade Tip (m)	Distance to Development (km)	Included in LVIA?	
Craig 1	1	126	27.05	No – due to very limited cumulative interaction with Development due to scale and distance.	
Craig 2	1	126	27.33	No – due to very limited cumulative interaction with Development due to scale and distance.	
Three Trees	2	109.5	29.5	No – due to very limited cumulative interaction with Development due to scale and distance.	
Comsented (possibly lapsed)					
Ringsend Road (84)	1	? Hub 30m	3.23	Consented on 18/01/2007	
Craigmore Road (146)	1	46	3.29	Consented on 02/11/2012	
Mill Road (26)	1	26	4.45	Consented on 10/06/2012	
Craigmore Road (121)	1	55	4.45	Consented on 19/12/2013	
Application					
Dunbeg South	9	149.9	4.01	Yes	
Corlacky Hill	11	150	11.59	No – this project does not materially alter the cumulative context of the Development beyond that which is altered by the closer proximity Brockaghbuoy and its extension. It is only visible to a limited extent from Viewpoint 8 and sits behind Evishagaran in Viewpoint 10.	
Barr Cregg	7	125	21.21	No – due to very limited cumulative interaction with Development due to distance and position largely beyond large operational windfarms.	
Islandranny Road	1	77	29.76	No – due to very limited cumulative interaction with Development due to distance and position largely beyond large operational windfarms.	

- 154. Cumulative ZTVs that show the visibility of the relevant sites along with the visibility of the Development have been included for all of the relevant windfarms (Figures 6.14 to 6.22) using a 30 km radius for each. The relevant cumulative sites are also shown in the wirelines (Figures 6.23 to 6.40) for each of the representative viewpoints. In these wirelines, the Development turbines are shown in red, operational and under construction windfarms are indicated in black, consented windfarms are shown in green, and proposed windfarms that are the subject of planning applications or at appeal are coloured blue. The wirelines are produced in increments of 90-degrees and cover a variable width of the view, ranging from 90-degrees to 360degrees, dependent on the horizontal field of view that has been used for each viewpoint.
- 155. In some instances, windfarms appear in the wirelines although they are beyond their own Study Area radius. Where this occurs, the windfarm is not included in the assessment as it is considered to lie beyond the radius within which it may contribute to a significant cumulative effect.

6.5.8 Trends and Projected Future Baseline

- The most notable changes which are occurring throughout the Study Area are the increase in windfarm developments and the 156. felling and replanting of coniferous forestry. Forestry comprises a substantial part of the landcover across the upland within the Study Area as illustrated by Figure 6.2a: Aerial Photograph and therefore its restructuring or expansion may markedly alter the landscape and views.
- 157. Figure 6.12 shows the extent of operational, under construction and consented windfarm developments, as well as those at application stage and in scoping. There is a growing acceptance that turbines are becoming larger in response to improved technology. This trend also reflects the drive to reduce the levelised cost of energy by utilising more efficient and robust turbines. Repowering projects will become increasingly evident across Northern Ireland as many of the earliest and smallest

turbines are replaced by larger and more productive models. In some areas this has given rise to variances in scale between older, smaller turbines and newer, larger turbines and this will continue to be an established baseline feature of the landscape.

- Due to the lack of economic support for smaller scale wind projects and single turbines it is considered likely that many of the consented windfarms and single turbines located within the Study Area may not be built or applications may be made to increase their scale in order to make the projects economically viable.
- In terms of Climate Change, the Stern Report³⁷ states 'The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response.' A warmer and wetter climate in Northern Ireland will mean greater risk of flooding in low-lying parts of the landscape, which in the Study Area, largely coincides with areas of farmland, where improved pasture is the predominant land use. While it will also mean an incremental rise in sea level, the predictions for more frequent stormy weather could lead to coastal settlements being affected by flooding during high tides and this may in turn increase the pressure for flood prevention schemes.

6.6 Assessment of Potential Effects

Potential effects are those which could result from the construction, operation and decommissioning of a windfarm, according to the project, site and receptor characteristics and their interactions. Table 6.6 describes typical landscape and visual effects that can occur from a windfarm, their inclusion does not imply that they would occur, or be significant in the case of the Development. A variety of landscape and visual mitigation measures have been incorporated through the iterative design of the Development in order to prevent, reduce or offset potential landscape and visual effects. These are described in the section on mitigation below. The residual effects of the Development - those effects remaining after mitigation that would materialise when the Development is under construction, operation or decommissioning, are assessed in the 'Assessment of effects on landscape character' and 'Assessment of effects on visual amenity' in the following sections.

Table 6.6: Potential Effects

Activity	Specific Element	Potential Effects	Potential Sensitive Receptors	
Decommissioning of Operational Rigged Hill Windfarm and construction of Development	Construction plant and cranes, temporary construction facilities, access tracks, earthworks for infrastructure.	Short-term physical effects on landscape fabric. Short-term effects on landscape character. Short-term effects on views. Short-term cumulative effects.	Physical landscape features, e.g. trees, ground cover. Landscape character receptors – Landscape Character Types, designated landscapes.	
Operation of Development	Wind turbines, permanent meteorological mast, access tracks, substation, Energy Storage Unit, control building and earthworks.	Long term effects on landscape character. Long term effects on views. Long term cumulative effects with other wind farms.	Views – experienced by different receptors, e.g. residents, road users, walkers.	
Decommissioning of Development	Construction plant and cranes, temporary construction facilities and materials.	Short-term physical effects on landscape fabric. Short-term effects on landscape character. Short-term effects on views.		

Mitigation and Residual Effects 6.7

6.7.1 Embedded Mitigation

161.

This section describes the landscape and visual mitigation measures which have been incorporated through the iterative design of the Development in order to prevent, reduce or offset potentially negative landscape and visual effects caused by the decommissioning and construction and operation of the Development. It should be read in conjunction with the full project description and the rationale for site selection and scheme design in Chapter 3: Development Description and Chapter 4: Site Selection and Alternatives.

6.7.1.1 Site Suitability

- The Site lies within an area of upland moorland that forms part of an undulating ridge that runs between Binevanagh in the north and the Sperrins in the south. The section of the ridge where the Site is located is lower lying and without any remarkable features. The Site is generally seen in separate parts of the view to the more notable forms of Binevenagh, Keady Mountain, Donald's Hill and Benbradagh. The high areas to the north and south are designated as AONB and, therefore, the fact that there is some distance and screening between the Site and parts of these areas is beneficial. Also, the direction of the views is towards the narrower cross section of the Development such that from these sensitive areas the horizontal extent of the Development is more contained when in views from areas lying to the west and east.
- The ridge does however provide some containment to the more settled, broad valleys on either side and therefore views 163. towards it from the numerous visual receptors are important. The Site and views towards it are currently influenced by the presence of Operational Rigged Hill Windfarm. The area is also influenced by large blocks of coniferous woodland plantation to the east, and farmland and settlement to the west. The suitability of the Site for windfarm development relates principally to the landscape character of the Site and surrounding upland landscape, which has some suitability in terms of its simplicity and large scale, as well as the presence of existing windfarm developments. Rigged Hill has proved a suitable location for the Operational Rigged Hill Windfarm which has been running for almost 25 years, with consent to operate in perpetuity.

6.7.1.2 Layout design

- The design of the windfarm layout is a vital part of the EIA process, as it is at this stage that the biggest contribution can be made to mitigate potential landscape and visual effects. This helps to create a windfarm which is appropriate for the existing landscape character and visual features of an area. The iterative design process allows the effects of different windfarm layouts to be assessed then modified to prevent, reduce or offset effects. The residual effects reported in the following section therefore include embedded mitigation in the form of design refinement and consideration against landscape and visual objectives, for example, arranging turbines with respect to landform features, particular consideration of a view of the windfarm from a highly valued landscape, or ensuring the arrangement of turbines is aesthetically balanced from sensitive viewpoints.
- In order to minimise negative effects on landscape and visual receptors, a number of design principles have been considered. These principles have sought to reduce significant effects through alterations to layout, design and siting (insofar as was possible given the other technical and environmental constraints), management practices and mitigation. The design principles relate to the characteristics of the existing landscape and visual environment described in the section on 'Baseline information' above, and are set out as follows:
 - To consider the latest wind turbine technology available, larger rotor sizes, and turbine hub heights to arrive at a turbine tip height considered appropriate for the Site;
 - To create a visually legible design, insofar as was possible on a Site which is constrained by other environmental and technical issues, and create a simple, positive layout, viewed consistently from different positions;
 - To ensure that the views of the Development from the Binevenagh AONB, in particular those from Viewpoint:13: Binevenagh Mountain, minor road and NCR, appear legible and the turbines relate well to a single landform and each other:
 - To create as compact a scheme as the technical aspects of the larger turbine spacing allows, which relates to the underlying landform, with turbines laid out to extend along the simple ridgeline created by Rigged Hill;
 - To reuse, where possible, areas within the Site that have been altered by the Operational Rigged Hill Windfarm infrastructure, in particular existing tracks and the hard standing/previously disturbed area at the existing control building; To ensure that the requirements for cut and fill are minimised when siting the infrastructure, in particular the new access •
 - road:
 - contours and natural breaks in the slope/vegetation cover as far as possible;
 - rotors in lines, favouring an evenly spaced and elevated group, that reflects the nature of the undulating landscape;
 - To Site buildings within low lying areas that are on the less visible north-east side of Rigged Hill; and

Designing the new access road so that the existing landform provides some screening and so that it follows the existing

To group turbines to create a balanced and coherent image, avoiding where possible 'stacking' or overlapping of turbine

³⁷ Stern, N. (2006). "Stern Review on the Economics of Climate Change Executive Summary". HM Treasury, London

- To group the infrastructure in order to limit the number of areas affected.
- During the early stages of the design process two different layouts were progressed. One of these had a linear form with turbines more regularly positioned along the ridgeline. Following further landscape and visual review and consideration by other topic specialists this option was dropped. Whilst this would have led to a layout where the turbines were set back at a greater distance from nearby visual receptors, there were two key landscape and visual reasons for not progressing with this option as follows:
 - The layout of the turbines appeared markedly different to those of the nearby cumulative windfarms that are operational or consented, which would have increased the cumulative magnitude of change of the Development; and
 - The ridgeline location would have set all turbines on the highest point of the Site, which would have increased their apparent height and would also have resulted in landform changes and the introduction of ancillary infrastructure such as transformer housings along the ridgeline.
- In addition, the seven turbine arrangement offers greater potential for reusing existing infrastructure.

6.7.2 Residual Effects

The residual effects (i.e. those which remain after mitigation) that the Development would have on the landscape and visual resource are assessed in the sections presented below. These are categorised into physical effects, effects on landscape character, and effects on views, as described previously. Cumulative effects are assessed in the 'Assessment of cumulative effects' later in this chapter at Section 6.8.

6.7.3 Assessment of Physical Landscape Effects

6.7.3.1 Introduction

- The first category of effects covered in the assessment is physical effects, which are direct effects on the fabric of the Site, such as the removal of ground cover vegetation. Physical effects are found only on the Site, where existing landscape elements may be removed or altered by the Development. This category of effects is made up of landscape elements and, in this case, there is generally only one element involved, rough grass moorland.
- The methodology for the assessment of physical effects is described in full in **Technical Appendix A6.1**.

6.7.3.2 Rough Grass Moorland

6.7.3.2.1 Baseline and Sensitivity

- This is a widespread ground cover in the affected and wider area. It comprises rough grasses and heathers growing in wet, boggy ground. This type of landcover is typical of the Binevenagh LCA where it is not covered in forestry.
- The sensitivity of the landscape element is determined through a combination of the value attached to it and its susceptibility 172. to the Development. The value of rough grass moorland is medium. While it is a relatively widespread landscape element of the local landscape that is not rare or specifically recognised for its value, it is also a highly characteristic element of the landscape that covers the Site and surrounding areas and contributes to the exposed, open character of the Site and its surroundings. There is also some value in the contrast that the rough grass moorland has with the improved pasture of the lowlands as this variation in ground cover is one of the indicators of the difference between the upland and lowland character areas.
- The susceptibility to change of this landscape element is medium to low due to the potential for reinstatement and restoration of the ground cover following the combined decommissioning of Operational Rigged Hill Windfarm and construction of the Development and at the end of the lifetime of the Development. The combination of the medium value and medium to low susceptibility to change of the landscape element results in a medium sensitivity for rough grass moorland ground cover.

6.7.3.2.2 Magnitude of Change

- The area of rough grass moorland to be removed or disturbed in the decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is limited in relation to the total area found on the Site and beyond.
- The sections of the existing turbine access tracks that are not required for the Development would be reinstated as rough 175. grass moorland in accordance with the Outline DCEMP and HMP which are contained in Technical Appendices TA3.1 and TA3.2 respectively.

- The construction of a new access road from Terrydoo Road to the Site would require an area of rough grassland to be removed along its length and within the areas required for cut and fill along the route. At the end of the construction period the side slopes and verges along the road would be soiled and seeded so that the grass moorland cover is reinstated.
- In order to construct and access the new layout of seven turbines, the retained access tracks would require to be widened in places and new sections of access tracks would need to be constructed around the hilltop, mostly along the contours of the land. Crane pads and turbine foundations would also lead to further losses of rough grassland, albeit only over relatively small areas. During the decommissioning and construction phases, construction compounds would also be required and these are approximately two areas of 110 x 30 m and 90 x 35 m close to the substation and a further compound of 50 x 50 m by the Site entrance with an equivalent, temporary loss of rough grassland as a result.
- As part of the construction of the Development a permanent compound of 55 x35 m would be built to accommodate staff parking, control building, a sub-station and an Energy Storage Unit.
- 179. As part of the combined decommissioning and construction phases, rough grass moorland would be reinstated following the removal of the obsolete or construction infrastructure and in areas where the landform has been altered. Rough grasses can be re-established with relative ease and this would moderate the magnitude of change, as this landscape element could be relatively easily restored.
- In relation to the overall area, the magnitude of change arising from the rough grass moorland removals during decommissioning of Operational Rigged Hill Windfarm and construction, operation and decommissioning of the Development is considered to be medium to low.
- During the decommissioning of the Development rough grasslands would be reinstated in those areas where infrastructure 181 would be removed.

6.7.3.2.3 Significance of the Effect

The effect of the Development on rough grass moorland would be not significant during the decommissioning of Operational Rigged Hill Windfarm and construction, operation and decommissioning of the Development. This is due to the limited sensitivity of the landscape element to the Development, the limited proportion of the wider area that would be affected and the relative ease with which the rough grass moorland that would be affected.

6.7.3.3 Summary of Physical Effects

The principal effect that the Development would have on the landscape fabric of the Site is the removal of the rough grass moorland land cover. The relatively limited extent of the removals would result in a not significant effect during the decommissioning / construction, and operational stages.

6.7.4 Assessment of Effects on Landscape Character 6.7.4.1 Introduction

- Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character occur both on the Site, where the pattern of elements that characterises the landscape would be directly altered by the addition of the Development to the landscape; and off-Site, around the Study Area, where visibility of the Development may alter the way in which this pattern of elements would be perceived. For example, if the Development is visible from an area of Roe Basin LCA, the perceived experience of this area may be altered as visibility of the Development introduces different contextual characteristics despite its physical location in another, separate area.
- It should be noted that levels of magnitude of change on landscape character receptors are generally found to be lower than the magnitude of change on viewpoints that lie within these LCAs. This means, for example, that if a viewpoint is assessed to undergo a medium to high magnitude of change it does not necessarily follow that the landscape character area within which it lies would also undergo a medium to high magnitude of change but may undergo a medium magnitude of change instead. This is because the effects on viewpoints are assessed within the context of a specific outlook of the Development and are usually specifically selected to gain a direct view over the Site. The landscape character of a receptor is not necessarily determined so specifically by the outlook over the Development, and there are many other considerations, both visual and perceptual, that may combine to give an area its landscape character. This means that the Development may have a lesser

degree of influence on landscape character than on a specific view. This is particularly true of areas that lie slightly further away from the Development.

- In the 'Immediate Landscape Setting' of the Site, covering a radius of 2 km, the magnitude of change on viewpoints and landscape character is likely to be similar, but beyond this, the magnitude of change on landscape character is found to often diminish more rapidly as the influence of the turbines is subsumed in the many other influences on landscape character. Viewpoints are referred to in the assessment of effects on landscape character as they give a useful indication of the appearance of the Development from specific locations within the various landscape receptors, however the level of magnitude of change may vary between the viewpoint assessment and the landscape character assessment.
- Furthermore, the presence and baseline influence of Operational Rigged Hill Windfarm on the Site of the Development, also 187. moderates the potential effects of the Development, as it would not be introducing a new or unfamiliar feature into this landscape, but instead would be replacing an existing development with a similar type of development, reducing the number of turbines from ten to seven, albeit with turbines of larger dimensions, located across a larger extent of the hill. The magnitude of change on surrounding landscape and visual receptors would, therefore, not be as pronounced as if there was no existing influence from windfarm development on this Site.
- The assessment of effects on landscape character covers two groups of receptors, LCAs and landscape planning 188. designations. Section 6.5 Baseline Description identifies the landscape character receptors which have the potential to undergo significant effects as a result of the Development and therefore require further assessment as agreed through the Scoping process.
- Wind Energy Development in Northern Ireland's Landscapes (Northern Ireland Environment Agency, 2010) requires that the effects of the Development are described in relation to a series of defined distance bands: Immediate Landscape Setting (up to 2 km), Local Landscape Setting (2 to 5 km), Landscape Setting (5 to 15 km), and Broad Landscape Context (15 to 30 km). In this assessment this has been based on the distances from the turbines since these would have the most pronounced effect on landscape character compared to other elements of the Development.
- Through the Scoping process it was agreed that only LCAs within the first 15 km radius of the Development would be considered and therefore the Broad Landscape Context (15 to 30 km) has been discounted from the assessment. The three closer range distance bands are shown in conjunction with the LCAs in Figure 6.6b and have been used as the basis upon which to structure the assessment of effects on landscape character.
 - 36. Binevenagh LCA (Immediate Landscape Setting, Local Landscape Setting, Landscape Setting); ٠
 - 37. Roe Basin LCA (Immediate Landscape Setting, Local Landscape Setting, Landscape Setting);
 - 38. Eastern Binevenagh Slopes LCA (Local Landscape Setting, Landscape Setting); ٠
 - 39. Glenshane Slopes LCA (Landscape Setting);
 - Binevenagh AONB (Local Landscape Setting, Landscape Setting); ٠
 - Sperrin AONB (Landscape Setting); and
 - Dog Leap SS (Landscape Setting).
- 191. It was agreed through the Scoping process, after initial assessment, that the effects on the LCAs that occur within the remainder of the Study Area would not have the potential to incur significant effects, and have therefore not been assessed in any further detail.
- Baseline descriptions and sensitivity ratings for each of the LCA receptors are presented below, while a detailed assessment of the effects of the Development on landscape character in relation to the defined distance bands is presented in Section 6.7.6.
- The assessment of effects on the AONB and Dog Leap SS is carried out separately to that of the LCAs, in Section 6.7.6 of this 193. Chapter, but also with reference to the distance bands.

6.7.4.2 36. Binevenagh

6.7.4.2.1 Baseline character

The Binevenagh LCA covers most of the land included within the Site and its Immediate Landscape Setting, as shown on Figure 6.6b, although the end of the Site Boundary's westerly 'fingers' are located in the Roe basin LCA to the west. It

encompasses a series of west facing scarps with a distinctive profile, and which run north from Binevenagh mountain down to the south, where the ridge meets the Sperrin Mountains at Benbradagh at a dramatic, cliff-like escarpment. The most prominent peaks along the scarp, from north to south, are Binevenagh (385 m AOD), Keady Mountain (337 m AOD) and Donald's Hill (399 m AOD) and Benbradagh (465 m AOD) as mentioned previously.

- The western edge of the area is defined by the steep scarp slopes overlooking the Roe basin to the west. The cliffs of 195 Binevenagh, which dominate the surrounding landscape mark the western limit of the Antrim basalt plateau, which stretches almost from Belfast to Derry. Magilligan Point, to the north-west provides the flat foreground to this dramatic mountain cliff in addition to providing the setting of the range around Lough Foyle to its south-west. To the east, the gently rolling plateau landscape slopes down to the River Bann and Coleraine, which contrasts with the sequence of steep summits with near vertical craggy rockfaces west of it. The Ulster Way and North Sperrins Way provide long-distance walking routes through the hills in the Binevenagh LCA (although there are numerous other walking routes in the area) and the forest tracks are well used for mountain biking.
- The landcover throughout the Binevenagh LCA is a mosaic of exposed upland moors and extensive conifer plantations, planted with angular geometry that subdivide and enclose areas of moorland. This mosaic pattern of plantation enclosure is more pronounced on the highest ground and towards the northern section of the Binevenagh LCA, falling away towards the east. Deciduous woodland is restricted to the glens and steeper slopes, particularly the lower slopes of Binevenagh mountain. Land eastwards transitions from moorland to a pattern of farmland and enclosed fields, although stone walls appear infrequently.
- Panoramic views from Binevenagh mountain give clear visibility of Lough Foyle and Inishowen to the north. The northern part of the escarpment which includes both Magilligan and the Bann estuary also forms the Binevenagh AONB, partially because of the spectacular views afforded from Binevenagh mountain. South of Benbradagh, the LCA falls within the Sperrin AONB. The landscape is highly visible from throughout the Roe Basin, with the distinctive landscape features of the escarpment key to the landscape setting of the settlements of Limavady and Dungiven in the Roe Basin LCA.
- more populated to the east: the main settlements are Macosquin and Ringsend on more sheltered ground. Despite the sparsely populated upland landscape, several roads pass over the plateau's lower saddles linking east to west. At the southern end of the Binevenagh LCA, at Mullaghomore, the landscape features sit prominently above Moneyneany and Draperstown to the south west. The hard rock quarries at Donald's Hill also feature prominently in the landscape to the south of the Binevenagh LCA.
- 100 decommissioned as part of the Development. Its ten turbines of 57 m to tip are relatively closely spaced, in a north-south configuration along the summit of Rigged Hill. The windfarm access road is routed through the forestry to the north and its small control building is located in the northern part of the Site. Apart from the turbines, the other infrastructure is not readily apparent except from in very close proximity and therefore the existing influence of the Operational Rigged Hill Windfarm is predominantly confined to its Site Boundary where it has altered the landscape character through physically changing its components and pattern. Beyond this, the influence is due largely to the visibility of the turbines.
- Dunbeg and Dunmore Windfarms have been constructed more recently and are located north of this, and as with the Operational Rigged Hill Windfarm these are visible from both east and west. Smulgedon Windfarm also falls within the Binevenagh LCA and is currently under construction although no turbines are apparent at the time of writing, whilst several others windfarms are already consented; namely Upper Ballyrogan, Craiggore, Evishagaran, Cam Burn and Dunmore Extension, at the time of writing.

6.7.4.2.2 Sensitivity

- The value of the LCA is medium to high. The northern and southern parts of this LCA are covered by the national landscape designation of AONB which denotes the national importance of the landscape. The value is however moderated by the presence of extensive commercial forestry and windfarm development which has modified the landscape from its natural state.
- ²⁰² The susceptibility of the LCA to the effects of the Development would be medium. The susceptibility is moderated by the presence of extensive commercial forestry plantations and Operational Rigged Hill Windfarm in this LCA, as well as Dunbeg and Dunmore windfarms to the north. These windfarms establish this type of development as part of the baseline character.

The upland area of the Binevenagh LCA itself is sparsely populated with scattered dwellings along the Roe valley, becoming

In terms of windfarm developments, the Site is located on the site of the Operational Rigged Hill Windfarm which would be

While this means the Development would not add a new type of influence to the character of the LCA, the larger scale of its turbines would mean that it would increase the influence and this in turn increases the susceptibility.

- The combination of the value of the LCA and its susceptibility to the Development would give rise to an overall medium to 203. high sensitivity rating.
- ^{204.} The SPG advises that parts of this landscape are more sensitive than others to windfarm development. Whilst it is stated that "Much of this landscape is of extreme sensitivity due to its iconic, landmark character and very wide visibility" it is also noted that "The relatively large scale and strong horizontal form of the escarpment means that certain locations in this LCA may be well suited to wind energy developments. The lower central section of the LCA may be better suited to wind energy development in landscape and visual terms than other areas. Siting in association with forestry may be beneficial."
- The Site is located within this lower, central section with forestry to the north and east. 205.

6.7.4.3 37. Roe Basin

6.7.4.3.1 Baseline character

- A broad alluvial floodplain basin to the River Roe, the striking cliff faces of the Binevenagh escarpment to the east overlooks the broad landscape of the Roe Basin LCA which extends south to the Sperrin mountains. The Roe Basin LCA extends west towards the Loughermore Hills bound by the River Roe to its east and the Rivers Faughan and Foreglen to its west and south. To the north the Roe Basin LCA extends to the coastal flats fronting Lough Foyle, an open, flat coastal landscape of alluvial deposits and sand dunes.
- The gently rolling landscape of the Roe Basin LCA is predominantly a low-lying alluvial floodplain of the River Roe, but the 207. ground rises to around 150 m AOD around its eastern, southern and western edges marking the lower slopes of the surrounding uplands which are fringed with the rounded edges of glacial moraine. The River Roe meanders through a landscape of open grassy embankments with a network of branching tributary streams and small marshy oxbow lakes throughout.
- The landscape is composed of a geometric network of open medium sized fields enclosed by hedgerows which are predominantly gorse. There are only some copses and small broadleaved woodlands within this character area, with few large woodlands present. Large arable fields are visible on the glacial ridges alongside the river, with scrubbier smaller pastures towards the edges of the basin.
- Villages are characteristically small and clustered in form, with Limavady and Dungiven the largest settlements within the Roe 209. Basin LCA. Individual white-washed farmsteads are scattered through the area with numerous roads and bypasses connected through the area, breaking up the landscape pattern.
- Whilst there are no operational or consented windfarms within the Roe Basin LCA, there are windfarms visible to the east 210. (Operational Rigged Hill Windfarm) and to the west, Altathullion (Northern Ireland's largest windfarm), and Glenconway which affect the character of the central part of the LCA. The more recently constructed Dunmore and Dunbeg windfarms to the east and Monnaboy to the west are also visible to a lesser degree.

6.7.4.3.2 Sensitivity

- The value of the LCA is medium. Small areas to the north and south of this LCA are covered by the national landscape designation of AONB which denotes the national importance of the landscape. While this LCA has been extensively modified by settlement, road infrastructure and agricultural practices, the retention of a well-defined pattern of enclosure by hedges and woodland adds to the rural character and quality.
- ^{212.} The susceptibility of the LCA to the effects of the Development is medium. The susceptibility is moderated by the settled and treed nature of parts of the area as well as the presence of extensive commercial forestry plantations and Operational Rigged Hill Windfarm close to this LCA. As well as the further contextual influence of the Altahullion and Glenconway group of windfarms to the west there are also numerous, moderately scaled, single or paired turbines located within this LCA. While this means the Development would not add a new type of influence to the contextual character of the LCA, the larger scale of its turbines would mean that it would increase the influence and this in turn increases the susceptibility.

^{213.} The combination of the value of the LCA and its susceptibility to the Development would give rise to an overall **medium** sensitivity rating.

6.7.4.4 38. Eastern Binevenagh Slopes 6.7.4.4.1 Baseline character

- 214 skyline to its west. It stretches from the coastal landscape that meets the North Atlantic Ocean to the north, south towards the Glenshane slopes, an upland area on the fringes of the Sperrins.
- The Eastern Binevenagh Slopes LCA is a low rolling landscape (100-150 m AOD) with a series of broad ridges aligned north-215. west to south-east, which have an irregular and crumpled surface. The plateau is drained by branching streams which flow between steep, well-defined valleys, but are contained by steeper gullies towards the west. The landscape is predominantly agricultural though described as 'poor quality farmland' in the NIEA (2010) SPG. Farmland is predominantly comprised of rough pastures with patches of marshy soils. Fields are irregularly shaped with an angular, geometric form and are enclosed by a mixture of incomplete field boundaries: stone walls, fences and fragmented hedgerows. Whilst the most substantial woodland block is located within the estate of Downhill near Castlerock (which also falls within the Binevenagh AONB), across the remainder of the Eastern Binevenagh Slopes LCA the hedgerow trees and small copses give the impression of more extensive tree coverage.
- The East Binevenagh Slopes LCA is scattered with numerous small holdings and small farms which are typically in poor 216 condition, and there are also many derelict buildings across the area. Areas of new development are more typically linear in form and have a suburban character. Roads generally follow ridge tops or cut across contours, emphasising the terrain's distinct north to south alignment.
- 217 the A2, Bann estuary, Portstewart and on high ground around Coleraine. Long Mountain Ridge, Garves and Glenbuck Windfarms are viewed on the skyline to the east.

6.7.4.4.2 Sensitivity

- The value of the LCA is medium. A small area to the north of this LCA is covered by the national landscape designation of AONB which denotes the national importance of the landscape. This LCA has been extensively modified by some settlement, road infrastructure, some small patches of forestry and agricultural practices, which reduce its quality.
- treed nature of parts of the area as well as the presence of some commercial forestry plantations and operational turbines. As well as the further contextual influence of the Operational Rigged Hill Windfarm to the west there are also other operational windfarms within the wider area to the south and east. While this means the Development would not add a new type of influence to the contextual character of the LCA, the larger scale of its turbines would mean that it would increase the influence and this in turn increases the susceptibility.
- The combination of the value of the LCA and its susceptibility to the Development would give rise to an overall medium 220. sensitivity rating.

6.7.4.5 39. Glenshane Slopes 6.7.4.5.1 Baseline character

- 221 to the Garvagh Farmland consisting of agricultural land divided by hedgerows across rounded drumlins. To the west, are the Sperrin mountains, and to the south is the Upper Moyola Valley which is the broad basin of the Moyola river. The Binevenagh LCA is situated to the north.
- The landform of the Glenshane Slopes LCA is broadly like the Sperrins, with sharp ridges and summits that contrast with the basalt escarpment of Carn Hill and Craigmore which separate the LCA from the main block of the Sperrin Mountains. There is no escarpment and the summits are surrounded by steep ridges and scree slopes. The highest summit is Carntogher (464 m AOD) which towers over the Glenshane Pass below. The steep slopes are carpeted with moorland grasses, grazed by moorland sheep, with lower slopes a mosaic of moorland, boggy ground and damp grassland.

The Eastern Binevenagh Slopes LCA is the sloping basalt plateau situated to the east of Binevenagh, which forms a long low

The area is widely visible in long distance views from the east, with clear views of the Eastern Binevenagh Slopes LCA from

The susceptibility of the LCA to the effects of the Development is medium. The susceptibility is moderated by the settled and

The Glenshane slopes LCA is a relatively small upland area on the eastern fringes of the Sperrins. The eastern edge extends

- The landscape is generally open and has wildness characteristics with outstanding views from the summits to Donegal and Lough Foyle, Sawel and the high Sperrins and the Antrim hills. Almost all of the Glenshane Slopes LCA lies in the Sperrin AONB. Existing infrastructure is generally limited here aside from the Glenshane Pass (A6) which cuts through the south western part of the Glenshane Slopes LCA. The area gives a dramatic approach to and through the Sperrins and to the northwest. The upland edges of the Glenshane Slopes LCA forms an important feature of the existing skyline. There are only occasional barns (used for storage or sheep shelter), which are often derelict, but no roads or cottages on the upper slopes. The eastern slopes have a more diverse landscape pattern, transitioning to a more pastoral landscape setting, with fragmented enclosure by hedgerows and stone walls, and small-holdings and derelict cottages scattered through the landscape.
- Brockaghboy and Brockaghboy Extension windfarms are operational to the north of the Glenshane Slopes LCA, with an 224. appeal currently underway for Corlacky Hill.

6.7.4.5.2 Sensitivity

- The value of the LCA is high. The majority of this LCA is covered by the national landscape designation of AONB which denotes the national importance of the landscape. The value is however moderated by the presence of some patches of commercial forestry and windfarm development in the north which has modified the landscape from its natural state.
- The susceptibility of the LCA to the effects of the Development would be medium. The susceptibility is moderated by the presence of commercial forestry plantations and Operational Brockaghboy Windfarm in this LCA. This windfarm establishes this type of development as part of the baseline character. While this means the Development would not add a new type of influence to the character of the LCA, the larger scale of its turbines would mean that it would increase the influence and this in turn increases the susceptibility.
- The combination of the value of the LCA and its susceptibility to the Development would give rise to an overall medium to 227. high sensitivity rating.

6.7.4.6 Assessment of the effects on landscape character within defined distance bands

- As required by 'Wind Energy Development in Northern Ireland's Landscapes' (Northern Ireland Environment Agency, 2010) the effects of the Development on landscape character are described in relation to a series of defined distance bands: Immediate Landscape Setting (up to 2 km), Local Landscape Setting (2 to 5 km), Landscape Setting (5 to 15 km), and Broad Landscape Context (15 to 30 km). The Broad Landscape Context has been discounted from detailed assessment through the Scoping process.
- 229. The assessment of effects on landscape character refers to theoretical visibility of operational and under construction cumulative windfarms from the LCAs, AONB and Dog Leap SS and particularly to the comparison with the existing visibility of the Operational Rigged Hill Windfarm, which is shown on Figure 6.11. This theoretical visibility is shown on the individual cumulative ZTVs in Figures 6.13 to 6.27. These show theoretical visibility of each of the other windfarm sites in association with the Development.
- Not all LCAs located within the landscape setting are included as some of these have been scoped out in agreement with 230. consultees as set out in Table 6.2.

6.7.4.7 Immediate Landscape Setting

- This comprises mostly of the Binevenagh LCA with a small area of the Roe Basin LCA occurring in the western part of the Immediate Landscape Setting. The Binevenagh LCA is assessed as having a medium to high sensitivity and the Roe Basin LCA is assessed as having a medium sensitivity to the Development.
- 232. In addition to the Operational Rigged Hill Windfarm the two Terrydoo Road turbines are the only other turbines that are operational within the Immediate Landscape Setting.

6.7.4.7.1 Magnitude of change

Within the Immediate Landscape Setting effects of the decommissioning of the Operational Rigged Hill Windfarm and the 233. construction of the Development would be most pronounced within the Site. This is where the physical changes to the components and pattern of the landscape would occur largely due to the use of machinery and tall cranes, modification of landform and removal/construction of new infrastructure such as the turbines, sub-station compound, control building and a met mast within the Site.

- Beyond the Site the magnitude of change on landscape character would vary according to the level and extent to which the 234 Development would be visible. The ZTV in Figure 6.6b shows that the numbers of Development turbines theoretically visible is varied and this indicates that landform provides some screening of parts of the Site from areas in the lee of the hill slopes.
- ^{235.} From open areas, particularly to the west, north-west and south of the Site these changes would be readily apparent across a relatively large proportion of the Immediate Landscape Setting. This is where the extension of development into previously undeveloped areas would have the most notable influence i.e. the lower westerly slopes of Rigged Hill where the main Site access track and four of the Development turbines and access tracks are located.
- 236. To the north and east of the Site, as shown on Figure 6.2 the hill slopes are covered in commercial forestry and this results in a more limited actual influence due to a general lack of inter-visibility (and therefore character influence) between the Development and the majority of the forested areas within this localised central part of the Binevenagh LCA.
- Within the areas of the Binevenagh and Roe Valley LCAs, that lie within the Immediate Setting the magnitude of change 237 during decommissioning and construction would be medium within the open settled farmland and hill areas and medium to low within the forestry areas. This takes account of the existing character influence of the Operational Rigged Hill Windfarm.
- ^{238.} During the operational stage, the effects would relate principally to the presence and movement of the Development turbines as well as the presence of the main access track on the westerly side slope of Rigged Hill in the Binnevenagh LCA with the access track also partly within the Roe Valley LCA. The key consideration is the degree to which the character differs from the baseline, which has been modified by and is already partially characterised by the Operational Rigged Hill Windfarm.
- On the Site itself, the presence of the turbines and new infrastructure associated with the Development is more widespread 239 and has a greater influence than that of the Operational Rigged Hill Windfarm that forms part of the baseline character, particularly on the open areas to the west. However, its fewer, more widely spaced turbines would also have some advantage in appearing less dense and of greater simplicity than the Operational Rigged Hill Windfarm. The relatively long length and simplicity of the ridgeline character assists with accommodating the turbines.
- 240. The larger scale of the Development turbines, compared to the Operational Rigged Hill Windfarm turbines, would have an increased influence on the character of the LCA, owing to their increased vertical extent in contrast with the largely horizontal nature of the LCA. This larger scale, would be emphasised through comparison with the scale of the surrounding landform and features (including buildings and the operational Terrydoo Road turbines). As a result of these factors the Development turbines would become a defining feature in the character of the open areas within the Immediate Landscape Setting.
- 241. within the Immediate Landscape Setting of the turbines would be medium. This takes onto account the fact that there is already a windfarm that characterises this part of the landscape.

6.7.4.7.2 Significance of the effect on the Immediate Landscape Setting

The effect of the Development on the areas of the Binevenagh LCA and the Roe Basin LCAs that are covered by the Immediate Landscape Setting would be significant during decommissioning / construction and operational phases, due to a combination of the medium magnitude of change and the medium and medium to high sensitivity of the LCAs that cover this area.

6.7.4.8 Local Landscape Setting

243. Binevenagh LCA in the areas to the north and south of the Site and also extending eastwards to where the character changes to the Eastern Binevenagh Slopes LCA at ranges of between 3.5 and 5 km. The western and south-western parts of the Local Landscape Setting are part of the Roe Basin LCA. The Binevenagh LCA has been assessed as having a medium to high sensitivity whilst the Roe Basin and Eastern Binevenagh LCAs have been assessed as having a medium sensitivity to the Development.

During operation the magnitude of change in the character of the Binevenagh LCA and the Roe Basin LCA in the area lying

The Local Landscape Setting encompasses the area within a 2-5 km radius of the Development turbines and includes the

- The assessment below relates only to those parts of the LCAs which lie within the Local Landscape Setting, despite these LCAs extending into other distance bands.
- Within the Local Landscape Setting there is an operational turbine at Betts Road and the windfarm of Smulgedon is understood to have started construction some time ago, however, no turbines are evident. The Dunbeg and Dunmore Windfarms are located immediately to the north but have little influence on the Local Landscape Setting due to the intervening landform. The Operational Rigged Hill Windfarm is also influential on the baseline character of the Local Landscape Setting.

6.7.4.8.1 Magnitude of change

- The Development lies entirely beyond the 2 to 5 km radius of the Local Landscape Setting, therefore, the change to landscape character in this area would be indirect or perceived; whereby the character of the landscape would be altered through visibility of the Development rather than through direct physical change.
- 247. Within the Local Landscape Setting the magnitude of change on landscape character would vary according to the level of visibility of the Development. Whilst illustrating the extent of theoretical visibility of the turbines the ZTV on Figure 6.6a and **6.6b** also provides an indication of the potential visibility of the Development during its construction.
- 248. The ZTV in Figure 6.6b shows that theoretical visibility of the turbines would be almost continuous within the 2 to 5 km radius to the west. To the north and south there are shown to be marked areas with no theoretical visibility due to the localised screening effects of Keady Mountain and Donald's Hill respectively. From the south-east round to the north-east the pattern of theoretical turbine visibility is influenced by the undulating landform with screening occurring across areas in the lee of the slopes.
- 249. Also, within the north, south and eastern parts of the Local Landscape Setting which coincide with the Binevenagh LCA, much of the landcover is commercial forestry plantation as can be seen in Figure 6.2a. This results in the actual influence being more limited due to a general lack of inter-visibility (and therefore character influence) between the Development and the majority of the forested areas within the Local Landscape Setting. The visibility of the Development is limited by this forestry which is located on the intervening high ground between the Eastern Binevenagh Slopes LCA and the Development to the west
- The effect of the Development during the decommissioning, construction and operational phases would vary across the LCA 250. depending on the level, extent and nature of visibility.
- The decommissioning and construction operations would be most notable from the Roe Basin LCA part of the Local 251. Landscape Setting due to its openness and the potential visibility of a large extent of this phase of the works at relatively close proximity. This would result in a medium magnitude of change and takes account of the existing character influence of the Operational Rigged Hill Windfarm.
- ^{252.} Within the Binevenagh and Eastern Binevenagh Slopes LCAs the magnitude of change during decommissioning and construction would be medium to low or negligible elsewhere due to the more restricted visibility of these construction activities from these parts of the Local Landscape Setting.
- ^{253.} During the operational phase, the effects would relate principally to the presence and movement of the Development turbines and to a lesser degree the presence of the main access track on the westerly side slope of Rigged Hill. The key consideration is the degree to which the character differs from the baseline, which has been modified by and is already partially characterised by the Operational Rigged Hill Windfarm.
- The presence of the Development turbines and new infrastructure within the views is more widespread and has a greater 254. influence than that of the Operational Rigged Hill Windfarm that forms part of the baseline character of the wider views, particularly on the open areas to the west. However, its fewer, more widely spaced turbines also has some advantage in appearing less dense and of greater simplicity than the Operational Rigged Hill Windfarm. The relatively long length and simplicity of the ridgeline character assists with accommodating the turbines.
- The larger scale of the Development turbines compared to the Operational Rigged Hill Windfarm turbines would have an 255. increased influence on the character of the LCA, owing to their increased vertical extent in contrast with the largely horizontal

nature of the LCA. This larger scale, would be emphasised through comparison with the scale of the surrounding landform and features (including buildings and the operational Terrydoo Road turbines).

During operation, the magnitude of change to the character of the Roe Basin LCA, the Binevenagh LCA (which is largely forestry covered) and the Eastern Binevenagh Slopes LCA would be medium to low. Intervening forestry and landform screening are the main factors while the orientation of the Development, such that it extends across a much lesser horizontal extent in views from the north and south, is also a contributory factor.

6.7.4.8.2 Significance of the effect on the Local Landscape Setting

257 the Local Landscape Setting would be not significant during the initial decommissioning / construction and operational phases, due to a combination of the medium to low or lower magnitude of change and the medium or medium to high sensitivities of the LCAs.

6.7.4.9 Landscape Setting

- The 5 to 15 km radius that comprises the Landscape Setting of the Development is covered by 11 LCAs, of which four are considered to have potential to undergo significant effects as a result of the Development. Three of these are those that also cover the Local Landscape Setting, namely, Bnevenagh, Roe Basin and Eastern Binevenagh Slopes LCAs with the fourth being the Glenshane Slopes LCA. The baseline characteristics of these LCAs are described in Section 6.7.4 of this Chapter.
- 259 The Roe Basin LCA covers the Landscape Setting within an arc round the Development from the north-west across the west and round to the south-south-west, extending well beyond the 15km limit of the Landscape Setting. The Binevenagh LCA extends to the north (to the coast) and south of the Development. The Eastern Binevenagh Slopes LCA runs through the eastern extents of the Landscape Setting from north to south with the Glenshane Slopes LCA extending from its southerly boundary at a range of 8 km from the Development out to beyond the 15 km limit of the Landscape Setting.
- The Binevenagh and Glenshane Slopes LCAs have been assessed as having a medium to high sensitivity whilst the Roe Basin and Eastern Binevenagh LCAs have been assessed as having a medium sensitivity to the Development.
- The operational windfarms of Dunbeg and Dunmore are located within the Binevenagh LCA part of the Landscape Setting to the north of the Study Area. The Altahullion and Glenconway Windfarms are located within the Loughermore Hills LCA in the western part of the Landscape Setting. These windfarms have an influence on the Roe Valley LCA which is located just to the east. The Brockaghboy Windfarm is located within the Glenshane Slopes LCA. The Operational Rigged Hill Windfarm is also influential on the baseline character of the Landscape Setting as are the numerous single and pairs of moderately sized turbines located across the lower lying slopes and settled areas of this landscape.

6.7.4.9.1 Magnitude of change

- The Development lies beyond the 5 to 15 km radius defined as the Landscape Setting, therefore, the change to landscape 262. character in this area would be indirect and perceived, whereby landscape character is altered through the visual influence of the Development as part of the wider context. Within the Landscape Setting the magnitude of change on landscape character would vary according to the level of visual influence of the Development, with distance as a key consideration, as its impact from a distance of 5 km would vary considerably from that at 15 km.
- The ZTV shows theoretical visibility to be widespread across the Roe Basin LCA, however, actual visibility at this range is 263. somewhat constrained by the screening effect of intervening vegetation, particularly around properties and along roadsides and rivers.
- Within the Binevenagh LCA part of the Landscape Setting theoretical visibility is shown to be restricted by successive 264. intervening landforms which limit the extent of visibility of the Development from the areas beyond them. These landforms do, however, offer the potential for theoretical visibility from their Development facing slopes and summits which include the mountains of Benbradagh and Binevenagh which are located within the Landscape Setting. Views from these locations are represented by Viewpoints 10 and 13 respectively.
- Within the Eastern Binevenagh Slopes LCA part of the Landscape Setting, theoretical visibility is shown to be widespread across an arc from the north-east, round the east to the south-east. Further north however theoretical visibility is shown to be

The effect on the parts of the Roe Basin LCA, Binevenagh LCA and Eastern Binevenagh Slopes LCA that are located within

limited by the intervening landform of the Binevenagh LCA. Two factors limit actual visibility from the Eastern Binevenagh Slopes LCA. Firstly, at close range the intervening forestry cover of the Binevenagh LCA reduces the visible height of the turbines. Secondly, from more distant locations the screening effect of intervening vegetation markedly reduces actual visibility of the Development and, therefore, its influence on the character of this landscape.

- The Glenshane Slopes LCA is shown to have theoretical visibility across its northerly extents and north-west facing hill slopes. 266 Due to the open nature of the grass moorland landcover, views of the Development are likely to be widespread here. However, this part of the landscape is already highly characterised by the Brockaghboy Windfarm which is seen at close range within this part of the landscape.
- At a range of 5 to 15 km the combined decommissioning / construction and operational phases of the Development would be 267. similar, in terms of the magnitude of change that these phases of the Development would have, in views from the Roe Basin LCA.
- The presence and activity of construction machinery (in views from the Roe Basin LCA) as well as tall cranes, in combination with the decommissioning of the Operational Rigged Hill Windfarm turbines and the construction of the Development turbines would be the main influence on the character of these LCAs during the combined initial decommissioning and construction phases.
- While such activities could be visible at a range of 5 to 10 km, set on the upland ridge and west facing slopes of Rigged Hill, 269 the separation distance would reduce their influence, especially owing to the broad extent of the valley and the presence of tree cover and hedgerows which makes this landscape more enclosed and introverted. The effect would also be moderated by the baseline presence of Operational Rigged Hill Windfarm, in the same general location, which would prevent the Development from occurring as a new influence.
- The magnitude of change to the character of the part of the Landscape Setting that is covered by the Roe Basin LCA during 270. the combined decommissioning and construction phases would be medium to low or lower.
- The effects on the Binevenagh, Eastern Binevenagh Slopes and Glenshane Slopes LCAs are likely to be of a lesser level during the combined decommissioning and construction phases due to the more limited extent of visibility of the decommissioning/construction processes across the Site due to intervening landform and forestry. The magnitude of change would be low or lower.
- 272. During the operational phase, the effects would relate principally to the presence and movement of the Development turbines as well as the presence of the access road on the westerly side slope of Rigged Hill, where views are obtained, which would generally be visible from the Roe Valley Basin part of the Landscape Setting. The key consideration is the degree to which the character differs from the baseline, which has been modified by and is already partially characterised by the Operational Rigged Hill Windfarm.
- The presence of the Development turbines and new infrastructure within the views is more widespread and has a greater 273. influence than that of the Operational Rigged Hill Windfarm that forms part of the baseline character of the wider views, particularly from the open areas to the west, however its fewer, more widely spaced turbines also has some advantage in appearing less dense and of greater simplicity than the Operational Rigged Hill Windfarm. The relatively long length and simplicity of the ridgeline character assists with accommodating the turbines.
- The larger scale of the Development turbines compared to the Operational Rigged Hill Windfarm turbines would have an 274. increased influence on the character of the LCA, owing to their increased vertical extent in contrast with the largely horizontal nature of the LCA. This larger scale, would be emphasised through comparison with the scale of the surrounding landform and features (including buildings and the operational Terrydoo Road turbines). However, due to the greater distances from the Development being considered here the effect of intervening woodland and roadside vegetation would reduce actual visibility from many locations within the Roe Basin LCA. In addition, the increased distance also reduces the relative scale of the Development and its contribution to the contextual character of the LCA, which is influenced by many factors including other windfarms to the west.
- During operation the magnitude of change in the character of the Roe Basin LCA in the area lying within the Landscape Setting of the turbines would be low or lower.

Within the Binevenagh and Eastern Binevenagh Slopes LCAs the magnitude of change to the landscape character during the decommissioning, construction and operational phases would be low or negligible. This is largely as a result of the more restricted visibility of the Development. Intervening forestry is a factor in this, whilst landform screening and the orientation of the windfarm so that it extends across a much lesser horizontal extent in views from the north and south, are also factors.

6.7.4.9.2 Significance of the effect on the Landscape Setting

The effect on the parts of the Roe Basin, Binevenagh, Eastern Binevenagh Slopes and Glenshane Slopes LCAs that are 277 located within the Landscape Setting would be not significant during the combined decommissioning and construction phases as well as the operational phase. This is largely as a result of the reduced magnitudes of change due to distance, restricted visibility within the LCAs due to intervening vegetation, the fact that the Operational Rigged Hill Windfarm is part of the baseline character and the wide range of contextual influences which include other windfarms.

6.7.4.10 Landscape Planning Designations

- 278. Designations have the potential to incur significant effects resulting from the Development:
 - Sperrin AONB:
 - Binevenagh AONB; and
 - Dog Leap SS.
- 279. The effect on each of these areas is assessed below. The Landscape Planning Designations which occur within the remainder of the Study Area were found through the initial filtering process to not have the potential to receive significant effects and have therefore not been assessed in any further detail.

6.7.4.10.1 Sperrin AONB

- Lying in the heart of Northern Ireland, the Sperrin AONB encompasses a largely mountainous area of great geological complexity with an abundance of natural tourism resources in the form of natural features, such as lakes, rivers, valleys and forests. It provides an attractive destination for a wide range of outdoor activities. Spanning four Council areas the AONB stretches from the Strule Valley in the west to the outer edge of the Lough Neagh lowlands in the east. This area presents a vast expanse of moorland penetrated by narrow glens and deep valleys. The area is rich in historic and archaeological heritage as well as having a strong association with folklore.
- In the absence of a citation or a description of the 'special gualities' or key landscape characteristics of the AONB, the assessment of effects on the landscape character of the AONB is based on the LCAs that cover the AONB.
- The AONB is the largest in Northern Ireland and is covered by a number of LCAs, however only the following LCAs are located within the Study Area:
 - 36. Binevenagh;
 - 29. Sperrin Mountains;
 - 39. Glenshane Slopes;
 - 37. Roe Basin;
 - 30. Sperrin Foothills;
 - 51. Garvagh Farmland;
 - 40. Upper Moyola Valley;
 - 41: Slieve Gallion;
 - 28. Glennelly Valley; and •
 - 24: South Sperrin.
- Only the northern part of the Sperrin AONB lies within the 5 to 15 km radius where it is considered that potential significant effects on landscape character may arise. The LCAs that coincide with this northerly part of the AONB are the Roe Basin, Sperrin Mountains, Binevenagh and Glenshane Slopes LCAs.
- The closest point of the AONB to the Development occurs at a range of 5.9 km within the Roe Basin LCA, where it closely 284 follows the northerly edge of the Sperrin LCA around the lower slopes of Benbradagh Mountain.

Through the Scoping process and further preliminary assessment it has been agreed that the following Landscape Planning

- The Sperrin Mountains LCA is shown on the ZTV on Figure 6.6b to have very little theoretical visibility within a range of 5 to 15 km. The effects on that part of the landscape were scoped out of the assessment through agreement with the consultees as it was assessed at an early stage that effects on the Sperrin Mountains LCA would be not significant.
- The findings of the assessments of the effects on the landscape character of the Roe Basin, Binevenagh and Glenshane 286 Slopes LCAs, where they lie within the area defined as the Landscape Setting of the Development, are relevant to this assessment as this assessment covers the effects on these LCAs at ranges of 5 to 15 km. The assessment of the sensitivity of these LCAs takes into account their heightened value as a result of the AONB designation.
- ^{287.} It was found that the effects on the parts of the Roe Basin, Binevenagh, Eastern Binevenagh Slopes and Glenshane Slopes LCAs that are located within the Landscape Setting would be not significant during the combined decommissioning and construction phases as well as the operational phase. This is largely as a result of the reduced magnitude of change due to distance, restricted visibility within the LCAs due to intervening vegetation, the fact that the Operational Rigged Hill Windfarm is part of the baseline character and the wide range of contextual influences which include other windfarms.
- The effects on the Sperrin AONB are therefore assessed as not significant.

6.7.4.10.2 Binevenagh AONB

- This AONB is relatively small in scale. It is focussed on the upland area of Binevenagh with its steep slopes and exposed rock 289. formations which form a distinctive headland and vantage point. In addition, the AONB extends along the northern coastline and part of the eastern shores of Lough Foyle encompassing long beaches and extensive dune systems.
- In the absence of a citation or a description of the 'special gualities' or key landscape characteristics of the AONB, the 290. assessment of effects on the landscape character of the AONB is based on the LCAs that cover the AONB.
- The AONB is covered by a number of LCAs: 291.
 - 36. Binevenagh; ٠
 - ٠ 37. Roe Basin;
 - 38. Eastern Binevenagh Slopes;
 - 54. Coleraine Farmland; and
 - 35. Magilligan Lowlands.
- The majority of the Binevenagh AONB lies within the 2-15 km radius where it is considered significant effects on landscape 292. character may arise.
- The closest point of the AONB to the Development occurs at a range of approximately 2.4 km within the Roe Basin LCA, 293. where further east the boundary closely follows lower slopes of Binevenagh Mountain along the route of the B66 road.
- The Coleraine Farmland and the Magilligan Lowlands LCAs were scoped out of the assessment through agreement with the 294. consultees as it was assessed at an early stage that effects on these LCAs would be not significant largely as a result of distance. It is also notable that the areas of these LCAs that coincide with the AONB have limited areas where there is theoretical visibility of the Development as shown on Figure 6.6b.
- The findings of the assessments of the effects on the landscape character of the Roe Basin, Binevenagh and Eastern 295. Binevenagh Slopes LCAs, where they lie within the area defined as the Local Landscape Setting and the Landscape Setting of the Development, are relevant to this assessment as these findings cover the effects on these LCAs at ranges of 2 to 5 km and 5 to 15 km respectively. The assessment of the sensitivity of these LCAs takes into account the heightened value of these areas of land as a result of the AONB designation which covers part of these areas.
- The effect on the parts of the Roe Basin LCA and the south facing slopes of Keady Mountain in the Binevenagh LCA that are 296. located within the Local Landscape Setting would be not significant during the initial decommissioning / construction phases and the operational phase, due to a combination of the medium to low magnitude of change and the medium or medium to high sensitivities of the LCAs.

- The effect of the Development on the other areas of the Binevenagh and Eastern Bineveangh Slopes LCAs is assessed as not significant due to the lower magnitudes of change that would occur, along with the sensitivity levels of medium to high and medium respectively.
- The effect on the parts of the Roe Basin, Binevenagh, Eastern Binevenagh Slopes and Glenshane Slopes LCAs that are located within the Landscape Setting would be not significant during the combined decommissioning and construction phases as well as the operational phase. This is largely as a result of the reduced magnitudes of change due to distance, restricted visibility within the LCAs due to intervening vegetation, the fact that the Operational Rigged Hill Windfarm is part of the baseline character and the wide range of contextual influences, which include other windfarms.
- It is therefore assessed that the effects on the character of the Binevenagh AONB would be not significant. 299.

6.7.4.10.3 Dog Leap Supplementary Site **Baseline character**

- The Register of Parks, Gardens and Demesnes of Special Historic Interest Northern Ireland (NIEA 2007) describes the property as follows:
- 'The house was built in 1923 to the designs of Buchanan and Reid and the gardens evolved from that time. A well planted 301 and maintained ornamental garden lies to the south and west of the house. Among the features are a rockery, ponds, rose garden and lawns. The site slopes down towards the River Roe. Gardens open for wedding photos'.
- 302. The land slopes gradually from north to south across the property which is located just to the east of the Roe Valley. To the north there is a belt of woodland with large farmsteads beyond. To the west there are open fields and thereafter the substantial woodland that surrounds the Roe Valley which also runs to the south of the property. To the east the property is separated from the B68 by a further open field.
- The house itself is located in the north-east corner of the broadly rectangular gardens. There is a gated entrance on the east side of the property where access is from Dogleap Road.
- There are substantial mature trees and ornamental plantings around the house and gardens which provide screening and filtering of views to the landscape beyond.

Sensitivity

- The value of this designated landscape is medium to high. The landscape to the west and south of the gardens is also contained in the Register with its woodland providing containment to the views from the Dog Leap gardens in those directions.
- The susceptibility of the gardens to the effects of the Development is medium. The susceptibility is moderated by the distance to the Development as well as the garden's containment and the screening and filtering of views in the direction of the Development, which currently include the Operational Rigged Hill Windfarm. While this means the Development would not add a new type of influence to the contextual character of the gardens, the larger scale of its turbines would mean that it would increase the influence and this in turn increases the susceptibility. The ornamental gardens are described as being the west and south of the house so that the main aspects and views from the house are likely to be in these directions and not east towards the Development.
- 307. sensitivity rating.

Magnitude of change

- The Development would be seen to the east of the gardens at a range of approximately 6.9 km to the nearest turbine. The closest Viewpoints to the property are Viewpoints 3, 4 and 11. These provide an indication of the likely magnitude of change in the views to the east of this property, however, the intervening trees and other vegetation around the property's eastern boundary would ensure less open views from the garden area.
- The magnitude of change in the views from these gardens would be medium to low during the decommissioning / construction 309. and operational phases.

The combination of the value of the LCA and its susceptibility to the Development would give rise to an overall medium to high

Significance of effect

The effect on the views from the Dog Leap gardens would be not significant. This takes into account the medium to high sensitivity and the medium to low magnitude of change. The main views across the gardens are not in the direction of the Development, which lies to the east but across the gardens to the south and west. Intervening screening by the house itself as well as garden planting ensures that the key views from the gardens do not incur significant effects.

6.7.5 Assessment of Effects on Visual Amenity

- Effects on visual amenity are the changes to views experienced by people that result from the introduction of the Development. The assessment of effects on views includes effects on the 19 viewpoints which illustrate visibility of the Development from points within the Study Area, and effects on the principal visual receptors such as settlements and routes that are represented by these viewpoints.
- The viewpoint locations are shown in conjunction with the blade tip ZTV on Figures 6.6a (A3 size) and 6.6b (A1 size) and the hub height ZTV on Figure 6.7. The viewpoints are illustrated in wirelines and photomontages in Figures 6.28 to 6.46. Visualisations have been prepared to the standards of SNH 2017 guidance, as agreed through the Scoping process. In accordance with guidance, viewpoints located within 20 km of the Development turbines are represented by both wirelines and a photomontage whilst those located at a greater distance are represented by wirelines only.
- In the wirelines, the Development turbines are shown in red, operational and under-construction wind farms are indicated in black, under construction in purple, consented wind farms in green and application-stage wind farms in blue (as defined in Table 6.5).
- In Viewpoint 1: Terrydoo Road two slightly different viewpoint locations have been used to illustrate the baseline view towards 314. the Site in the 90 degree field of view and 53.5 degree field of view images. The use of photographs taken from different sides of the road was considered to provide the best understanding of the Development on the Site and the wider cumulative context, which would otherwise have been screened by hedgerows.
- ^{315.} Due to the length of time between starting work on the LVIA and preparing the submission documentation some of the photographs have had the Terrydoo Road turbines added to the baseline view as a photomontage as they were not present when the earliest photographs were taken.
- Section 6.5: Baseline Description identifies the viewpoints and principal visual receptors that have the potential to undergo 316. significant effects (including significant cumulative effects) and therefore require further assessment. The effect on each of these viewpoints and principal visual receptors is assessed below. The other viewpoints and principal visual receptors were found through the initial filtering process to not have the potential to undergo a significant effect and have therefore not been assessed in any further detail. The viewpoints and associated principal visual receptors that are assessed in more detail are set out in the following sections.

6.7.5.1 Viewpoint 1: Terrydoo Road 6.7.5.1.1 Baseline

- The viewpoint is located on the minor Terrydoo Road, which provides a north-south link between Ringsend Road in the north and Drumsurn Road in the south passing close to west of the Site. This viewpoint illustrates a view towards the Site at Rigged Hill from the minor Terrydoo Road and is representative of the type of view that may be gained from the nearby residential properties.
- The view shows a field gate and the hedgerow boundary that runs alongside the road, beyond which, agricultural pasture 318. covers the gently rising and rolling landform. In contrast, rough grassland covers the upper slopes of Rigged Hill, occurring as a narrow band following the long linear ridge above the improved pasture. The turbines of Operational Rigged Hill Windfarm are visible as moderately sized, moving objects on the skyline. Whilst they are apparent as a component of the landscape, the turbines are one of a number of characterising features in the view, with other elements also appearing prominent.
- The roofs of nearby houses can be seen amongst trees and garden vegetation with Donald's Hill seen on the skyline beyond. 319. Pole mounted transmission lines are also apparent as vertical features within this view.
- This viewpoint lies close to the marked transition of the landscape from the low lying, cultivated and settled landscape of the 320. Roe Basin LCA and the higher, grass moorland hills of the Binevenagh LCA, which can be seen rising as a narrow strip of hill

land above the pastoral fields. The main focus of the view is the rising landform of Donald's Hill and the woodland around the nearby houses which are seen in the view south-south-east.

- The residential properties in the vicinity, tend to be located close to the road or along minor access roads. The main aspects 321 of the houses generally follow the alignment of the road with many of them having either their rear or front elevations and gardens facing towards the Site on Rigged Hill. The Residential Visual Amenity Survey provides further detail on the specific views from the houses.
- In views to the north-east, there are two moderately scaled turbines (34 Terrydoo Road) visible above the intervening trees. To the south-west, the Glenconway and Altahullion Windfarms are apparent on the upland area beyond the Roe Valley at a range of 11.90 km and 12.77 km respectively.

6.7.5.1.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (in the direction of the Site) lie within an 323. area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users.
- The specific view is one that would be obtained by users of the minor road as they travel along it (generally in a southerly direction), such that viewers would generally be transient. While the view direction of road-users would be perpendicular to the road in this instance, it would be just off to the side of the direct line of travel from more distant locations to the north and south of the route. Residents are also considered as receptors in this viewpoint assessment and are considered to have a higher susceptibility than transient road users as their views from within their properties or from garden grounds, would potentially be of longer duration and greater regularity.
- The views along the road and from nearby properties are often contained by the roadside hedgerows and other vegetation 325 however, from more elevated sections and sections where gaps in vegetation occur, longer range views open up.
- The susceptibility of rural residents in this area would be medium to high. Rigged Hill forms an important landform feature in the local landscape, appearing prominent in views from Terrydoo Road owing to its close proximity and elevated ridgeline. Its prominence is, however, moderated by the influence of the wider landscape in the panoramic views across the Roe Basin. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as **medium to high** as a result of a medium value and a medium-high susceptibility to the proposed change.

6.7.5.1.3 Magnitude of Change

- The photomontage in Figure 6.28g shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible, set on, or behind, the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 1.61 km.
- The proximity of the Site to Terrydoo Road and the properties along it means that much of the decommissioning works associated with Operational Rigged Hill Windfarm and construction works associated with the Development would be readily visible, including for the construction of the access roads and the presence and activity of the tall cranes, as well as the turbines being decommissioned and constructed.
- The change in this view during construction would involve the removal of a section of hedgerow to form the junction and sight 330. lines. The construction compound and storage areas would be seen from this viewpoint, as well as construction signage and fencing. Beyond this, the alterations in the landform and the construction of the access roads and decommissioning and construction traffic, with heavy machinery would be seen traversing the agricultural pasture. Due to the undulating landform, the track itself would disappear beyond an intervening rise for a section of its route. Thereafter, it would be seen traversing across the open hill slope as a relatively narrow feature, made temporarily more visible in the parts under construction where the machinery is present.

- The tall structures of the turbines and cranes could be perceived to be at variance with the scale of Rigged Hill and the magnitude of change during the initial decommissioning / construction phases would be high. The general activity during the overall works programme would continue for a longer period than the presence of the cranes and would include earthworks to make up the levels and the construction of transformers at the base of each turbine. Many sections of the existing access tracks would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, all of the remaining turbine access tracks and transformers would be screened by the brow of the hill from this location.
- At the end of the temporary construction phase the construction compound would be removed and the permanent fence lines instated behind the sight lines up to the gated junction mouth, which would be set back from the road edge.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. 333. The following factors would add to the magnitude of change on the views of local residents and predominantly south bound road-users in the Terrydoo Road area, during this phase;
 - The close proximity of the Development to residents and road-users would mean that the Development turbines would appear as large scale moving structures on the skyline of this locally prominent hill ridge;
 - The operational access road would also be apparent as a new development feature at this location close to where the access point junction would be located and crossing the hill slopes;
 - The Wind Turbines of the Development would be perceived to have a notably larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed. No direct scale comparison would be possible. Any perceived increase would be based on people's recollection of the difference in the comparative scale of these Wind Turbines and the features of the landscape in the views; Only the upper extents of the Met Mast would be visible above the skyline and its more slim line form would be seen between the Wind Turbines of the Development;
 - The Development would be apparent across a greater extent of the skyline than the Operational Rigged Hill Windfarm;
 - The Development would be seen in combination with the two smaller Terrydoo Road turbines, with the variance in scale accentuating the larger scale of the Development turbines;
 - Because Rigged Hill is not seen to its full height, the comparative scale of the Development turbines would reduce the perceived scale of the hill;
 - There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms; and
 - The angle of the view to the hill summit and turbines means that some residents may not gain clear views from their internal living spaces, however the Development would be likely to be visible from nearby garden grounds and approaches.
- The following factors would moderate the magnitude of change on the views of residents and road-users in the Terrydoo Road 334. area, during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The turbines would appear evenly spaced and form a composition that appears legible across a single hill landform of the upland landscape;
 - There would be a sufficient gap between the Development and the two smaller Terrydoo Road turbines to ensure that they do not create a confusing image due to the comparatively larger scale of the Development turbines;
 - The view is simple and there are few elements within it that provide scale comparators, such that the scale of the Development turbines may not be as readily apparent as might otherwise have been the case;
 - The Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect; and
 - The increase in the cumulative effect that the Development would give rise to would occur in a separate part of the view and landscape to the other cumulative windfarms which occur on the upland area to the east of the Roe Valley.
- Taking all these factors into account, the magnitude of change on the views of residents and road-users as a result of the operational phase of the Development would be medium to high.

6.7.5.1.4 Significance of Effect

The effect of the Development on residents and road-users would be significant during both the decommissioning / construction and operational phases. This finding relates chiefly to the proximity of Terrydoo Road to the Development, and the increased influence that the larger turbines and access tracks would have on the character of the views, despite there being a baseline influence from Operational Rigged Hill Windfarm.

6.7.5.2 Viewpoint 2: Temain Road to Aghansillagh and Temain Hill 6.7.5.2.1 Baseline

- This viewpoint illustrates a view towards the Site on Rigged Hill from the minor Temain Road, which traverses up the hill slopes between Temain Hill and Craiggore.
- The view shows the near fenced field boundary with further, parallel boundaries formed of the remains of stone walls, fences 338. and hedgerows. These define medium sized fields of pasture across gently rising, rolling landform. There are a number of brightly coloured farm buildings seen within the area of lower ground. Pole mounted transmission lines are also apparent as vertical features within this view.
- This viewpoint lies close to the marked transition of the landscape from the low lying, cultivated and settled landscape of the Roe Basin LCA and the higher, grass moorland hills of the Binevenagh LCA, which can be seen rising as a narrow strip of upland above the pastoral fields.
- Beyond a band of trees and hedgerow trees, which mark the middle slopes, rough grassland covers the rising upper slopes to 340. the summit of Rigged Hill. The rough grassland side slopes have some sub-division by field boundaries in a variety of forms with some variation in landcover occurring as a result of wetter areas and ditches running off the hill side. Darker patches of heather moorland can be seen near to the summit and relatively low ridge of Rigged Hill.
- The turbines of Operational Rigged Hill Windfarm are visible as moderately sized, moving objects on the hill skyline above. Whilst they are apparent as a component of the landscape, the turbines are one of a number of characterising features as other components of the view are also prominent. The skyline is also characterised by the dark form of coniferous forestry plantation encroaching over a short section.
- In views to the north-east there are two medium sized turbines (34 Terrydoo Road) visible on the skyline. To the south-west 342. the Glenconway and Altahullion group of windfarms is apparent on the upland area beyond the Roe Valley at a range of 10.89 km and 11.66 km respectively. Other more distant windfarms are also visible on the upland skyline and single turbines are visible at closer range within the settled landscape of the Roe Valley.

6.7.5.2.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view lie (in the direction of the Site) within an area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents, but also road-users.
- This is a view that would be obtained by users of the minor road as they travel along it (in an easterly direction) such that 344. viewers would generally be transient. There are a number of houses near to the viewpoint location so that this viewpoint is also representative of residential receptors. Residents are considered to have a higher susceptibility than transient road users as their views potentially are of longer duration and greater regularity.
- occur, longer range views open up. The existing turbines draw the attention of viewers towards Rigged Hill as they travel along Temain Road.
- The susceptibility of rural residents in this area would be medium to high. Rigged Hill forms an important landform feature in the local landscape, owing to its close proximity, its elevated position above the viewpoint and its enclosure of the view. Its prominence is moderated by its position beyond the fore to middle ground of farmland. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a medium value and a medium to high susceptibility to the proposed change.

While views from along the road are often contained by vegetation, in sections of higher elevation or where gaps in vegetation

6.7.5.2.3 Magnitude of Change

- The photomontage in Figure 6.29g shows that the Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind, or slightly to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 2.02 km.
- ^{349.} The proximity of the Site to Temain Road and the properties along it means that much of the decommissioning works and construction works associated with the Development would be readily visible. The most prominent features would be the decommissioning and construction of the turbines, and the associated tall cranes, decommissioning and construction traffic traversing the access tracks, including for the movement of heavy machinery, which would be seen on open hill slopes during these phases, and this unusual occurrence (within this upland landscape) would make the Development more noticeable.
- Because Rigged Hill is not seen to its full height, the comparative scale of the Development turbines and cranes would reduce the perceived scale of the hill and the buildings that are seen within the mid-ground of this view. The magnitude of change during the initial combined decommissioning / construction phases would be high. The general activity during the overall works programme would last longer than the presence of the cranes, and works associated with the decommissioning and construction of the turbines, and would include earthworks to make up the levels and the construction of transformers at the base of each turbine. Many sections of the existing access tracks would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, most of the turbine access tracks and the majority of the external turbine transformers, located at the base of the proposed turbines would be screened by the brow of the hill. The transformer located at the base of Wind Turbine 5 is sited to the east of the tower so that it is also largely screened in views from the west.
- 351. At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- ^{352.} During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of local residents and road-users travelling generally in an easterly direction in the Temain Road area during this phase;
 - The close proximity of the Development to residents and road-users would mean that the Development turbines would appear as large scale moving structures on the skyline of this locally prominent hill top;
 - The operational access road would appear as a new development feature crossing the hill slopes;
 - The Met Mast would be visible on the skyline to the south of the Wind Turbines of the Development however, its presence will be less noticeable than the turbines due to its smaller, slender construction;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;);
 - The Development would be apparent across a greater extent of the skyline than Operational Rigged Hill Windfarm;
 - The Development would be seen in combination with the two smaller Terrydoo Road turbines, with the variance in scale accentuating the larger scale of the Development turbines;
 - The Development turbines would be seen in the context of other buildings, such that their comparatively larger scale would be readily apparent;
 - Because Rigged Hill is not seen to its full height, the comparative scale of the Development turbines from this location would appear to reduce the perceived scale of the hill;
 - There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms; and
 - The angle of the view to the hill summit and turbines means that some residents may gain clear views from their internal living spaces and from nearby garden grounds and approaches.
- The following factors would moderate the magnitude of change on the views of residents and road-users in the Temain Road 353. area, during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The turbines would appear evenly spaced and form a composition that appears legible in this upland landscape;
 - The ridgeline setting allows the majority of the turbines to be set back beyond the horizon created by the rounded hill slope;
 - The scale and simplicity of the features on Rigged Hill assist with accommodating the Development;

- The operational access road would be used infrequently by vehicles and over time vegetation would re-establish so that its presence would be less obvious;
- There would be a sufficient gap between the Development and the two smaller Terrydoo Road turbines to ensure that • they do not create a confusing image due to the larger scale of the Development turbines;
- The Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect; and
- The increase in the cumulative effect that the Development would give rise to would occur in a separate part of the view and landscape to the other cumulative windfarms which occur on the upland area to the east of the Roe Valley.
- Taking all these factors into account, the magnitude of change on the views of residents and predominately east bound roadusers as a result of the operational phase of the Development would be **medium to high**.

6.7.5.2.4 Significance of Effect

The effect of the Development on residents and east-bound road-users would be significant during both the 355. decommissioning / construction and operational phases. This finding relates chiefly to the proximity of Temain Road to the Development, and the increased influence that the larger turbines and visibility of access tracks would have on the character of the views where these are seen, despite there being a current influence from the Operational Rigged Hill Windfarm.

6.7.5.3 Viewpoint 3: Edenmore Road, Limavady 6.7.5.3.1 Baseline

- This viewpoint is located near the south-easterly edge of the town of Limavady. Where the viewpoint is located, housing is set out along the west side of the street with their main aspects facing north-east. This is with the exception of a single, isolated house at the southerly extent, which lies on the east side of the road and faces the road. There is also a small military establishment on the east side of the road, however its boundaries are largely enclosed by vegetation. The southerly edges of the settlement are formed by the rear boundaries of the properties, which are predominantly single storey but with some visibility over garden boundaries to the open countryside and the hills to the south-east and south.
- The view is taken from the westerly pavement so that the road and fenceline boundary form part of the foreground. Whilst this 357. view is across pastoral fields with some woodland and overgrown hedgerows, signage, lighting columns and pole mounted transmission lines reinforce the urban edge character of this view. The scattered dwellings and farm buildings are also evidence of the settled nature of this agrarian landscape.
- Field boundary vegetation screens much of the middle distance and the hill slopes between Keady Mountain and Donald's Hill can be seen rising above this with forestry, wind turbines, some access tracks and telecoms masts apparent on the hill slopes. The valley that runs between Keady Mountain and Boyd's Mountain and which provides a route across the hills for the B66, is apparent, as is the forestry and more settled side slopes which run alongside the route.
- A single turbine is apparent above the intervening trees and the two turbines at 34 Terrydoo Road are also visible higher up the slopes. To the north-west the Dunmore and Dunbeg group of windfarms is apparent in the valley area between Keady Mountain and Binevenagh at a range of 8.51 km and 7.96 km respectively. Single turbines are visible at closer range within the settled landscape of the Roe Valley.
- The Wind Turbines of the Operational Rigged Hill Windfarm are apparent as relatively small scale, moving, vertical features on the skyline.

6.7.5.3.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the majority of the view (towards the Site) lie within an area that is covered by a landscape planning designation. However, a small section (Keady Mountain) of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users.
- This is a view that would be experienced by users of this relatively minor road as they travel along it (in a southerly direction), 362. such that viewers would generally be transient. There are a number of houses near to the viewpoint location so that this viewpoint is also representative of residential receptors on the edge of Limavady. Residents are considered to have a higher susceptibility than transient road users as their views are potentially of longer duration and greater regularity.

- The views from along the road are often contained by vegetation, however, in elevated sections or where gaps in vegetation occur, longer range views open up. The existing turbines draw the attention of viewers towards Rigged Hill from their properties or gardens and as they travel southwards along Edenmore Road.
- The susceptibility of residents in this area would be medium to high. Rigged Hill forms an important landform feature in the 364 local landscape, owing to its elevation above the valley and the enclosure it provides. Its prominence is moderated by its separation distance from the viewpoint and its position beyond the fore to middle ground of farmland. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a medium value and a medium-high susceptibility to the proposed change.

6.7.5.3.3 Magnitude of Change

- The photomontage in Figure 6.30e shows that the Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind, or to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 6.14 km.
- The distance of the Site to Edenmore Road and the properties along it, means that much of the decommissioning and construction works associated with the Development would be visible. The most prominent features would be the decommissioning and construction of the turbines and the associated tall cranes, with decommissioning and construction traffic including for the use of heavy plant traversing the access roads, along a relatively narrow route extending across a small section of this view where it crosses upper slopes. This relatively unusual occurrence (within this upland landscape) would make the Development more noticeable.
- The full height and much of the simple landform of Rigged Hill is apparent at this range and therefore the tall elements of the turbines and cranes would not appear at variance with its scale, although they would appear large compared with the Terrydoo Road turbines and the masts on Temain Hill. The magnitude of change during the decommissioning / construction phases would be medium. The general activity during the overall works programme would last longer than the presence of the cranes and would include earthworks to make up the levels and the construction of transformers at the base of each turbine although the majority of these would be screened by the intervening landform. Many sections of the existing access tracks and disturbed areas would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the more distant access tracks would be screened by the brow of the hill, however those of the closest turbines would be visible, extending across the upper slope of the hill.
- At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- During the operational phase, the effects would relate principally to the presence and movement of the proposed Development turbines. The following factors would add to the magnitude of change on the views of local residents and road-users travelling south in the Edenmore Road area during this phase;
 - The proximity of the Development to residents and road-users would mean that the Development turbines would appear as medium scale moving structures on the skyline of this locally prominent hill top;
 - The operational access tracks, including for the access tracks serving the closest proposed turbines would also be visible as a new development feature crossing the hill slopes;
 - The Met Mast would be visible on the skyline to the south of the Wind Turbines of the Development however, its presence will be less noticeable than the turbines due to its smaller, slender construction;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be apparent across a slightly increased extent of the skyline than the Operational Rigged Hill Windfarm:
 - The Development would be seen in combination with the two smaller Terrydoo Road turbines and the masts on Temain Hill, with the variance in scale accentuating the larger scale of the Development turbines; and

- There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- 371. The following factors would moderate the magnitude of change on the views of residents and road-users in the Edenmore Road area, during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same location;
 - The turbines would form a composition that appears legible and well-contained in this simple upland landscape;
 - The operational access road would be used infrequently by vehicles and over time vegetation would re-establish so that its presence would be less obvious;
 - There would be sufficient separation between the Development and the two smaller Terrydoo Road turbines and this •
 - reduce its cumulative effect owing to continuity in appearance; and
 - the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and road-users travelling south as a result of the operational phase of the Development would be medium.

6.7.5.3.4 Significance of Effect

The effect of the Development on residents and road-users would be significant during both the decommissioning / 373. construction and operational phases. This finding relates chiefly to the proximity of Edenmore Road to the Development, and the increased influence that the access road and the larger turbines would have on the character of the views, despite there being a current influence from the Operational Rigged Hill Windfarm.

6.7.5.4 Viewpoint 4: Roe Park Resort driveway, Limavady 6.7.5.4.1 Baseline

- 374. 5th green on the golf course. It is representative of the views that may be obtained by people using the facilities and hotel at the Roe Park Resort. Views from the main access from Limavady itself, and the parts of the resort that lie to the west of it, are generally less open than this viewpoint portrays, due to the screening effect of the intervening trees.
- Most people that would experience views from these locations are transient. While many golfers are focused on their game, the pleasant countryside setting for the course may also be part of their reason for staying or playing here, which may be a regular occurrence for local people.
- The fore and middle ground of the view are characterised by the golf course with the woodland along the banks of the River Roe enclosing this to the south-east. The large mature trees that run alongside the access road are imposing, whilst most of the trees on the golf course are younger and of a less imposing stature.
- The façade of the hotel is just visible in the view beyond a small shelter, a golf green and benches, where people may sit or gather in advance of teeing off.
- Between and above the trees, the edge of the town of Limavady is visible as roofs and some facades. Floodlighting masts are 378. visible, rising up above the Grammar School playing field, where fenced boundaries also emphasise the edge of the settlement. Rising beyond the woodland and settlement, the upper parts of the enclosing hills are apparent with Keady Mountain being the most prominent. Its quarried western slope and pockets of forestry break up its otherwise smooth, moorland covered landform.
- 379. Further south, the low point that runs between Keady Mountain and Boyds Mountain is apparent with the long, unremarkable ridge skyline, that includes Rigged Hill, extending beyond this to the more notable, angular form of Donald's Hill.

would assist in ensuring that they do not create a confusing image due to the larger scale of the Development turbines; The Development would be seen in a separate part of the view from the Dunmore and Dunbeg Windfarms which are slightly more distant and located within a valley, however the similarities in scale to those of the Development would partly

Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore

This viewpoint is located adjacent to the main driveway on the northern approach to the hotel and close to the 1st tee and the

- Operational Rigged Hill Windfarm is seen along the ridge skyline along with the masts on Temain Hill. These appear as relatively small scale moving structures within a large scale element of this view. Two turbines are also visible on the lower hill slopes further to the north, partially back-clothed by a large swathe of commercial forestry plantation.
- ^{381.} To the north of Keady Mountain and sitting beyond the school floodlighting are the larger scale turbines of Dunbeg Windfarm.

6.7.5.4.2 Sensitivity

- The value of the view is assessed as medium. The viewpoint does not lie within an area that is covered by a landscape planning designation. A small section (Keady Mountain) of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint itself is not of particular importance. There are benches located along the driveway, however their view is more directed across the golf course than in the direction of the Site. The golf course and hotel do offer recreational and leisure facilities whereby the setting is likely to be a contributory factor in the enjoyment of the activities and views. There is, therefore, a local value associated with the visual amenity, especially of visitors and people visiting this area with the partial purpose of enjoyment of the setting of the hotel and golf course.
- This is a view that would be obtained by users of this relatively minor access road as they travel along it (in a southerly direction) and also users of this part of the golf course. Viewers would therefore generally be transient. From parts of the hotel it would also be possible to have views similar to this, however, people residing in a hotel are not considered to be as susceptible as residents, due to the fact that their views are likely to be of shorter duration and less regular. The views from along the access road and from parts of the golf course are often contained by vegetation, whilst much of Roe Park Resort does not have views towards the Site.
- The susceptibility of users of Roe Park Resort would be medium. While Rigged Hill forms an important landform feature in the local landscape, its prominence is moderated by its position beyond the fore to middle-ground of the golf course and woodland, as well as the influence and extent of the wider upland landscape. Furthermore, the presence of Operational Rigged Hill Windfarm as well as Dunbeg and Dunmore Windfarms establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium as a result of a medium value and a medium susceptibility to the proposed change.

6.7.5.4.3 Magnitude of Change

- The photomontage in Figure 6.31e shows that Operational Rigged Hill Windfarm is no longer there and all seven Development turbines would be visible set on, behind, or to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 8.26 km.
- The distance of the Site to the Roe Park Resort means that much of the decommissioning and construction works associated 387. with the Development would be visible, although not prominent. The most visible features would be the decommissioning and construction of the turbines and associated cranes, albeit at this distance these will be less perceptible, and the construction of the access tracks along a relatively narrow route extending across a small proportion of this view. Decommissioning and construction traffic, including for heavy machinery would be seen, albeit at some distance, traversing the open hill slopes during these phases, and this relatively unusual occurrence (within this upland landscape) may make the Development more noticeable, at distance, subject to weather conditions, and whether clear views towards Rigged Hill may be obtained.
- The full height and much of the simple landform of Rigged Hill is apparent at this range and therefore the tall elements of the 388. turbines and cranes would not appear at variance with its scale, although they may, albeit at some distance, appear larger when compared with the Terrydoo Road turbines and the masts on Temain Hill, although these features will not appear prominent at these distances, and only in clear visibility conditions. The magnitude of change during the decommissioning / construction phases would be medium. The general activity during the overall works programme would last longer than the duration of the decommissioning and construction activity of the cranes, and would include earthworks to make up the levels, many sections of the existing access tracks would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the more distant access tracks, those relating to the closest turbines would appear at distance and would be barely discernible across the upper slope of the hill, but may draw the eye during periods of time when machinery is working on them, during clear visibility conditions.

- 389. At the end of the construction period the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of the users of the Roe Valley Resort during this phase:
 - The proximity of the Development to the Roe Valley Resort at 8.2 km would mean that the Development turbines would appear as moderately scaled moving structures on this part of the ridge skyline;
 - and its presence will be less noticeable than the turbines due to its smaller, slender construction;
 - the hill slopes at distance;
 - larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be seen across a slightly increased extent of the skyline than the Operational Rigged Hill Windfarm:
 - of variance in scale accentuating the larger scale of the Development turbines; and
 - an increased cumulative effect with these baseline windfarms.
- 391. phase:
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - landscape, which is seen at an appropriate scale to accommodate the Development;
 - wider view and not as part of the immediate context of the golf course/resort;
 - its presence would be less obvious;
 - also at this distance the Terrydoo turbines are much less visible in this view;
 - and
 - the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of people using the Roe Valley Resort as a result of the operational phase of the Development would be medium.

6.7.5.4.4 Significance of Effect

The effect of the Development on users of the Roe Valley Resort would be not significant during the decommissioning / construction and operational phases. This finding relates chiefly to the 8.2 km distance of the Roe Valley Resort to the Development, and the sporadic nature of the influence on views of the decommissioning and construction activity associated with the erection of the taller turbines and access track construction on views. The current influence of other development within the wider views and the existing visibility of the Operational Rigged Hill Windfarm are further factors considered in determining the significance of the effects.

• The Met Mast would be barely visible at this distance on the skyline to the south of the Wind Turbines of the Development

The main access track and the closest turbine access tracks would also be visible as a new development feature crossing

Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a

The Development would be seen in combination with the two smaller Terrydoo Road turbines and the masts on Temain Hill, albeit at this distance, these elements will be much less noticeable, which in turn will reduce any resulting perception

• There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to

The following factors would moderate the magnitude of change on the views of people using the Roe Valley Resort during this

The turbines would form a composition that appears legible and well-contained in this simple and unremarkable upland

The Development would be seen at 8.2 km and would take up a relatively small proportion of the upland located within the

The operational access track would be used infrequently by vehicles and over time vegetation would re-establish so that

There would be a sufficient separation between the Development and the two smaller Terrydoo Road turbines and this would assist in ensuring that they do not create a confusing image due to the larger scale of the Development turbines,

The Development would be seen in a separate part of the view from the Dunmore and Dunbeg Windfarms which are at a similar range and located within a valley, at a closer distance that the proposed Development turbines, with the similarity in scale to that of the Development which would partly reduce its cumulative effect owing to the continuity in appearance;

Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore

6.7.5.5 Viewpoint 5: Drumsurn, Beech Road 6.7.5.5.1 Baseline

- This viewpoint is located on Beech Road, which runs east-north-east and perpendicular to the main road through Drumsurn at the north end of the village. It was selected as its orientation is directly towards the Site and the view is further focussed towards Rigged Hill and Operational Rigged Hill Windfarm by the housing on both sides of the route, with the moving forms of the turbines seen across part of the moorland hill skyline above the houses.
- The houses closest to the viewpoint are single storey with their main aspects facing the road. Several of these have solar panels mounted on their roofs. Further down the hill, the houses are two-storey with some of these having their rear and side aspects towards the Site. Parked cars, public open space, lighting columns and pole mounted transmission lines further emphasise the modern urban nature of this part of the village, with the taller structures creating an obvious vertical element.
- There is a cluster of farm buildings and a house seen beyond the edge of the village, separated from it by open pastoral fields 396. and set against a backdrop of deciduous woodland. Woodland extends across the central part of the view, providing some separation between the village and the open hill landscape.
- The gently rolling slopes and ridgeline of Rigged Hill provide further containment, with the conferous forestry at Cam Forest 397 seen encroaching over the distant horizon. The turbines of Operational Rigged Hill Windfarm are apparent as relatively small scale, moving, vertical features on the skyline.
- The view in the opposite direction includes the single, Betts Road wind turbine, which is more readily associated with the settled, agricultural landscape than the upland context. In views to the north-north-east there are two moderately scaled turbines (34 Terrydoo Road) visible on the skyline. To the south-west the Glenconway and Altahullion group of windfarms is apparent on the upland area beyond the Roe Valley at a range of 9.17 km and 9.97 km respectively.

6.7.5.5.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (towards the Site) lie within an area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents, but also road-users.
- This is a view that would be obtained by users of this residential road as they travel along it (in a north-easterly direction) so that viewers would generally be transient. There are a number of houses at the viewpoint location so that this viewpoint is also representative of residential receptors in parts of Drumsurn. Residents are considered to have a higher susceptibility than transient road users as they have the opportunity for long duration and greater regularity of views.
- The existing turbines draw the attention of viewers towards Rigged Hill from the properties or gardens and as they travel along 401. Beech Road.
- The susceptibility of residents in this area would be medium to high. Rigged Hill forms an important landform feature in the local landscape, and although not the highest enclosing hill, the alignment of Beech Road towards Rigged Hill combined with its relatively close proximity raises the susceptibility of residents and road-users to the effects of the Development. The prominence of Rigged Hill is, however, moderated by its position beyond the fore to middle ground of the urban area and farmland. Furthermore, the presence of Operational Rigged Hill Windfarm (and the Betts Road turbine in the other direction) establishes this type of development as a feature of the baseline views. The Operational Rigged Hill Windfarm reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as **medium to high** as a result of a medium value and a medium-high susceptibility to the proposed change.

6.7.5.5.3 Magnitude of Change

The photomontage in Figure 6.32f shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible, set on, behind, or to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 3.84 km.

- The relatively close proximity of the Site to Beech Road and the properties along it means that much of the decommissioning works and construction works associated with the Development would be visible. The most prominent features would be the activity associated with the turbines and use of the tall cranes at various stages of decommissioning and construction.
- The construction of a section of the access road is seen along a relatively narrow route extending across much of the open part of this view. Decommissioning and construction traffic, including heavy machinery would be seen traversing the open hill slopes during these temporary phases, and this unusual occurrence (within this upland landscape) can make the Development more noticeable.
- The full height and much of the simple landform of Rigged Hill is apparent at this range and therefore the tall elements of the 407. turbines and cranes would not appear at variance with its scale, the Terrydoo Road turbines are located to the left of the view above the ridgeline of the residential properties and therefore do not form a main component or focus of this view, albeit the proposed Development turbines would appear larger when compared with the buildings located within the middle ground of this view. The magnitude of change during the decommissioning / construction phases would be medium to high. The general activity during the overall works programme would last longer than the works associated with the decommissioning and construction activity associated with the turbines and cranes and would include earthworks to make up the levels. Many sections of the existing access tracks would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the more distant access tracks and many of the transformers would be screened by the brow of the hill, those of the three closest turbines extending across the upper slope of the hill, will have the potential to be visible, but their transformers will be largely screened by the towers and seen at c 3.84 km distance.
- 408. At the end of the construction period the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- During the operational phase, the effects would relate principally to the presence and movement of the proposed Development 409. turbines. The following factors would add to the magnitude of change on the views of local residents and north-east bound road-users in the Beech Road area during this phase;
 - The relatively close proximity of the Development to residents and road-users would mean that the Development turbines would appear as large scale moving structures on the skyline of this locally prominent hill top;
 - The Met Mast would be visible on the skyline to the south of the Wind Turbines of the Development however, its presence will be less noticeable than the turbines due to its smaller, slender construction;
 - The location of the proposed turbines ahead, within the focus of the view created by the alignment of the road;
 - crossing the hill slopes;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be apparent across a greater extent of the skyline than the Operational Rigged Hill Windfarm;
 - The Development would be seen in combination with the closer buildings, with the variance in scale accentuating the larger scale of the Development turbines;
 - the houses and away from the focus of the view tempers the degree to which their scale difference is apparent; and
 - these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of residents and north-east road-users in the Beech Road area during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - their presence would be less obvious;

The operational access road and the closest turbine access tracks would also be visible as a new development feature

The Development would be seen in combination with the smaller Terrydoo Road turbines, however, their location close to Whilst they are not all visible from this location there are other single turbines and large scale windfarms within the wider views from Drumsurn and therefore the effect of the Development would give rise to an increased cumulative effect with

The turbines would form a composition that appears legible and well-contained in this simple and upland landscape; The operational access tracks would be used infrequently by vehicles and over time vegetation would re-establish so that

- There would be a sufficient separation between the Development and the two smaller Terrydoo Road turbines and this would assist in ensuring that they do not create a confusing image due to the larger scale of the Development turbines; and
- The Operational Rigged Hill Windfarm, already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and road-users as a result of the 411. operational phase of the Development would be medium.

6.7.5.5.4 Significance of Effect

The effect of the Development on residents and north-east bound road-users would be significant during both the 412. decommissioning / construction and operational phases. This finding relates chiefly to the 3.9 km distance of the Development from this viewpoint and the orientation of Beech Road to the Development, and the increased influence that the larger turbines and the section of access track visible, would have on the character of the views, despite there being a current influence from the Operational Rigged Hill Windfarm.

6.7.5.6 Viewpoint 6: Ringsend

6.7.5.6.1 Baseline

- ^{413.} This viewpoint is illustrative of the views towards the Development that would be available from a small number of elevated properties at Ringsend, as well as the minor road that provides their access. Here a minor road runs parallel to the main road on slightly higher ground so that unobstructed, panoramic views across the landscape to the south-west round to the southeast are possible. Lower properties may also obtain similar but less open views.
- The view is across a settled agricultural low-lying fore and middle ground with rising, forestry and moorland covered low hills 414. beyond. The agricultural landscape is one of moderately sized fields with subdivision by overgrown hedgerows and hedgerow trees as well as some stone walls. Some of the land appears of lower quality, which may indicate water-logging.
- There are several groups of residential properties visible, particularly along Shanlongford Road, as well as farm building clusters on the low-lying land. Pole mounted transmission lines, roads and commercial developments emphasise the settled nature of this landscape.
- The more elevated land provides containment as well as a less complex landscape of a larger scale. The turbines of Operational Rigged Hill Windfarm are not seen to their full height as their towers are partially screened by intervening forestry. They appear as relatively small scale moving structures within a large scale part of this view.
- To the south, Brockaghboy Windfarm and its extension are apparent on the upland area beyond the low-lying agricultural 417. landscape at a range of 11.16 km. Other more distant windfarms are also visible on the upland skyline to the east. Single turbines are visible at closer range within the settled landscape.

6.7.5.6.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (towards the Site) lie within an area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users.
- This is a view that would be obtained by users of this residential road as they travel along it (in a westerly direction) so that 419. viewers would generally be transient. There are a number of houses at the viewpoint location so that this viewpoint is also representative of residential receptors in parts of Ringsend. Residents are considered to have a higher susceptibility than transient road users as they have the opportunity for views of longer duration and greater regularity.
- The susceptibility of residents in this area would be medium to high. While Rigged Hill appears relatively low in scale and 420. unremarkable in character in this view from the north-east, it does form part of the outlook from the small number of properties at Ringsend. The views from the properties tend to be orientated more to the south so that the Site is slightly peripheral to the view. Furthermore, the Operational Rigged Hill Windfarm is not prominent owing to its partial screening behind the intervening landform and forestry. However, it does establish this type of development as a feature of the baseline views. This reduces

the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.

421. The sensitivity of the view has been appraised as medium to high as a result of a medium value and a medium to high susceptibility to the proposed change.

6.7.5.6.3 Magnitude of Change

- The photomontage in Figure 6.33e shows that the Operational Rigged Hill Windfarm is no longer there and all seven Development turbines would be visible in part behind the ridgeline and forestry cover of Rigged Hill. The closest Development turbine would be seen at a distance of 4.67 km. Three of the turbines would be visible as blades only, although the hubs of the turbines would be visible if the intervening forestry were to be felled.
- The distance between the Site and Ringsend means that parts of the decommissioning and construction works associated with the Development would be visible. Due to the intervening forestry the only visible elements would be the turbines being decommissioned and constructed and the tall cranes used in this process.
- The magnitude of change during the decommissioning / and construction phases would be low. This finding relates chiefly to 424. the extent to which the intervening landform and forestry would screen much of the decommissioning and construction works. The presence of the cranes would likely occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases.
- 425. During the operational phase, the effects would relate only to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of local residents and west-bound road-users in the Ringsend area during this phase;
 - The proximity of the Development to residents and road-users at Ringsend would mean that the Development turbines would appear as large scale moving structures on the skyline of this forested ridgeline;
 - The Met Mast would be just visible on the skyline above the forestry to the south of the turbines of the Development however, its presence will be less noticeable than the turbines due to its smaller, slender construction;
 - Although no direct scale comparison would occur, the turbines of the Development would be perceived to have a larger scale than the turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be apparent across a greater extent of the skyline than the Operational Rigged Hill Windfarm, with notably increased vertical extents.
 - The Development would be seen in combination with the closer buildings, albeit these are located in the settled foreground, with the variance in scale accentuating the larger scale of the Development turbines; and
 - There are other single turbines and large scale windfarms within the wider views from Ringsend and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- 426. The following factors would moderate the magnitude of change on the views of residents and west-bound road-users in the Ringsend area during this phase;
 - The partial visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised, to a small degree, by the presence of a windfarm in the same location;
 - The turbines would form a composition that appears legible and well-contained in this simple upland landscape;
 - the lowlands; and
 - therefore the Development would notably increase this but it would not give rise to a new cumulative effect.
- 427. Taking all these factors into account, the magnitude of change on the views of residents and west-bound road-users at Ringsend as a result of the operational phase of the Development would be medium.

The Development would also be seen in a separate part of the view from the other groups of windfarms which are more distant, located within different areas of the landscape but within similarly upland areas that provide the containment to

The Operational Rigged Hill Windfarm already has some minor influence as part of the cumulative windfarm context and

6.7.5.6.4 Significance of Effect

The effect of the Development on residents and west-bound road-users would be not significant during the decommissioning / construction phases and significant during the operational phase. This finding relates chiefly to the moderate proximity of Ringsend to the Development, the limited influence of Operational Rigged Hill Windfarm on the baseline view and the increased influence that the proposed larger turbines would have on the character of the views once operational.

6.7.5.7 Viewpoint 7: Glenullin Bog Viewpoint, Glenullin Resource Centre 6.7.5.7.1 Baseline

- This viewpoint is located in the car park of the Resource Centre which is slightly elevated above the adjacent road. It is also 429 the location of an interpretative information board, which describes Glenullin Bog. The village of Glenullin is broadly linear, set along the lower side slope of Ashlamaduff Hill, set above Glen Ullin, which is the valley of the Agivey River.
- 430. Brockagh Road can be seen extending down the hill with the houses forming the western edge of the village. Beyond these, the valley landscape is agricultural with moderately sized fields. These contain a variety of crops, and are subdivided by hedgerows, hedgerow trees and small patches of woodland, providing the landscape with a pleasant agrarian character. Along the valley floor, and on the rising slopes of the other side of the valley, there are scattered houses and farms visible, punctuating the otherwise varied green of the valley. This is with the exception of the large patches of brown, unenclosed land that forms the remains of the lowland raised bog.
- A31. Rising beyond the valley, the land becomes more steeply sloping with less defined subdivision and the landcover becoming a simpler patchwork of pasture and coniferous forestry, which extends to the enclosing hill summits. The skyline is without much prominent variation, although the more angular forms of Donald's Hill and the forested summit to the south-east of it create a slight focus.
- 432. There is a single turbine seen close to Donald's Hill and the telecommunications masts on Temain Hill also punctuate the skyline further east. The Operational Rigged Hill Windfarm is barely visible, seen as a small number of blades rotating above the intervening Gortnamoyagh Forest.

6.7.5.7.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (towards the Site) lie within an area that is covered by a landscape planning designation. The viewpoint is one that has interpretative signage describing the outlook over the Glenuillin Bog. There is also a local value associated with the visual amenity, especially of residents, but also road-users.
- This is a view that would be obtained by users of the resource centre and the minor road as they travel along it (in a northerly direction) so that viewers would generally be transient. There are a number of houses at the viewpoint location so that this viewpoint is also representative of residential receptors in parts of Glenuillin. Residents are considered to have a higher susceptibility than transient road or resource centre users as they have the opportunity for views of a longer duration and greater regularity.
- The susceptibility of residents in this area would be medium to high. Rigged Hill forms an important part of the containing skyline ridge in views across this local landscape. Its prominence is moderated by its separation distance from the viewpoint and its position beyond the fore to middle ground of the settled farmland and bog. In the wider panoramic views, Rigged Hill does not form a particularly important landform feature and is not prominent due to the screening provided by the intervening coniferous forest.
- The sensitivity of the view has been appraised as **medium to high** as a result of a medium value and a medium-high 436. susceptibility to the proposed change.

6.7.5.7.3 Magnitude of Change

The photomontage in Figure 6.34e shows that five of the proposed Development turbines would be visible, in part behind the 437. ridgeline and forestry cover of Rigged Hill. The closest Development turbine would be seen at a distance of 8.48 km. Three of the turbines would be visible as blades only, although the hubs and upper parts of the towers of three turbines as well as the blades of the other four would be visible if the intervening forestry were to be felled.

- The distance between the Site and Glenullin means that parts of the decommissioning works and construction works associated with the Development would be barely visible. Due to the intervening forestry, the only visible elements would be the turbines being decommissioned and constructed with some visibility of the associated cranes but at some distance.
- The magnitude of change during the initial combined decommissioning and construction phases would be low. This relates chiefly to the extent to which intervening landform and forestry would screen decommissioning and construction works, as well as their separation distance from the viewpoint. The presence of the cranes would barely be perceptible at this distance, and the decommissioning and construction of the turbines is likely to occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases.
- During the operational stage, the effects would relate only to the presence and movement of the proposed Development 440. turbines. The following factors would add to the magnitude of change on the views of local residents, north-bound road-users and other visitors to the Glenullin area during this phase;
 - At a distance of 8.48 km the proximity of the Development to residents, visitors to the facilities and road-users at Glenullin means that the Development turbines would be partially visible, moderately scaled, moving structures on the skyline above this forested ridgeline;
 - Development, thus raising its prominence, although only across a relatively narrow proportion of the wider view;
 - give rise to a minor cumulative effect with these.
- The following factors would moderate the magnitude of change on the views of residents, north-bound road-users and other visitors to the Glenullin area:
 - The turbines would form a composition that appears legible in this simple upland landscape and clearly separated from the settled valley landscape;
 - of this view:
 - would diminish the potential for scale comparison with the other elements seen within the view; and
 - The forestry presents an area of simple, large scale land cover, which prevents awkward comparisons of scale from arising and appears to 'contain' the extents of the Development.
- 442 as a result of the operational phase of the Development would be medium to low.

6.7.5.7.4 Significance of Effect

The effect of the Development on residents and users of the facilities at Glenullin would be not significant during both the 443. decommissioning / construction and operational phases. This finding relates chiefly to the moderate proximity of the Glenullin viewpoint to the Development, and the limited influence that the only partially visible turbines would have on the character of the views, even in respect of the baseline context in which Operational Rigged Hill Windfarm is not readily apparent.

6.7.5.8 Viewpoint 8: Magheramore Road, south-west of Garvagh 6.7.5.8.1 Baseline

- vegetation that prevents views from publicly accessible locations and is likely to screen visibility of the Development from the town.
- This viewpoint is located on a more elevated minor road to the south-west of the town where there are clear views towards the Development from the scattered properties in the vicinity. The viewpoint also illustrates the relationship between the land on which the Development would be located and the town, and shows how intervening forestry to the north-west of Garvagh screens visibility to the north-west, where the Development would be located.

The alignment of the road and the orientation of the landform would draw views across the valley landscape towards the There are other single turbines within the wider views from Glenullin and therefore the effect of the Development would

The Development would be contained within a limited horizontal extent of the skyline, making up only a small proportion

The intervening landform and forestry would limit the extent to which the Development would be visible and therefore this

Taking all these factors into account, the magnitude of change on the views of residents and users of the facilities at Glenullin

It was not possible to obtain a viewpoint within, or on the edge of Garvagh itself, due to the intervening woodland or roadside

- The narrow road and its remnant stone walls and hedgerow enclosure are strongly characterising features of this view, as are the numerous properties and clusters of commercial and farm developments that are set within this settled, agricultural landscape. Some of the properties are traditional and stone built and these tend to recede into the landscape, whilst others are more modern and their light coloured facades or paintwork makes them more prominent.
- The fields are moderate to small scale with varied enclosure of hedges, post and wire fences, and walls. There is also a strong, scattered woodland component that serves to break up the more planar regularity of the fields. There is a single turbine (Tirkeeran Road) visible within the middle ground of this view as well as several pole mounted transmission lines. To the south-south-west, the turbines of Brockaghboy Windfarm and its extension are apparent at a range of 3.23 km on the skyline, appearing as part of the wider, agricultural landscape. Other more distant windfarms are also visible on the upland skyline to the north-east and potentially to the east, where not obscured by vegetation.
- The view is enclosed to the north by a low, gently undulating ridge which appears above the intervening deciduous woodland as a narrow band of open moorland and forest cover. This simple skyline is punctuated by the masts on Temain Hill in the distance, as well as the turbines of the Operational Rigged Hill Windfarm, which are relatively small scale, moving structures above the intervening forestry on Tibaran Mountain within a small proportion of the view.

6.7.5.8.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (towards the Site) lie within an area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users.
- This is a view that would be obtained by users of this minor road as they travel along it (in a westerly direction), so that viewers 450. would generally be transient. There are a number of houses close to the viewpoint location so that this viewpoint is also representative of residential receptors in parts of this area of scattered settlement. Residents are considered to have a higher susceptibility than transient road users as they have the opportunity for long duration and greater regularity of views.
- The susceptibility of residents in this area would be medium. Rigged Hill does not form a particularly important landform feature in the panoramic views across this local landscape that are obtained by residents. The presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views on this part of the skyline. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium as a result of a medium value and a medium susceptibility to the 452. proposed change.

6.7.5.8.3 Magnitude of Change

- The photomontage in Figure 6.35g shows that Operational Rigged Hill Windfarm would no longer be there and all seven 453. Development turbines would be visible in part behind the ridgeline and intervening forestry cover. The closest Development turbine would be seen at a distance of 9.33 km. Four of the turbines would be visible as blades only, although the hubs of these turbines would be visible if the intervening forestry were to be felled.
- The distance of the Site to Magheramore Road means that parts of the decommissioning works associated with Operational Rigged Hill Windfarm and construction works associated with the Development would be barely visible. Due to the intervening forestry the only visible elements would be the turbines being decommissioned and constructed and some visibility of cranes albeit barely perceptible at this distance.
- The magnitude of change during the initial combined decommissioning and construction phases would be low. This finding relates to a combination of the separation distance between the viewpoint and the Site and the partial screening of the decommissioning and construction works that would occur owing to the intervening landform and forestry. The turbines being decommissioned and constructed would likely occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases, and would be contained within a small proportion of this view.

- 456. During the operational phase, the effects would relate only to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of local residents and road-users in the Magheramore Road area during this phase;
 - The proximity of the Development to residents and road-users at Magheramore Road of 9.33 km would mean that the Development turbines would appear as moderately scaled moving structures on the skyline of this forested ridgeline within a small proportion of the wider view;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed, with the met mast barely perceptible at this distance;
 - The Development would form a more notable feature compared to the limited extent to which Operational Rigged Hill Windfarm is visible in the baseline;
 - The Development would occupy a greater extent of the skyline than the Operational Rigged Hill Windfarm; and There are other single turbines and large scale windfarms within the wider views from Magheramore Road and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- 457 The following factors would moderate the magnitude of change on the views of residents and road-users in the Magheramore Road area during this phase;
 - The baseline partial visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised, to a degree, by the presence of a windfarm in the same general location;
 - The turbines would form a composition that appears legible and well-contained in this simple upland landscape within a small proportion of the wider view at a distance of 9.33 km:
 - The Development would be seen at distance, in combination with a close-range single turbine, which appears larger in scale and does not therefore accentuate the taller comparative height of the Development turbines, which would otherwise detract from views of the Development;
 - The location of the Development, contained within a small proportion of the simple, large-scale upland landscape appears appropriate and ensures it would be separate from the more complex pattern of the settled valley landscape, diminishing the potential for scale comparison;
 - The Development would also be seen in a separate part of the view from the Brockaghboy Windfarm which is located within a different area of the landscape and view; and
 - Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore • the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and west-bound road-users in the Magheramore Road area as a result of the operational phase of the Development would be medium to low.

6.7.5.8.4 Significance of Effect

The effect of the Development on residents and road users around Magheramore Road would be not significant during both the decommissioning / construction and operational phases. This finding relates chiefly to the 9.33 km separation distance between Magheramore Road and the Development, and the extent to which landform and forestry would screen the extents of the Development, with its containment within a small proportion of what is large scale upland landscape.

6.7.5.9 Viewpoint 9: Legavallon Road

6.7.5.9.1 Baseline

- This viewpoint is representative of views from this road that runs north-east out of Dungiven providing links to Garvagh and Coleraine further to the east and north-east respectively. Its alignment means that the view, when travelling north-east along the road is directed towards the hill ridge upon which the Site is situated. The view from the road is not constantly open with numerous patches of woodland and roadside trees providing intermittent screening.
- There are a number of houses in the vicinity of the viewpoint and some of these have their aspects towards the Site. 461.
- Legavallon Road, and its enclosing verges and hedgerow, are a prominent characteristic of the view with the signage, pole mounted transmission lines and a large single wind turbine also being notable features of the fore and middle ground.

Otherwise this is a low lying, undulating landscape of moderate to large scale fields of mixed landcover and some indicators of poorly draining soil. Beyond the enclosed fields deciduous trees break the skyline formed by the low enclosing ridgeline. This runs from the angular form of Binevenagh in the north to the edge of Benbradagh in the south and forms a continuous low enclosure to the view.

The Wind Turbines of the Operational Rigged Hill Windfarm appear as relatively small scale, moving structures on the skyline within the central part of the ridgeline. These are visible in the field although they are not readily apparent within the baseline photography. More distant moderately scaled turbines are also visible near to the skyline on the upland area. To the westsouth-west, the Glenconway and Altahullion group of windfarms is apparent on the upland area at a range of 7.35 km and 7.51 km respectively. Other more distant windfarms are also visible on the skyline.

6.7.5.9.2 Sensitivity

The value of the view is assessed as medium to high. Neither the viewpoint nor the majority of the view (in the direction of the Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users using the Sperrins Scenic Routes, which have been attributed a value at a national level.

This is a view that would be obtained by users of the minor road as they travel along it (in a north-easterly direction) so that viewers would generally be transient. There are a number of houses near to the viewpoint location so that this viewpoint is also representative of residential receptors. Residents are considered to have a higher susceptibility than transient road users as they have the opportunity for long duration and greater regularity of views.

The views from along the road are often constrained by vegetation however, higher land beyond and gaps in vegetation allow longer range views. The existing turbines draw viewers to look towards Rigged Hill as they travel north-east along Legavallon Road albeit extensive tree cover along the route only allows for intermittent perpendicular views.

The susceptibility of rural residents in this area would be medium to high. Rigged Hill is not an important landform feature in the local landscape and its prominence is moderated by its position beyond the fore to middle ground of farmland, however, it appears in close proximity to the more notable Donald's Hill in the views from this route. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.

The sensitivity of the view has been appraised as **medium to high** as a result of a medium-high value and a medium-high susceptibility to the proposed change.

6.7.5.9.3 Magnitude of Change

- The photomontage in Figure 6.36f shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind or to the fore of, the ridgeline. Two of the turbines are largely screened by the intervening form of Donald's Hill in this view with only parts of blades visible and are unlikely to be noticed. The closest Development turbine would be seen at a distance of 9.66 km.
- The distance of the Site to this viewpoint means that much of the decommissioning works and construction works associated with the Development would be visible although not prominent. The most visible features would be the turbines being decommissioned and constructed.
- The change in this view during construction would involve the alterations in the landform and albeit at distance, the construction of the access track, with decommissioning and construction traffic, including for heavy plant, along a relatively narrow route extending across a small section of this view barely visible at this distance.
- The full height and much of the simple landform of Rigged Hill is apparent at this range and due to the distances involved any 467. of the taller elements such as cranes will be barely visible, and the turbines would not appear at variance with its scale. The magnitude of change during the decommissioning / construction phases would be medium to low. The general activity during the overall works programme would last longer than the decommissioning and construction of the turbines, and would include

earthworks to make up the levels. Activity will be contained within only a small proportion of the wider view. Many sections of the existing access tracks would be also be reused to access the Development turbines.

- 468. At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- ^{469.} During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of north-east bound road-users on Legavallon Road and the nearby residents during this phase;
 - The proximity of the Development to the viewpoint at 9.66 km would mean that the Development turbines would appear as moderately scaled moving structures on this part of the skyline ridge;
 - The Development appears in close proximity to the focus of the view, Donald's Hill, and therefore draws attention from it to some degree;
 - Windfarm is visible in the baseline;
 - distance:
 - larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;

 - Development would give rise to an increased cumulative effect with these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of north-east bound road-users on Legavallon Road and the nearby residents during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The turbines would form a composition that appears legible and well-contained, sitting within a small proportion of the wider view, in this simple upland landscape;
 - Donald's Hill would continue to appear as the tallest and most prominent feature of the view in this direction with the Development sitting below and partly to the rear;
 - The access tracks at this distance would be barely visible and used infrequently by vehicles and over time vegetation would re-establish so that its presence would be less visible at a range of almost 10 km;
 - There would be sufficient separation between the Development and the smaller single and pairs of turbines to ensure they would not create a confusing image due to the larger scale of the Development turbines;
 - The Development would be seen in combination with the close-range Legavallon Road single turbine, which appears larger in scale and provides a greater and separate focus within this view;
 - The Development would be seen in a separate part of the view from the other groups of windfarms which are slightly closer in range. The similarities in the scale of the turbines and location in upland areas would present continuity in appearance between the Development and the operational windfarms which would moderate the cumulative effect; and Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this, but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and road-users as a result of the operational phase of the Development would be medium to low.

6.7.5.9.4 Significance of Effect

The effect of the Development on residents and users of Legavallon Road would be not significant during both the decommissioning / construction and operational phases. This finding relates chiefly to the distance of the viewpoint to the Development, and the current influence from the Operational Rigged Hill Windfarm on the skyline alongside Donalds Hill with the Legavallon turbine forming a more prominent feature in this view.

The Development would form a more notable feature compared to the limited extent to which Operational Rigged Hill

Some of the proposed access tracks would also be visible as a new development feature crossing the hill slopes albeit at

Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a

The Development would be present across a greater extent of the skyline than the Operational Rigged Hill Windfarm; The Development would be seen in combination with the two smaller Terrydoo Road turbines and the Kilhoyle Road turbine, albeit at some distance, with the variance in scale accentuating the larger scale of the Development turbines; and There are other single turbines and large scale windfarms within the wider view and therefore the effect of the

6.7.5.10 Viewpoint 10: Benbradagh Mountain 6.7.5.10.1 Baseline

- This viewpoint is at the summit of Benbradagh Mountain, which falls within the Sperrins AONB, overlooking Dungiven at the gateway to the Glenshane Pass. The summit is reached after a short climb along an unmarked route from the old "American Road", so named as the area was used during the Cold War by the US Navy as a communications base. The hilltop, at 465 m AOD, provides some of the finest views around to the southern Sperrins and to Donegal. Web-based literature notes its popularity with walkers, para gliders and hang gliders.
- 474. The view illustrates the contrasting landscape pattern. The settled lowland area is characterised by its patchwork of welldefined fields and boundaries punctuated by residential and farm properties, some larger patches of woodland and numerous moderately scaled wind turbines. Against this, the larger scale moorland and forested hills provide containment to this with Binevenagh Mountain seen close to Lough Foyle and the hills of Donegal apparent beyond.
- 475. Rigged Hill is an unremarkable component of the upland ridgeline. The turbines of the Operational Rigged Hill Windfarm are apparent as relatively small scale, moving, vertical features, contained within a small proportion of this wide panoramic view, on the large scale skyline, close to the masts on Temain Hill, which are barely perceptible at the distances involved here, and only during clear visibility conditions.
- 476. To the west, the Glenconway and Altahullion group of windfarms is visible on the skyline to the west at distances of 9.33 km and 9.44 km respectively and Brockaghboy and its Extension are visible at over 8 km to the east.

6.7.5.10.2 Sensitivity

- The value of the view is assessed as medium to high partly due to its location within the Sperrin AONB but moderated by the fact that there is windfarm development within the Sperrin AONB. A large proportion of the wider panoramic view is not located within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. Although offering a wide and diverse panorama the viewpoint itself is not of particular importance and there are no facilities to promote enjoyment of the view or to guide you to the summit.
- This is a view that would be obtained by walkers on and near to the summit of the hill so that viewers would generally be transient. The existing turbines draw viewers to look towards Rigged Hill when looking in this direction, as they travel along parts of the route.
- The susceptibility of walkers in this area would be medium. While Rigged Hill is not an important landform feature in the local landscape it appears immediately behind the more marked profile of Donald's Hill in this view. Its prominence is moderated by its position beyond the fore to middle ground of farmland and set away from the more prominent skyline feature of Binevenagh set against Lough Foyle. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views in this direction. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a medium to high value and a medium susceptibility to the proposed change.

6.7.5.10.3 Magnitude of Change

- The photomontage in Figure 6.37g shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind or to the fore of, the ridgeline. One of the turbines is partially screened by the intervening form of Donald's Hill in this view. The closest Development turbine would be seen at a distance of 8.54 km.
- The distance between the Site and this viewpoint means that much of the decommissioning works and construction works associated with the Development would be discernible, although not prominent. The most visible features would be the turbines being decommissioned and constructed and the construction of access roads albeit at some distance.
- The change in this view during construction would involve the alterations in the landform and the construction of the access 483. tracks along a relatively narrow route extending from the low lying area across the more upland slopes within what is a small proportion of this wide open view. Decommissioning and construction traffic including for heavy machinery may be perceptible at this distance, in clear visibility conditions, traversing the open hill slopes during these phases, but again contained within a

small proportion of the wider view, and this unusual occurrence (within this upland landscape) may draw the eye in this direction.

- The full height and the simple landform and landcover of Rigged Hill is apparent at this range and therefore the tall elements 484 of turbines would not appear at variance with the scale of the landscape. The magnitude of change during the decommissioning / construction phases would be medium to low. The general activity during the overall works programme would last longer than the decommissioning and construction of the turbines. Many sections of the existing access tracks and disturbed areas would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the location of the access tracks at this distance would be screened by the intervening hill, however those of the closest turbines would be visible extending across the upper slopes of the hill, only seen during periods of clear visibility, and contained within a small proportion of this wide panoramic view.
- At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them 485. as rough grassland so that over time they would blend in more with the surrounding landcover.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of the walkers at the summit of Benbradagh Mountain during this phase;
 - The proximity of the Development at 8.66 km to the viewpoint would mean that the Development turbines would appear as moderately scaled moving structures contained within what is a small proportion of the wide open ridge skyline;
 - The Development appears upon the long enclosing ridgeline behind Donald's Hill, and therefore draws attention from it to due to the back-clothing by further high ground:
 - The access tracks at this distance would be visible during periods of clear visibility, as a new development feature crossing the hill slopes, located within a small proportion of this wide open view;
 - ridgeline and the manner in which the turbines are positioned on either side of it; The Development would be visible across a slightly increased extent of the skyline than the Operational Rigged Hill Windfarm;
 - landscape, with the variance in scale accentuating the larger scale of the Development turbines in clear visibility conditions; and
 - There are other single turbines and large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of the walkers at the summit of Benbradagh 487. Mountain;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - which has the capacity to accommodate turbines of this scale;
 - be even less obvious;
 - they would not create a confusing image due to the larger scale of the Development turbines;
 - The Development would also be seen in a separate part of the view from the other groups of windfarms which are at similar or closer ranges;
 - the Development and the operational windfarms which would moderate the cumulative effect; and
 - The Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.

a slight degree, although this is moderated by the fact that the profile of Donald's Hill is less apparent than in other views

The turbines would form a composition that appears slightly discordant due to the angle of the view in relation to the

The Development would be seen in combination with the two smaller Terrydoo Road turbines, albeit difficult to perceive at these distances and the Kilhoyle Road turbine as well as numerous other single turbines located within the settled valley

The Development would be seen within a large scale, upland landscape within a small proportion of a wide open view,

The proposed access tracks would be barely perceptible at this distance, and only during periods of clear visibility, and would temporarily be used infrequently by vehicles and over time vegetation would re-establish so that its presence would

There would be sufficient separation between the Development and the smaller single and pairs of turbines to ensure that

The similarities in the scale of the turbines and location in upland areas would present continuity in appearance between

Taking all these factors into account, the magnitude of change on the views of the walkers at the summit of Benbradagh Mountain as a result of the operational phase of the Development would be medium to low.

6.7.5.10.4 Significance of Effect

The effect of the Development on the walkers at the summit of Benbradagh Mountain would be not significant during the decommissioning/ construction and operational phases. This finding relates chiefly to the 8.54km distance to the Development and the current influence from Operational Rigged Hill Windfarm. In addition, the taller turbines of the Development appear to be of a similar scale to those of Brockaghboy Windfarm and its extension, located in a similar upland landscape at a similar distance to the Development (and within the Sperrin AONB). This view of the Development from the south also ensures that the field of view affected by the Development is narrow when considered as part of the panoramic views available.

6.7.5.11 Viewpoint 11: Polly's Brae Road junction with B192 6.7.5.11.1 Baseline

- This viewpoint illustrates the type of view that is available from the rising ground on the west side of the valley of the River Roe. The B192 (or Drumrane Road) runs along the slope between Dungiven and Limavady and there are numerous minor roads connecting with it from the higher ground to the west. The views towards the Site are perpendicular to the line of travel at the viewpoint. This location has been selected as it is also representative of a small settlement where an adjoining minor road (Polly's Brae Road) provides the opportunity for views to the east-north-east that are directly towards the Site. At the junction there is also an area of public open space with benches alongside. These do not face towards the Site.
- 491. The view is over pastoral fields, subdivided by post and wire fences and hedgerows. The fore and middle ground contain numerous scattered dwellings and farm buildings, and there is also a substantial group of mature deciduous trees around one of the properties and further deciduous woodland seen at greater distances on the other side of the valley. The visible properties have their frontages towards the road and their rear aspects, with open views over the valley, to the hills beyond.
- The River Roe is located within an incised valley at this point on its course and cannot be seen in this view, which continues with the more distant landscape on the other side of the valley. This comprises a small area of settled, farming landscape on the lower ground where this is visible but also the rising, moorland ridgeline where the Operational Rigged Hill Windfarm is located. The turbines of the Operational Rigged Hill Windfarm are visible as relatively small scale, moving, vertical features on the large-scale skyline. The masts on Temain Hill are also visible slightly further along the ridge. While Glenconway and Altahullion Windfarms are present along the ridgeline to the south-west, they are partially screened in this view by the intervening built form and forestry.
- The houses clustered near to Polly's Brae Road and around Brookfield Park are mainly single and 1.5 storey houses. The majority of the properties would not have views towards the Development from their main aspects due to their orientation or intervening buildings. However, some may have some visibility from upper or side windows or gardens.

6.7.5.11.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the view (towards the Site) lie within an area that is covered by a landscape planning designation. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of this particular view. There is, however, a local value associated with the visual amenity, especially of residents, but also of users of the public open space and road-users.
- This is a view that would be obtained by users of these roads as they travel along them, so that viewers would generally be transient, and perpendicular views towards the Site would be obtained. There are a number of houses near the viewpoint location such that this viewpoint is also representative of residential receptors in the vicinity. Residents are considered to have a higher susceptibility than transient road users as they have the opportunity for long duration and greater regularity of views. The existing turbines draw the attention of viewers towards Rigged Hill from the properties or gardens, from the public open space or as they travel along Polly's Brae Road or Drumrane Road.
- The susceptibility of residents in this area would be medium to high. While Rigged Hill forms an important landform feature in the local landscape, its prominence is moderated by its position beyond the fore to middle-ground of the farmland and valley of the River Roe. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.

497. The sensitivity of the view has been appraised as medium to high as a result of a medium value and a medium to high susceptibility to the proposed change.

6.7.5.11.3 Magnitude of Change

- The photomontage in Figure 6.38f shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible, either behind or to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 7.77 km.
- The distance of the Site to the viewpoint means that much of the decommissioning works associated with Operational Rigged Hill Windfarm and construction works associated with the Development would be visible although not prominent. The most visible features would be the turbines being decommissioned and constructed, with the access tracks, and the decommissioning and construction traffic including for heavy machinery, and the use of tall cranes. This would occur across a relatively narrow route extending across a small section of this view. This unusual occurrence (within this upland landscape) would make the Development more noticeable.
- Much of the height and the simple landform of Rigged Hill is visible at this range and therefore the tall elements of the cranes and turbines would not appear at variance with its scale. The magnitude of change during the initial decommissioning and construction stage at this distance would be **medium to low**. The general activity and disruption during the overall works programme would last longer than the decommissioning and construction of the turbines, however the influence of the different decommissioning/construction tasks over this phase would be temporary and sporadic with activities occurring over different parts of the Site at any one time. Many sections of the existing access tracks will be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the more distant access tracks of the closest turbines would be visible, at extending across the upper slope of the hill.
- At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them 501 as rough grassland so that over time they would blend in more with the surrounding landcover.
- ⁵⁰² During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of the residents and road users during this phase;
 - The proximity of the Development to the viewpoint would mean that the Development turbines would appear as moderately scaled moving structures on this unremarkable part of the ridge skyline, directly ahead of east bound road users:
 - The operational access road and the closest turbine access tracks would also be visible as a new development feature crossing the hill slopes:
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be visible across a slightly greater extent of the skyline than the Operational Rigged Hill Windfarm.
 - to an increased cumulative effect with these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of the residents and road users; 503.
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The turbines would form a composition that appears legible partly due to the well spaced turbines in this simple upland landscape that is separated from the viewpoint/visual receptors by intervening landform;
 - The operational access road, barely perceptible at the distances involved, would also be used infrequently by vehicles and over time vegetation would re-establish so that its presence would be even less visible;
 - the containment to the lowlands; and
 - Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.

There are other large scale windfarms within the wider views and therefore the effect of the Development would give rise

 The Development would also be seen in a separate part of the view from the other groups of windfarms which are largely screened from this viewpoint, located within different areas of the landscape but within similarly upland areas that provide

Taking all these factors into account, the magnitude of change on the views of residents and road-users as a result of the operational phase of the Development would be medium to low.

6.7.5.11.4 Significance of Effect

The effect of the Development on residents and road users at Polly's Brae Road Junction would be not significant during the decommissioning / construction and operational phases. This finding relates chiefly to the distance of the viewpoint to the Development at 7.7 km and its separation from the visual receptors/viewpoint by intervening landform. This also takes account of the current influence from the Operational Rigged Hill Windfarm.

6.7.5.12 Viewpoint 12: A2, north of Limavady 6.7.5.12.1 Baseline

- This viewpoint is located on the A2, at one of the first points in the road where there is open visibility towards the Site when approaching from the north around the high ground of Binevenagh. The viewpoint is located at a gate access into a field and not a formal layby or stopping point.
- The view is representative of views from this road, which is one of the main routes between Derry/ Londonderry, Limavady 507 and the coastal attractions to the north-east including Portstewart, Portrush and the Giant's Causeway. This section of the A2 forms part of the promoted Causeway Coastal Route.
- The foreground of the view illustrates the low lying, flat, pastoral landscape of hedgerow bound fields and deciduous trees that 508 is characteristic of this area close to Lough Foyle. The trees and woodland along the route and within this foreground tend to screen or break up views from along the road with some of the focus of the wider view being across the open landscape to the south-west towards the more distant hills.
- In the view towards the Site, the land quickly begins to rise to a more rolling profile, where the pattern of agricultural fields, 509. hedgerow boundaries and scattered properties is visible along an intermediate ridgeline. Beyond this, the higher ground of the more upland landscape is seen rising as a series of undulating hills and ridges. The most pronounced in this view is the large convex form of Keady Mountain. Its landcover of rough grass moorland and forestry gives way to heather at higher elevations, and the deciduous woodland and riparian vegetation along the small water courses can be seen running part way up the side slopes. Some of the Wind Turbines of the Dunbeg Windfarm are visible on the low ground and skyline in the valley to the north of Keady Mountain.
- To the south of Keady Mountain, the upland area forms more of a ridgeline with only limited definition of Rigged Hill and 510. Temain Hill as individual summits. They are, however, made more notable by Operational Rigged Hill Windfarm and the telecommunications masts on the respective skylines of these hills. There are a further two turbines on the lower slopes of Rigged Hill. These, along with the wind turbines of Operational Rigged Hill Windfarm, are visible as relatively small scale, moving, vertical features set against or on the skyline of the upland ridge.
- Extending further to the south, the ridgeline appears to end abruptly with the markedly angular form of Donald's Hill creating 511. some more distant interest in the part of the view that is more directly ahead of the line of travel along the A2.
- 512. The A2 itself is prominent within the central part of the view, bounded as it is by fences, hedgerows and roadside trees. Large scale industrial and commercial buildings can be seen on the opposite side of the road from the direction of the Site. These are glimpsed between roadside vegetation and set against the rising hills beyond in the view from this location. However, from further south along the A2, closer to Limavady, their development influence on this landscape becomes more pronounced. The Altahullion and Glenconway Windfarms are visible above the skyline created by the high ground beyond.
- Views further to the west extend across a relatively low and level agricultural landscape with a cluster of large commercial buildings in the middle ground. While Lough Foyle is screened by the intervening landform, the ridge of Donegal hills which enclose its north-western side form a distinct, albeit distant landform feature.

6.7.5.12.2 Sensitivity

The value of the view is assessed as medium-high. Neither the viewpoint nor the majority of the view (in the direction of the 514. Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there

are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity of the road-users using the Causeway Coastal Route.

- This is a view that would be obtained by users of this major road as they travel along it (in a southerly direction) so that 515 viewers would generally be transient.
- 516. The views from along the road are often contained by vegetation, however, from more elevated sections and where gaps in vegetation occur, longer range views open up. The existing turbines draw the attention of viewers towards Rigged Hill as they travel southwards along the A2 in this location.
- 517. feature in the local landscape with its prominence moderated by its association with a lower section of ridgeline relative to closer range and more distinctive hills. It is separated from the viewpoint by a depth of farmland and occupies only a small proportion of a much wider panorama. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.

The sensitivity of the view has been appraised as medium to high as a result of a medium-high value and a medium susceptibility to the proposed change.

6.7.5.12.3 Magnitude of Change

- The photomontage in Figure 6.39g shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind or to the fore of, the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 8.91 km.
- The distance of the Site to the viewpoint combined with the exposed nature of the hill, means that much of the 519 decommissioning works and construction works associated with the Development would be visible, although not prominent. The most visible features would be the turbines being decommissioned and constructed, with the utilisation of tall cranes to support this activity, and the construction of the access tracks, with decommissioning and construction traffic including the use of heavy machinery traversing the slope of the hill, across a small section of this view. This relatively unusual occurrence (within this upland landscape) would make the Development more noticeable within this section of the view.
- The full height and much of the simple landform of Rigged Hill is visible at this range and therefore the tall elements of the turbines and cranes would not appear at variance with its scale although they would appear larger in scale when compared with the Terrydoo Road turbines and the masts on Temain Hill albeit these are barely perceptible at this distance. The magnitude of change during the initial combined decommissioning and construction phases would be medium to low. The general activity during the overall works programme would last longer than the decommissioning and construction of the turbines and would include some earthworks to make up the levels. Many sections of the existing access tracks would be reused to access the Development turbines. Owing to the rounded profile of Rigged Hill, the more distant access tracks would be screened by the brow of the hill, however those serving the closest turbines would be seen extending across the upper slope of the hill, at these distances any transformers would not be perceptible/or form a prominent feature in the view.
- 521. as rough grassland so that over time the access tracks would blend in more with the surrounding landcover.
- ⁵²² During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of south bound road-users of the A2, north of Limavady during this phase;
 - The proximity of the Development to the viewpoint would mean that the Development turbines would appear as
 - will be less noticeable than the turbines due to its smaller, slender construction;
 - the hill slopes:

The susceptibility of road users travelling south-bound would be medium. Rigged Hill does not form an important landform

At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them

moderately scaled moving structures on this unremarkable part of the ridge skyline within a small proportion of the view; The Met Mast would barely be perceptible on the skyline between the Wind Turbines of the Development however, and

The main access track and the closest turbine access tracks would also be a visible new development feature crossing

- Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a ٠ larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
- The Development would be visible across a slightly greater extent of the skyline than the Operational Rigged Hill Windfarm:
- The Development would be seen in combination with the two smaller Terrydoo Road turbines and the variance in scale would accentuate the larger scale of the Development turbines; and
- There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of south bound road-users on the A2, north of 523. Limavady;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The Development would be seen within a large scale, upland landscape which has the capacity to accommodate turbines of this scale and occupying a contained extent of an unremarkable, relatively long and level skyline ridge;
 - The Development would also be seen in a separate part of the view from the Dunmore and Dunbeg Windfarms which are slightly closer (6.78 km and 6.60 km respectively) and located within the valley. The similarities in the scale of the turbines would present continuity in appearance between the Development and the operational wind farms and this would moderate the cumulative effect;
 - There would be sufficient separation between the Development and the single turbines located within the settled valley to ensure that they would not give rise to a confusing image; and
 - Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of south bound road-users as a result of the 524. operational phase of the Development would be medium to low.

6.7.5.12.4 Significance of Effect

The effect of the Development on south bound road users of the A2 north of Limavady would be not significant during the decommissioning / construction and operational phases. This finding relates chiefly to the 8.9 km distance of the viewpoint to the Development, and the influence that the decommissioning activity and construction of the larger turbines would have on the character of the views taking account of the current influence from Operational Rigged Hill Windfarm.

6.7.5.13 Viewpoint 13: Binevenagh Mountain, minor road and NCR

6.7.5.13.1 Baseline

- This viewpoint is located on the minor road that traverses over the eastern slopes of Binevenagh Mountain via Bishops Road. Large areas of the mountain are covered in commercial forestry and therefore this location represents one of the first towards the Site when road-users are descending on the southern side of the Mountain. The route forms part of National Cycle Route 93 and this view occurs almost directly in the south-bound line of travel.
- There are no formal stopping places along the route from which to obtain such views. There is a widening at a junction with a 527. forest track slightly further down the road where one can stop, however there is no clear visibility towards the Site from the road at that point.
- Further down the road, the view of the ridgeline (including the Site) becomes more open, however, the view is more directed 528. towards the open, valley landscape to the south from the lower sections of the road.
- The view shows the sloping nature of the land on this side of the Mountain with the rising, open grass moorland seen to the 529. west above the road. The near slopes are dominated by commercial forestry of varied types with a patch of boggy grassland in the foreground. This allows this opportunity for the view to be obtained, across and between the edge trees, to the valley of the Curly River below, with Keady Mountain rising up beyond. It appears as a large rolling concave form with a simple landcover of grass moorland, heather and geometric blocks of forestry.
- The Wind Turbines of Operational Rigged Hill Windfarm are just visible on a small section of the skyline above Keady Mountain, although they are actually on the more distant summit of Rigged Hill, which is screened from view.

^{531.} The road is directed towards the more open, settled valley landscape of the Roe Valley, which can be seen beyond. In the distance, within that part of the view, higher hills to the south-west can be seen providing containment and a backdrop to the valley.

6.7.5.13.2 Sensitivity

- The value of the view is assessed as high due to its location within the Binevenagh AONB. The views over the foreground and Keady Mountain are also within the AONB, however, the lower lying areas of the wide panoramic view are not located within an area that is covered by a landscape planning designation. Although offering a diverse panorama, the viewpoint itself is not of particular importance and there are no facilities to promote enjoyment of the view.
- This is a view that would be obtained by south-bound users of the minor road or cycle way who are transient and of medium 533. susceptibility. While Rigged Hill is not an important landform feature in the local landscape, it appears immediately behind Keady Mountain which is a prominent feature in this view. Its prominence is, however, moderated by the influence of the other landscape features in the view and its position beyond the intervening valley and upland. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views in this direction. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a high value and a medium susceptibility to 534. the proposed change.

6.7.5.13.3 Magnitude of Change

- The photomontage in Figure 6.40b shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible in part set behind the ridgeline. The closest Development turbine would be seen at a distance of 8.95 km and three of the turbines would be visible as blades only.
- 536 The distance of the Site to the viewpoint means that parts of the decommissioning works and construction works associated with the Development would be visible. Due to the intervening landform, the only visible elements would be the decommissioning and construction of the turbines and the use of any tall cranes, albeit less perceptible at this distance.
- The full height of the upland area and much of the simple landform of the ridge are apparent at this range and therefore the tall 537. elements of the turbines and to a lesser extent the cranes would not appear at variance with its scale. The magnitude of change during the initial combined decommissioning and construction phases would be low. The decommissioning and construction of the turbines and use of cranes would occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of south-bound road-users on the Binevenagh Mountain, minor road and NCR during this phase;
 - moderately scaled moving structures on this unremarkable part of the ridge skyline;
 - The view to the Development from short sections of the road being directly aligned with the direction of travel;
 - •
 - larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;and
 - The Development would be visible across a slightly greater extent of the skyline than the Operational Rigged Hill Windfarm;
- The following factors would moderate the magnitude of change on the views of south-bound road-users on the Binevenagh 539. Mountain minor road and NCR;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - of the intervening landform and roadside vegetation, within a small unremarkable portion of a much wider view;

• The proximity of the Development to the viewpoint at 8.9 km would mean that the Development turbines would appear as

The turbines would form a composition that appears slightly discordant due to the irregularity of the degree of visibility; Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a

The limited extent to which the Development would be visible from this route and viewpoint owing to the screening effect

- The separation distance between the viewpoint and the Development which would ensure that the turbines appeared • moderate in scale, well contained in extent;
- The Development would be seen within a large scale, upland landscape which has the capacity to accommodate turbines of this scale; and
- Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of south-bound road-users as a result of the operational phase of the Development would be low.

6.7.5.13.4 Significance of Effect

The effect of the Development on the users of the Binevenagh Mountain minor road and NCR would be not significant during both the decommissioning / construction and operational phases.

6.7.5.14 Viewpoint 14: Wheatsheaf Road, Coleraine

6.7.5.14.1 Baseline

- This viewpoint is taken from the north-western edge of Coleraine, from a point on the road where there is an open view towards the Site as well as the other cumulative windfarms along the skyline to the west. The view is representative of the views available to road users as well as from the properties along this open edge of Coleraine.
- At the viewpoint, the front elevations of the properties face approximately south-west towards the Dunmore and Dunbeg Windfarms, with Operational Rigged Hill Windfarm visible as smaller scale wind turbines on the skyline to the side and set apart from these.
- 543. The busy road and vehicles form a substantial influence in the foreground of the view from this location and beyond this there is an expanse of rolling agricultural landscape with some naturally regenerated deciduous woodland and tree-lined boundaries. These break up an otherwise relatively uniform landscape pattern of medium sized fields, in which scattered settlement and some large farmsteads and other buildings. There are also several moderately scaled single turbines in relatively close proximity to the edge of the town and seen here as tall moving structures. Other pole mounted transmission lines are also apparent crossing the landscape nearby, emphasising the settled nature of this landscape.
- The settled, agricultural landscape is seen rising up the lower slopes of the eastern side of the ridge, which tends to be more 544. gently sloping than is to be found on the west side of this upland area.
- 545. A narrow sliver of simple, upland landscape is visible above this settled middle ground area. It appears as an unremarkable ridgeline of gently undulating hills and ridges with moorland and forestry landcover. They do, however, provide containment to the view and are punctuated by the moving structures of the windfarms on the skyline.

6.7.5.14.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the majority of the view (in the direction of the Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users.
- This is a view that would be obtained by road users as they travel along it (in a southerly direction) so that viewers would 547. generally be transient. There are a number of houses at the viewpoint location so that this viewpoint is also representative of residential receptors in parts of Coleraine. Residents are considered to have a higher susceptibility than transient road users, as their views are of potentially longer duration and greater regularity.
- The susceptibility of residents in this area would be medium to high. Rigged Hill does not form a particularly important landform feature in the panoramic views across this landscape and the presence of Operational Rigged Hill Windfarm is not prominent. However, it does establish this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.

549. The sensitivity of the view has been appraised as medium to high as a result of a medium value and a medium to high susceptibility to the proposed change.

6.7.5.14.3 Magnitude of Change

- The photomontage in Figure 6.41e shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind, or to the fore of the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 14.58 km and one of the turbines would be visible as blades only.
- The distance between the Site and Wheatsheaf Road means that much of the decommissioning works and construction works 551 associated with the Development may be visible, although not prominent. The most visible features would be the turbines being decommissioned and constructed, as well as the use of tall cranes, albeit barely perceptible at these distances.
- 552. As the full height of the upland area and much of the simple landform of the ridge are visible at this range, the tall elements of the turbines and cranes would not appear at variance with the scale of the landscape. The magnitude of change during the initial decommissioning and construction phases would be low. The decommissioning and construction activity associated with the turbines is likely occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of residents and south-bound road users in the Wheatsheaf Road area during this phase;
 - The moderate proximity of the Development to the viewpoint would mean that the Development turbines would appear as small scale moving structures on this unremarkable part of the ridge skyline:
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be visible across a slightly increased extent of the skyline than Operational Rigged Hill Windfarm: and
 - There are other moderately scaled single turbines and large scale windfarms within the wider view and therefore the effect of the Development would give rise to an increased cumulative effect with these baseline windfarms.
- 554. The following factors would moderate the magnitude of change on the views of residents and south-bound road users in the Wheatsheaf Road area during this phase;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - The turbines would form a composition that appears legible, evenly spaced and well-contained in this simple upland landscape:
 - The separation distance would ensure that the Development turbines would appear as relatively minor components occupying a small proportion of the wider skyline ridge;
 - The Development would be located within a separate part of the view from the three nearby turbines and this assists in ensuring that they do not create a confusing image due to the larger scale of the more distant Development turbines; The Development would also be seen in a separate part of the view from the Dunmore and Dunbeg Windfarms which are slightly closer at 8.78 km and 9.11 km respectively and located within a valley, while their similar scale to the
 - Development would create continuity in appearance that would reduce the cumulative effect; and
 - Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and south-bound road-users as a 555. result of the operational phase of the Development would be low.

6.7.5.14.4 Significance of Effect

The effect of the Development on residents and users of Wheatsheaf Road would be not significant during the 556. decommissioning / construction and operational phases. This finding relates chiefly to the distance from the viewpoint to the Development and takes into account the current influence from the Operational Rigged Hill Windfarm.

6.7.5.15 Viewpoint 15: A26 layby near Seacon (Ballymoney)

6.7.5.15.1 Baseline

- This viewpoint is located at a layby off the north bound carriageway of the busy A26, which connects the large towns of Coleraine with Ballymena via Ballymoney.
- ^{558.} It is not a particularly attractive layby to stop at and provides only a litter bin in the way of facilities. The outlook is across a relatively flat, pastoral landscape with the immediately adjacent fields sub-divided by post and wire fences and broken, unkempt hedgerows with some indicators of drainage issues within the fields. The more distant hedgerows appear better defined and there is a large cluster of farm buildings and dwellings set against a patch of mixed woodland.
- 559. Beyond this the layers of hedgerow and hedgerow trees tend to screen the lower lying elements of the settled, agricultural landscape although some further buildings and pole mounted transmission lines are visible within this area.
- Rising up beyond this low-lying landscape is the narrow, darker band created by the gently undulating ridgeline of hills that separates this area of the broad valley of the River Bann from the valley of the River Roe further to the west. Rigged Hill is part of this ridgeline and the viewpoint has been specifically sited so that it is seen within the view as well as the part of the ridge where the Dunbeg and Dunmore Windfarms are visible between the trees. The landcover of the hills is a simple patchwork of commercial forestry and rough grass moorland which contrasts with the greater complexity of the agricultural foreground.
- The wind turbines of Operational Rigged Hill Windfarm are visible as relatively small scale, moving, vertical features on the 561. large scale skyline. The larger forms of the Dunmore and Dunbeg wind turbines are more apparent, although their influence on the character of the view remains peripheral due to their distance and location within a markedly different part of the landscape.

6.7.5.15.2 Sensitivity

- The value of the view is assessed as medium. Neither the viewpoint nor the majority of the view (in the direction of the Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view except that it is from a parking layby.
- This is a view that would be obtained by users of this major road as they travel along it (in a south-easterly direction) or when 563. stopped briefly at the layby (when travelling north-west) so that viewers would generally be transient.
- The views from the road are often contained by vegetation however, higher land beyond and gaps in vegetation allow longer 564. range views. The existing turbines draw viewers to look towards Rigged Hill as they travel along the A26 where open views allow.
- The susceptibility of road users within this area would be low. Rigged Hill does not form an important landform feature in the 565. local landscape and its prominence is moderated by its position beyond the fore to middle-ground of farmland as part of a ridgeline and wider panorama with a number of more notable features. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale albeit less perceptible at these distances.
- The sensitivity of the view has been appraised as medium as a result of a medium value and a low susceptibility to the 566. proposed change.

6.7.5.15.3 Magnitude of Change

- The photomontage in Figure 6.42e shows that Operational Rigged Hill Windfarm would no longer be there and all seven 567. Development turbines would be visible at distance, in a small proportion of what is a wide open view and ridge line, set on, behind or to the fore of, the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 16.48 km.
- The distance between the Site and the A26 layby, combined with the visibility of Rigged Hill, means that much of the decommissioning and construction works associated with the Development will be barely discernible, and not prominent with

other foreground distractions such as road infrastructure, moving vehicles being more prominent in the wider context of this view. The most visible features would be the turbines being decommissioned and constructed with any tall cranes being barely discernible at this distance.

- As the full height of the upland area and much of the simple landform of the ridge are apparent at this range and, the tall elements of the turbines would not appear at variance with the scale of the landscape. The magnitude of change during the decommissioning and construction phase would be low. The decommissioning and construction activity associated with the turbines, would likely occur over two periods of limited duration and not during the full length of the programmed decommissioning/construction phases.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. 570. The following factors would add to the magnitude of change on the views of south-east bound road users, and users stopped at the A26 layby during this phase;
 - The moderate proximity of the Development to the viewpoint would mean that the Development turbines would appear as small scale moving structures on this small proportion and unremarkable part of the enclosing ridge skyline;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a discernible at this these distances;
 - Hill Windfarm: and
 - an increased cumulative effect with these baseline windfarms.
- 571. The following factors would moderate the magnitude of change on the views of south-east bound road users, and users using the A26 layby;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;

 - The Development would be seen in a separate part of the view from the Dunmore and Dunbeg Windfarms which are its cumulative effect by presenting a more consistent appearance;
 - of the wider views;

 - therefore the Development would increase this but it would not give rise to a new cumulative effect.
- 572. Taking all these factors into account, the magnitude of change on the views of road-users using the A26 lay-by as a result of the operational phase of the Development would be low.

6.7.5.15.4 Significance of Effect

573 / construction and operational phases. This finding relates chiefly to the 16.48 km distance between the viewpoint to the Development and takes into account the current influence from Operational Rigged Hill Windfarm, as well as taking account of the small proportion of the view that the Development will be seen within by mostly transient receptors.

6.7.5.16 Viewpoint 16: Garvagh Road, Dungiven 6.7.5.16.1 Baseline

This viewpoint is representative of the views that may be available from parts of Dungiven, including residential properties, 574. some of which have their aspects in a similar direction. It is taken from the B64, Garvagh Road, which is on the north-eastern edge of the small town and provides a link between Dungiven, Coleraine and Garvagh. The road offers a slightly elevated

larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed albeit barely

The Development would be visible across a slightly increased horizontal extent of the skyline than the Operational Rigged

• There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to

The association of the turbines with the upland landscape would appear appropriate and they would form a composition that would appear evenly spaced and well contained within what is a small proportion of the view at 16.48 km distance; slightly closer range and located within the valley, while their similar scale to that of the Development would partly reduce

The separation distance would also ensure that the Development turbines would appear as a relatively minor component

The Development would also be seen in a separate part of the view from the other groups of windfarms which are located within different areas of the landscape but within similarly upland areas that provide the containment to the lowlands; and The Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and

The effect of the Development on road users of the A26 and layby would be not significant during both the decommissioning

view towards the Site that is almost directly ahead of the line of travel. However, it appears, due to the hoardings that some housing development may occur in the future that may prevent such views from this precise location.

- The road, the boundary walls and hoardings, as well as the lighting columns, pole mounted transmission lines and signage, 575. emphasise the 'edge of urban' nature of this view. Beyond the settlement boundary the landscape is one of undulating pasture with a higher proportion of mature hedgerow trees than is seen in many parts of the Study Area. These ensure that the views are well contained, and while in summer, they tend to screen other forms of development, in winter it is possible to see glimpses of scattered buildings through the trees.
- Above the tree cover (and hoarding) the rising land of Benbradagh Mountain is a key feature in the view and a prominent 576. landmark within the town, which sits below it. From this viewpoint its steep slopes and slightly rugged form is imposing. Directly ahead of north-east bound road travellers the undulating ridgeline formed by Donald's Hill, Rigged Hill and Keady Mountain is visible. A quarry and a single turbine are visible on the slopes, which otherwise have a simple landcover of grass moorland, heather and forestry. The steeply sloping, rugged form of Donald's Hill makes it the most prominent of the summits with the less remarkable Rigged Hill seen to the side and beyond. The wind turbines of the Operational Rigged Hill Windfarm are barely visible at this distance as relatively small scale, moving, vertical features on the upland skyline, contained within a small proportion of the wider view. The wind turbines sit close to the slightly distinctive form of Donald's Hill but their substantially smaller scale means that the landform remains the focus of the view ahead.

6.7.5.16.2 Sensitivity

- The value of the view is assessed as medium to high. Neither the viewpoint nor the majority of the view (in the direction of the Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB with the closer range upland area being part of the Sperrin AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users using the Sperrins Scenic Route, which is important at a national level.
- This is a view that would be obtained by users of the road as they travel along it (in a north-easterly direction), such that 578. viewers would generally be transient. There are a number of houses near to the viewpoint location, making this viewpoint also representative of residential receptors. Residents are considered to have a higher susceptibility than transient road users as their views have potential to be of longer duration and greater regularity.
- The views from along the road are often contained by vegetation and buildings, however, from more elevated sections and where gaps in vegetation or development occur, longer range views may be obtained. The existing turbines can be seen in the distance, and can draw the attention of viewers towards Rigged Hill as they travel along Garvagh Road.
- The susceptibility of residents in this area would be medium to high. While Rigged Hill is not an important landform feature in 580. the local landscape, in this view it appears adjacent to the more distinctive Donald's Hill and this association raises its prominence. Its prominence is, however, moderated by its distance, its position beyond the intervening landform of the valley landscape and its associated woodland cover. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views, adjacent to Donald's Hill. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as **medium to high** as a result of a medium to high value and a medium to 581. high susceptibility to the proposed change.

6.7.5.16.3 Magnitude of Change

- The photomontage in Figure 6.43d shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind or to the fore of, the ridgeline. Two of the turbines would be largely screened by the intervening form of Donald's Hill in this view, but may be visible as blades above the skyline. The closest Development turbine would be seen at a distance of 11.18 km.
- The distance between the Site and this viewpoint means that much of the decommissioning works and construction works 583. associated with the Development may be visible, although not prominent. The most visible features would be the decommissioning and construction of the turbines, the tall cranes would be barely discernible at this distance, with a small

upper section of the access road perceptible (albeit at some distance) with decommissioning and construction traffic including heavy machinery perceptible, albeit contained within a small proportion of the view. This unusual occurrence (within this upland landscape) would make the Development more noticeable.

- The full height and much of the simple landform of Rigged Hill is apparent at this range and therefore the tall elements of the decommissioning and construction of the turbines, including for any tall cranes would not appear at variance with its scale. The magnitude of change during the initial decommissioning and construction phases would be medium to low. The general activity during the decommissioning and construction of the turbines will be over a shorter period, than the full decommissioning and construction programme, and may be visible to a slight degree at this range.
- At the end of the construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them 585. as rough grassland so that over time they would blend in more with the surrounding landcover.
- ^{586.} During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of the users of Garvagh Road and the nearby residents during this phase;
 - The distance of the Development to the viewpoint at 11.18 km would mean that the Development turbines would appear as large scale moving structures;
 - therefore would detract from it to some degree;
 - larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed; and
 - Windfarm albeit this will be barely perceptible at this distance.
- The following factors would moderate the magnitude of change on the views of north-east bound road users on Garvagh Road and the nearby residents;
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views a small proportion of the wider view;
 - With a separation distance of 11.18 km, the Development would appear as a relatively distant feature in a view characterised by closer range urban artefacts and tree cover;
 - evenly spaced and well contained;
 - the key feature in the wider view;
 - re-establish such that its presence would be even less obvious;
 - prevent direct scale comparisons; and
 - The Operational Rigged Hill Windfarm already has some influence in a small proportion of this view, as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect and would be barely discernible at this distance.
- Taking all these factors into account, the magnitude of change on the views of residents and north-east bound road-users as a result of the operational phase of the Development would be medium to low.

6.7.5.16.4 Significance of Effect

decommissioning / construction and operational phases. This finding relates chiefly to the separation distance between the viewpoint and the Development, the small proportion of the view which it occupies, the existing influence from the more immediate urban context, and tree cover and the existing influence from Operational Rigged Hill Windfarm.

The Development would appear in close proximity to and partially behind the minor focus of the view, Donald's Hill, and

• Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a The Development would be visible across a slightly increased extent of the skyline than the Operational Rigged Hill

which for around 25 years have been characterised by the presence of a windfarm in the same general location in what is

The turbines would appear appropriate in this simple upland landscape and would form a composition that would appear

Donald's Hill appears as the tallest and most prominent feature of the view ahead, with Benbradagh Mountain remaining

The barely discernible access roads at this distance, will be used infrequently by vehicles and over time vegetation would

Albeit difficult to identify at this distance, sufficient separation between the Development and the smaller single and pairs of turbines will ensure that they do not create a confusing image with distance and closer range tree cover helping further

The effect of the Development on nearby residents and users of Garvagh Road would be not significant during both the

6.7.5.17 Viewpoint 17: Scotchtown Road, Magilligan 6.7.5.17.1 Baseline

- This viewpoint is taken from a minor road that leads to Balls Point on the eastern coast of Lough Foyle where there is parking providing access to a Nature Reserve and short walk to a tower. The area appears popular with dog walkers and for taking in the views across the Lough which are seen to the west.
- The view towards the Site is across large, pastoral fields with some subdivision by stone walls and tree clumps. Also apparent 591. are areas of gorse, which have grown up on unimproved or rocky areas of this otherwise flat landscape. The tree cover mostly screens views of the scattered properties located within this local area, however, one is just visible across the near field.
- The view provides a wide panorama that illustrates some of the more distinctive landforms of the upland area and that provide 592. containment to the lower lying landscapes within the view. The closest of these is Binevenagh Mountain. Its steeply sloping escarpment has some exposed rock faces near the summit with other slopes having grass moorland or coniferous forestry landcover. Some areas of recent felling are apparent on the lower slopes. The forestry is of mixed types with some deciduous woodland on lower slopes. Its irregular edges and pattern ensure that it is not generally detrimental to the character of the Mountain, however more angular edges near the skyline appear less sympathetic.
- Beyond Binevenagh the convex form of Keady Mountain is apparent whilst the less marked forms of Rigged Hill and Temain 593. Hill create a ridge that extends to the angular summit and side slope of Donald's Hill. Here the land drops forming a lower area of land and the valley that leads to Garvagh. The other side of the valley is formed by Benbradagh, which appears as a further escarpment and marks the northerly extent of the Sperrin Mountains, which can be seen extending into the distance.
- The wind turbines of the Operational Rigged Hill Windfarm are visible as distant, relatively small scale, moving, vertical features on the upland skyline, contained within a small proportion of this wide panoramic view.

6.7.5.17.2 Sensitivity

- The value of the view is assessed as high due to its location within the Binevenagh AONB. The views over the foreground and Binevenagh and Keady Mountain are also within the AONB. Although offering a diverse panorama, the viewpoint itself is not of particular importance and there are no facilities to promote enjoyment of the view.
- This is a view that would be obtained by users of the minor road and parking area who are transient and of medium susceptibility. Rigged Hill does not form a particularly important landform feature in the wide panoramic views across this landscape, which tend to be focussed towards Binevenagh or across Lough Foyle to Donegal. The presence of the Operational Rigged Hill Windfarm is not prominent at this distance. However, it does establish this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a high value and a medium susceptibility to 597. the proposed change.

6.7.5.17.3 Magnitude of Change

- The photomontage in Figure 6.44f shows that Operational Rigged Hill Windfarm would no longer be there and all seven Development turbines would be visible set on, behind or to the fore of, the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 14.0 km.
- The distance of the Site to the viewpoint means that much of the decommissioning works and construction works associated 599. with the Development may be visible, although not prominent at this distance, and contained within a small proportion of this wide panoramic view. The most visible features would be decommissioning and construction of the turbines, and associated tall cranes, albeit the cranes will be barely discernible at this distance, and decommissioning and construction traffic including any heavy machinery traversing the access tracks along a relatively narrow route extending across a small proportion of this view at some distance. This unusual occurrence (within this upland landscape) may make the Development more noticeable, albeit at some distance.
- The full height and much of the simple landform of Rigged Hill is apparent at this range and therefore the tall elements of the 600. cranes and turbines would not appear at variance with its scale, in this small proportion of the view, although they would appear large compared with the Terrydoo Road turbines and the masts on Temain Hill, albeit these features will be barely

discernible at this distance minimising any scale comparisons. The magnitude of change during the initial decommissioning and construction phases would be low. The general activity during the overall works programme would last longer than the decommissioning and construction activity associated with the turbines, albeit it is unlikely to be readily visible at this range.

- At the end of the temporary construction phase the roadside verges and changes in level would be soiled and seeded, reinstating them as rough grassland so that over time they would blend in more with the surrounding landcover.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. 602. The following factors would add to the magnitude of change on the views from Scotchtown Road during this phase;
 - The proximity of the Development at 14 km to the viewpoint would mean that the Development turbines would appear as small to moderate scale moving structures, contained within a small proportion of the wider view on the ridge skyline;
 - larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - Windfarm:
 - larger scale of the Development turbines albeit at distance; and
 - an increased cumulative effect with these baseline windfarms.

^{603.} The following factors would moderate the magnitude of change on the views of people using Scotchtown Road:

- The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views contained within a small proportion of this wide panoramic view;
- of this scale;
- The Development would occupy a relatively level and unremarkable section of the skyline and would not impinge on the more notable hill tops at either end;
- this distance, and the single turbines located on the lower hill slopes and within the settled valley;
- The Development would also be seen in a separate part of the view from the other more distant groups of windfarms, and
- give rise to a new cumulative effect.
- 604. Taking all these factors into account, the magnitude of change on the views of road-users as a result of the operational phase of the Development would be low.

6.7.5.17.4 Significance of Effect

The effect of the Development on users of Scotchtown Road would be not significant during both the decommissioning / 605 construction and operational phases. This finding relates chiefly to the separation distance between the viewpoint and the Development, its occupation of a small proportion of this wide panoramic view, will its main focus retained on Lough Foyle, towards Donegal and towards Binevenagh, and takes into account the current influence from the Operational Rigged Hill Windfarm.

6.7.5.18 Viewpoint 18: Greenbank Church, Quigley's Point, Republic of Ireland 6.7.5.18.1 Baseline

This viewpoint is located on the R238 which runs along the north-western shore of Lough Foyle in the Republic of Ireland. It is 606. on the north-easterly section of a route that is promoted as the Wild Atlantic Way with this section connecting Derry /

Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a The Development would be visible across a slightly increased extent of the skyline than the Operational Rigged Hill

• The Development may be seen in combination with the two smaller Terrydoo Road turbines and the masts on Temain Hill although these features are barely discernible at this distance, helping minimise the variance in scale accentuating the

There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to

which for around 25 years have been characterised by the presence of a windfarm in the same general location albeit

The closest access tracks are unlikely to be visible as a new development feature crossing the hill slopes at this distance; The Development would be seen within a large scale, upland landscape which has the capacity to accommodate turbines

The Development would be seen in a separate part of the view from the Terrydoo turbines which are barely discernible at

located within different areas of the landscape, albeit similarly upland areas that provide the containment to the lowlands;

Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context, albeit contained within a small proportion of this wide panoramic view, and therefore the Development would increase this but it would not
Londonderry with Inishowen Head. As well as users of this route, the viewpoint is also representative of views that would be obtained by residents and users of the amenities along this section of the coastline.

- When the tide is out, the foreground of the view is an area of mudflats that gradually merge into the wide Lough Foyle, which 607 extends across much of the view in this direction. The mouth of the Lough can be seen to the north where it meets the open sea. The land appears to end with the pronounced form of Benivenagh, however the lower, flat expanses of the coastal area around Magilligan Point extends almost to the other side of the Lough, although this is barely perceptible from this viewpoint.
- The view beyond the Lough includes a very narrow band that is the flat, settled agricultural land that extends around the 608. Lough. The built form of the scattered settlement, the industrial and commercial area to the north of Limavady, and the towns of Limavady and Ballykelly, are just apparent as a narrow sliver of pale coloured blocks. Further to the west the shore is more gradually sloping and this along with the closer range means that the pattern of the settlements and agricultural land uses are more apparent rising up the hill sides.
- A ring of upland landform appears to enclose this lower lying area across the Lough. The most prominent landform is Binevenagh. Beyond its large extent, the convex form of Keady Mountain is apparent whilst the less marked forms of Rigged Hill and Temain Hill create a ridge that extends to the angular summit and side slope of the Donald's Hill escarpment. The Sperrins extend beyond this into the distance. Further round on the other side of the Roe Basin the high ground is formed by the Loughermore Hills.
- 610. At this range the wind turbines of the Operational Rigged Hill Windfarm are barely visible as small scale, moving, vertical features on the upland skyline. There are also other distant windfarms in this sector of the view including Dunbeg to the left and Glenconway further right, while the smaller single and paired turbines are barely discernible.

6.7.5.18.2 Sensitivity

- The value of the view is assessed as medium to high. Neither the viewpoint nor the majority of the view (in the direction of the 611 Site) lie within an area that is covered by a landscape planning designation. However, a section of the upland that forms part of the backdrop of the view is located within the Binevenagh AONB. The viewpoint is not of particular importance and there are no facilities to promote enjoyment of the view. There is, however, a local value associated with the visual amenity, especially of residents but also road-users using the Wild Atlantic Way tourist route.
- This is a view that would be obtained by users of the road as they travel along it so that viewers would generally be transient 612. with the views being perpendicular to the line of travel and across Lough Foyle. There are a number of houses near to the viewpoint location so that this viewpoint is also representative of residential receptors. Residents are considered to have a higher susceptibility than transient road users, as their views are potentially of longer duration and greater regularity.
- The existing turbines draw the attention of viewers towards Rigged Hill, as they travel along the road, but the turbines are only 613. visible at this range in very clear conditions and occupy a very small proportion of what is a wide panoramic view with other competing foreground distractions, such as transient fishing vessels.
- The susceptibility of residents in this area would be medium. Rigged Hill is not an important landform feature in the local 614. landscape, it is at a considerable distance from the receptors and is within a completely different landscape. Its prominence is moderated by its position beyond the intervening Lough Foyle, contained within a small proportion of what is a wide panoramic view. Furthermore, when visible, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as medium to high as a result of a medium to high value and a medium susceptibility to the proposed change.

6.7.5.18.3 Magnitude of Change

The wireline in Figure 6.45b shows that Operational Rigged Hill Windfarm would no longer be there and all seven 616. Development turbines would be theoretically visible set behind, or to the fore of, the ridgeline. The closest Development turbine would be seen at a distance of 25.92 km.

- 617. The distance between the Site and the viewpoint means that the majority of the decommissioning works and construction works associated with the Development are unlikely to be visible. The features which are most likely to be visible would be the decommissioning and construction activity, and any associated tall cranes, which would be barely discernible at this distance, and would only be visible during periods of very good visibility.
- 618. The full height and much of the simple landform of Rigged Hill can be appreciated at this range and therefore the vertical elements of the turbines would not appear at variance with its scale. The magnitude of change during the initial decommissioning and construction phases would be low to negligible.
- During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. 619. The following factors would add to the magnitude of change on the views from Quigley's Point during this phase;
 - The long distance of the Development from the viewpoint would mean that the Development turbines would appear as small scale moving structures on this panoramic ridge skyline;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The Development would be visible across a slightly increased extent of the skyline than the Operational Rigged Hill Windfarm albeit this will be difficult to appreciate at this distance; and
 - an increased cumulative effect with these baseline windfarms.

E20. The following factors would moderate the magnitude of change on the views of people at Quigley's Point;

- The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views are contained within a very small proportion of a wide panoramic view;
- There will be other closer range competing influences on this view in the form of fishing vessels, other water users
- The Development would be seen only in very good visibility within a large scale at this distance, in a section of upland landscape which has the capacity to accommodate turbines of this scale;
- more distant ranges, located within different areas of the landscape but within similarly upland areas that provide the containment to the lowlands; and
- The Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of road-users as a result of the operational phase of the Development would be low.

6.7.5.18.4 Significance of Effect

The effect of the Development on people at Quigley's Point would be not significant during the initial decommissioning / construction and operational phases. This finding relates chiefly to the long distance between the viewpoint and the Development, the fact that it is contained within a small proportion of this wide panoramic view, with visibility only likely during very good visibility conditions, and its location on an unremarkable section of the skyline which already contains Operational Rigged Hill Windfarm.

6.7.5.19 Viewpoint 19: B66, west of Ringsend, north of Site

6.7.5.19.1 Baseline

- This viewpoint is located on the B66 which is a route that passes between Keady Mountain and Boyds Mountain to the north 623. of the Site. There are numerous properties along this route, some of which may gain similar views to the viewpoint. The viewpoint is taken from an area around some farm buildings that offers an opportunity to pull off the road. There are no formal stopping points or passing places along the route nearby.
- The view towards the Site is perpendicular to the direction of travel along this route and is more likely to be seen when 624. travelling from the west as the view would be more ahead of travellers when approaching from that direction.

The turbine layout would appear slightly discordant due to the two instances of aligned or overlapping turbines;

There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to

which for around 25 years have been characterised by the presence of a windfarm in the same general location, which

• The Development would also be seen in a separate part of the view from the other groups of windfarms at both closer and

- At this location it is possible to see the summit of Rigged Hill above the intervening landform and forestry of Boyds Mountain. The side slopes of Boyds Mountain are largely unimproved pasture and rough grazing. There is some subdivision and pattern to the land formed by the drainage, which influences the land cover. There is a geometric block of coniferous forestry and some riparian woodland along the numerous streams that come off the hill. Higher up the slopes the land is characterised by an expanse of coniferous forestry with regular edges and uniform species emphasising that it is a human intervention rather than occurring naturally.
- The wind turbines of the Operational Rigged Hill Windfarm are readily visible as moving, vertical features on the upland skyline. There are also two turbines of similar scale, sited out on the open hill slope of Boyds Mountain and, from this angle, they too are seen on the skyline. They appear of similar scale to those of Rigged Hill.
- 627. To the west of Boyds Mountain, the land is seen to fall away and become gradually more settled with a greater complexity formed by the pattern of the agricultural and settled landscape, seen to extending into the distance. The angular form of the Donald's Hill escarpment can be seen in the distance, with the upland ring of hills extending around and providing containment to the low lying landscape around the Roe Valley. Single moderately scaled turbines can be seen across the settled landscape and the larger windfarms of Glenconway and Althullion are visible on the uplands further west.

6.7.5.19.2 Sensitivity

- The value of the view is assessed as medium. The viewpoint is located on the boundary of the Binevenagh AONB. However, no part of the view towards the Site is within the AONB. Although offering a diverse panorama, the viewpoint itself is not of particular importance and there are no facilities to promote enjoyment of the view and no formal area to stop along the road.
- This is a view that would be obtained by road users who are transient and of medium to low susceptibility. There are a number 629. of houses near to the viewpoint location so that this viewpoint is also representative of residential receptors. Residents are considered to have a higher susceptibility than transient road users as their views are potentially of longer duration and greater regularity.
- While Rigged Hill is not an important landform feature in the local landscape, it appears as a prominent ridge in the relatively close-range views of road-users. Its prominence is moderated by its position beyond the intervening landform of the valley and the forestry along the upland ridgeline. Furthermore, the presence of Operational Rigged Hill Windfarm establishes this type of development as a feature of the baseline views in this direction. This reduces the susceptibility of viewers to the effects of the Development, as it would be seen to be replacing an existing feature, albeit with turbines notably larger in scale.
- The sensitivity of the view has been appraised as **medium to high** as a result of a medium value and a medium-high 631. susceptibility to the proposed change.

6.7.5.19.3 Magnitude of Change

- The photomontage in Figure 6.46e shows that Operational Rigged Hill Windfarm would no longer be there and all seven 632. Development turbines would be visible set on, behind or slightly to the fore of, the ridgeline of Rigged Hill. The closest Development turbine would be seen at a distance of 2.39 km, with one turbine seen only as blades appearing above the skyline.
- The proximity of the Site to the B66 and the properties along it means that parts of the decommissioning and construction works associated with the Development would be readily visible. The most prominent features would be works associated with the decommissioning and construction of the turbines and any associated tall cranes used, as well as the construction of the access track leading to the closest turbine. However, the majority of the construction would be concealed by the intervening forestry.
- The tall elements of the turbines and cranes would not appear at variance with the large scale of Rigged Hill. The magnitude 634. of change during the initial combined decommissioning and construction phases would be medium to high. Owing to the rounded profile of Rigged Hill and the intervening forestry most of the turbine access tracks and lower activities would be screened by the brow of the hill or forestry cover.

- ^{635.} During the operational phase, the effects would relate principally to the presence and movement of the Development turbines. The following factors would add to the magnitude of change on the views of local residents and B66 road-users during this phase;
 - The close proximity of the Development to residents and road-users would mean that the Development turbines would appear as large scale moving structures on the ridge skyline;
 - Although no direct scale comparison would occur, the Wind Turbines of the Development would be perceived to have a larger scale than the Wind Turbines of Operational Rigged Hill Windfarm which would have been removed;
 - The turbine layout appears slightly discordant due to the irregularity of the turbine spacing, overlapping blades and the

 - would accentuate the larger scale of the Development turbines;
 - Because Rigged Hill is not seen to its full height, the comparative scale of the Development turbines would reduce the perceived scale of the hill; and
 - an increased cumulative effect with these baseline windfarms.
- The following factors would moderate the magnitude of change on the views of residents and road-users in the Temain Road 636 area:
 - The baseline visibility of Operational Rigged Hill Windfarm would mean that the Development would be visible in views which for around 25 years have been characterised by the presence of a windfarm in the same general location;
 - of this scale:
 - variation in turbine appearance;
 - There would be sufficient separation between the Development and the two smaller Terrydoo Road turbines and this
 - and landscape to the other cumulative windfarms which occur on the upland area to the east of the Roe Valley; and
 - the Development would increase this but it would not give rise to a new cumulative effect.
- Taking all these factors into account, the magnitude of change on the views of residents and road-users as a result of the 637 operational phase of the Development would be medium to high.

6.7.5.19.4 Significance of Effect

The effect of the Development on residents and road-users would be significant during both the decommissioning / 638. construction and operational phases. This finding relates chiefly to the proximity of the B66 to the Development, and the increased influence that the larger turbines, and the partial visibility of the construction of a section of access track would have on the character of the views, despite there being a current influence from the Operational Rigged Hill Windfarm.

6.7.5.20 Visual Receptors 6.7.5.20.1 Drumsurn

- This is a small settlement that lies approximately 3.6 km to the south-west of the closest turbine of the Development. The 630 village largely sits astride a minor road, that runs in a generally north to south direction, between Limavady in the north, and the B64 in the south. The settlement is not densely laid out, so that the hill forms of Donald's Hill and Benbradagh are apparent within the surrounding area, forming part of its character, particularly from locations such as the sports pitches and the play park on the north-easterly edge of the village. The existing windfarm is clearly visible on the hillside from parts of the village, with the movement of blades apparent, however, other features and characteristics of the setting of the village, such as the hill forms and agricultural landscape are definitive.
- The town has a number of spur roads leading off the main street, which provide access to farms and small pockets of housing 640. as can be seen in Viewpoint 5: Drumsurn, Beech Road. The baseline view shows the type of view towards the Operational Rigged Hill Windfarm that is currently available from parts of the village.

variance in the degree to which the turbines would be visible albeit the most prominent overlapping turbines are screened; The Development would be visible across a greater extent of the skyline than the Operational Rigged Hill Windfarm; The Development would be seen in combination with the two smaller Terrydoo Road turbines and the variance in scale

There are other large scale windfarms within the wider view and therefore the effect of the Development would give rise to

The Development would be seen within a large scale, upland landscape which has the capacity to accommodate turbines

The intervening forestry screens the lower lying turbines and all of the infrastructure and this moderates the apparent

would assist in ensuring that they do not create a confusing image due to the larger scale of the Development turbines; The increase in the cumulative effect that the Development would give rise to would occur in a separate part of the view Operational Rigged Hill Windfarm already has some influence as part of the cumulative windfarm context and therefore

- The effect on the viewpoint as a result of the Development was assessed as significant due to a medium to high sensitivity and a medium to high magnitude of change during the combined decommissioning and construction phases and a medium magnitude of change during the operational phase.
- The ZTV illustrates that there would be theoretical visibility across the village, however, this would not actually be the case due to intervening buildings and small pockets of vegetation. Due to the proximity of the Development and its location on the nearby ridgeline it is considered that it would be a prominent feature from many locations.
- Where there is clear visibility of the Development from the properties and recreational areas of the village and the approaches 643. to these it is assessed that the effect would also be significant. In all remaining areas, where there is no or limited visibility the effect would be not significant. The Development is likely to become a further characteristic of the surrounding area, detracting, to a degree, from the contextual character that is derived from the hill forms.

6.7.5.20.2 Ringsend

- Ringsend is a small linear hamlet that runs primarily along a minor road that sits above the main Craigmore Road (B66) route that lies to the south. There are some dwellings on the Craigmore Road itself. It is located approximately 4.5 km to the eastnorth-east of the closest turbine of the Development.
- Viewpoint 6 is located at Ringsend and represents the type of view that may be available to the elevated properties with an open outlook towards the Development. The assessment of the viewpoint found that there would be a significant effect on this view during the operation of the Development due to the medium to high sensitivity and a medium magnitude of change. The effect during the combined decommissioning and construction was assessed as not significant due to the lower magnitude of change.
- The ZTV on Figure 6.6b illustrates that there would be theoretical visibility from all parts of the hamlet. However, views of the Development from the lower-lying and easterly properties are largely screened by intervening businesses, whilst the Development turbines would also be less visible due to the intervening forestry. The orientation of the properties in the eastern end of the hamlet tend to be more orientated towards the south rather than the south-west towards the Development, although it would be possible to see it from garden grounds and approaches.
- It is assessed that there would be significant effects on the views from the westerly upper properties in Ringsend where 647. views are obtained, which amounts to 10-12 homes and not significant effects on the remaining parts of Ringsend.

6.7.5.20.3 Limavady

- The closest part of the settlement is located at a distance of approximately 5.9 km to the west-north-west of the closest turbine of the Development. There are two representative viewpoints located around the edges of Limavady: Viewpoint 3: Edenmore Road, Limavady; and Viewpoint 4: Roe Park Resort Driveway, Limavady. Both of these viewpoints illustrate views from locations where there would be opportunities for clear visibility of the Development across countryside or the golf course at the Roe Park Resort, respectively. The assessments for these viewpoints found the sensitivity of the receptors to be medium to high and the magnitude of change to be medium, resulting in a significant effect for those receptors in closest proximity as shown in Viewpoint 3: Edenmore Road at 6.14 km.
- Whilst the ZTV on Figure 6.6b illustrates that there would be theoretical visibility of the Development from the majority of the 649. settlement this would not be the case. This is due to the screening effect of intervening urban areas and vegetation.
- It is possible that from taller buildings and locations where there is an open area in the fore and middle ground of the views 650. towards the Site, the Development would be seen on the ridgeline above and beyond the urban area. The Development would be seen to replace Operational Rigged Hill Windfarm. However, such views would be of lower magnitude of change, when compared with the Viewpoints, due to the baseline views being characterised by development.
- The magnitude of change in the views would be medium from the following residential receptors along the southern and south-easterly edge of Limavady where there may be clear views of the Development from the properties and their gardens:
 - Approximately ten houses (generally two storey and front aspects) and their gardens along the southern extent of Edenmore Road where it leaves the town;

- The properties and gardens of the houses east of Rosedale Gardens and that back onto the minor road that runs parallel and south of Rossair Road, which are generally single or 1.5 storey; and
- The houses at the southerly extents of the road off Drummond Manor where there are two storey houses with their rear and side aspects towards the Development.
- ^{652.} From these closer locations there may be **significant** effects as a result of the Development.
- Elsewhere within the settlement of Limavady the magnitude of change would be lower and the effects would be not 653. significant.

6.7.5.20.4 Garvagh

illustrates that there would be theoretical visibility from locations in the north, east and south of Garvagh. However, this does not take into account the extent of the intervening woodland that lies between Garvagh and the Development. The majority of the screening is provided by the commercial coniferous woodland of Garvagh Forest and Rabbit Hill. To the north along Coleraine Road it is small blocks of deciduous woodland and boundary trees that create have a screening effect. If visibility of the Development is visible from locations within Garvagh it is likely to be over or through this vegetation and the magnitude of change would be low or negligible. Based on a medium to high sensitivity, consistent with other settlements in the area the effects would be not significant.

6.7.5.20.5 Dungiven

Viewpoint 16: Garvagh Road, Dungiven illustrates an open view from a slightly elevated location near the north-easterly edge of Dungiven. The effect of the Development on the viewpoint was found to be not significant as a result of a medium to high sensitivity and a medium to low magnitude of change. The effects on the settlement of Dungiven are therefore also assessed as not significant.

6.7.5.20.6 Ballykelly

- This village lies approximately 12 km to the west of the Development. It generally follows the west to east alignment of the A2 with several spurs to the north and west providing access to modern housing areas, which are separated by open fields, grassed areas, commercial development and pockets of woodland. It is shown on the ZTV on Figure 6.6b that there would be theoretical visibility of the Development from the majority of the settlement. However, due to the intervening buildings and woodland, as well as the orientation of the settlement, this would not actually be the case. It is generally the 15 to 20 properties on the eastern edge of the settlement that gain clear views of Rigged Hill and the Operational Rigged Hill Windfarm, although there may be some limited opportunities from other areas of the village from taller buildings or where there is an open area as part of the foreground.
- 657. similar to that of Viewpoints 3 and 4 in Limavady, however the distance to the Development from Ballykelly is greater than for these views. The distance to the Development is more akin to Viewpoint 16: Garvagh road, Dungiven.
- The Development would be seen in the same part of the view toward the long ridgeline as the Operational Rigged Hill 658. Windfarm. The turbines of the Development would appear similar in scale to those of the Dunbeg and Dunmore Windfarms but separated from them by the form of Keady Mountain.
- The magnitude of change as a result of the Development would be medium to low and this would result in effects that are not 659. significant.

6.7.5.20.7 Coleraine

The south-western extent of Coleraine lies at a distance of approximately 12.8 km from the nearest turbine of the Development which lies to the south-west, however woodland planting screens visibility from this part of the settlement. Viewpoint 14 illustrates an open view from the edge of Coleraine which is available from the front aspects of residential properties as well as a popular road around the edge of the town. The distance between Viewpoint 14 and the Development turbines is 14.58 km. The findings of the assessment for Viewpoint 14 are that the effect would be not significant due to a medium to high sensitivity and a low magnitude of change.

Garvagh is located at a distance of approximately 8.8 km to the south-east of the closest turbine of the Development. The ZTV

Dungiven is located at a distance of approximately 10.9 km to the south-south-west of the closest turbine of the Development.

The sensitivity of the receptors to the Development would be medium to high. The direction of the view to the Development is

- The ZTV in Figure 6.6b illustrates that there is theoretical visibility from areas to the south of this along the western edge of Coleraine. It was found during fieldwork that from the more southerly sections of Wheatsheaf Road and the Greenhall Highway, localised landform and roadside vegetation would screen or filter views towards the Development. To the south and west of the Greenhall Highway, residential areas extend to the edge of the countryside. The properties on the western edge of Wheatfield Avenue and Broomhill Park may have open views towards the Development from their rear aspects at a closer range of 13.2 km, albeit in the context of other windfarms. Their sensitivity to the Development would be medium to high. The Development would replace Operational Rigged Hill Windfarm in these views. The magnitude of change would be low and the effect on views from this part of Coleraine would be **not significant**.
- The ZTV illustrates that there are areas further to the east of the River Bann where there is theoretical visibility, however views from these locations are at a greater distance from the Development, which would also be seen across a foreground of urban areas, therefore further reducing the magnitude of change so that effects would be not significant.

6.7.5.20.8 Kilrea

- This small town is located at a distance of approximately 17.5 km to the south-east of the Development. It lies in a similar direction to the closer range Garvagh. The view from the higher ground to the south-west of Garvagh is illustrated in Viewpoint 8 which lies at a distance of 9.3 km from the Development and has been assessed as having a medium to high sensitivity and a low magnitude of change, which results in a not significant effect.
- The sensitivity of Kilrea would also be medium to high. The landscape that lies between the settlement of Kilrea and the Development is highly characterised by woodland and other vegetation, particularly along roadsides and field boundaries and this would screen the Development from most locations. A review of aerial photography also shows there to be vegetation along the northern edges of the town including at Larchfield Gardens and Blackrock Park. It is assessed that the magnitude of change in the views would be low and this would result in effects which would be not significant.

6.7.5.20.9 Ballymoney

The town of Ballymoney is located at a distance of approximately 19 km from the closest Development turbine. The closest Viewpoint to the settlement is Viewpoint 15 on the A26 to the north, which lies at a range of 16.5 km. The assessment found that the effects would be not significant due to the medium sensitivity and low magnitude of change at that viewpoint. The receptors in the settlement of Ballymoney would have a medium to high sensitivity. The landscape that lies between the settlement of Balleymoney and the Development is highly characterised by woodland and other vegetation, particularly along roadsides and field boundaries. The screening or filtering effect of this, along with the increased distance compared with Viewpoint 15 ensures that the magnitude of change would be low and the effect on the receptors in Balleymoney would be not significant.

6.7.5.20.10 Portstewart

- The town of Portstewart lies on the coast approximately 16.9 km to the north-east of the Development. It has a strong association with the sea. The closest viewpoint to Portstewart is at Coleraine, which lies some 2 km to the south-south-east of Portstewart and 15.6 km from the Development. The ridgeline upon which the Development is located is apparent from the south-western edge of the town, however the key views from the settlement tend to be out to sea.
- The assessment of the effects on Viewpoint 14 at Coleraine found the effects would be not significant as a result of the 667. medium to high sensitivity and a low magnitude of change.
- Drawing on this assessment and a review of wirelines generated to illustrate the views of the Development, the sensitivity of 668. the people at Portstewart is assessed as being medium to high and the magnitude of change low, resulting in an effect that would be not significant.

6.7.5.20.11 B66 (Limavady to Aghadowey)

This route runs in a broadly east to west alignment and provides a cross country link between Limavady and the major roads 669. that run in a north south alignment further to the east, linking the larger towns. The closest point of the route to the Development is represented by Viewpoint 19: B66, west of Ringsend, north of Site. The further Viewpoint 6: Ringsend is also close to the B66 and therefore the magnitude of change on the views from the route near to this would be similar. Viewpoint 3: Edenmore Road, Limavady provides an indication of the type of view available towards the Site at the western extremity of the B66 as it is from a similar range and direction.

- These viewpoints provide a good indication of the level and nature of the visibility of the Operational Rigged Hill Wind Farm whilst also illustrating the Development.
- The views from receptors using the route are assessed as having a medium sensitivity to the Development. Wireline views, as 671 well as the magnitudes of change assessed for each of the above viewpoints, have been used to further inform the assessment of the effects on this route.
- Travelling from the westerly extent of the route toward the Site, views of Operational Rigged Hill Windfarm on the long ridgeline are consistently available with the exception of some incidental sections where screening is provided by intervening field boundaries, farm buildings and some small pockets of associated woodland. The Development would be seen extending across a larger extent of the ridgeline with turbines of a larger scale and more pronounced movement. From the junction with the A29, the distance to the nearest Development turbine would be approximately 5.55 km. The orientation of the turbine layout within the Development is along a north to south alignment. This means that as road-users move towards the north of it, the horizontal extent of the view affected by the turbines becomes less, whilst the vertical extent becomes greater due to the closer proximity. The magnitude of change in the views between the A29 junction and approximately where the Ulster Way long distance route (LDR) crosses the road (a distance of approximately 6 km of the route) would range between medium and medium to high during operation and higher during the combined decommissioning and construction phases. This would result in a significant effect.
- Travelling from east to west towards the Development and the location of Viewpoint 19, a similar effect also occurs, although the screening effect of Boyds Mountain reduces visibility to blade tips of a small number of turbines for a short distance. Furthermore, intervening woodland and commercial forestry reduces visibility of both the Operational Rigged Hill Windfarm and the Development.
- ^{674.} For a distance of approximately 3.25 km to the east of the crossing of the Ulster Way, the Operational Rigged Hill Windfarm and the Development are, or would be, largely screened from view by Boyds Mountain, intervening forestry or other roadside vegetation and field boundaries. Travelling from Ringsend, which lies further to the east, visibility of Rigged Hill is more open, however, views of much of Operational Rigged Hill Windfarm are screened by Cam Forest and the forestry on Tibaran Mountain. This is similar to what is shown in Viewpoint 6: Ringsend, where the magnitude of change was assessed as medium during operation, resulting in a significant effect. Views are also possible of other operational cumulative windfarms on the uplands to the south-east. Significant effects would occur on the B66 through and west of Ringsend for a distance of approximately 1.7 km when travelling west towards the Development.
- When travelling from further east, open views towards the Development are screened by the woodland around the Recycling Centre and commercial development, scrubby roadside vegetation, and farm buildings further to the west. There would be a medium magnitude of change in the views from a 1.2 km stretch of the road from west of the farm to Ringsend due to the Development being apparent in views close to the alignment of the direction of travel when moving westwards. This results in effects which are assessed as being **significant**.
- To the east of the farm the magnitude of change reduces due to a combination of intervening vegetation and buildings as well as increased distance. The low to medium or lower levels of magnitude of change result in effects that are not significant between the farm and Aghadowey.
- In summary the effects on west bound travellers on the B66 would be **significant** between the junction with the A29 and the point on the route where the Ulster Way LDR crosses the road, a distance of approximately 6 km at ranges of between 5.55 km and 2.4 km to the nearest turbine. The effects on all other sections would be not significant.
- Travelling westwards the effects on road users would be significant between the farm that lies west of the Recycling Centre and approximately 1.6 km west of the junction with the B70, a distance of approximately 2.9 km of the route at ranges of between approximately 3.6 km and 6 km from the nearest Development turbine. The effects on all other sections would be not significant.

6.7.5.20.12 B64 (Dungiven to Garvagh)

This route runs predominantly in a west to east alignment. Viewpoints 9 and 16 are located at the western end of the route. 679. The ZTV on Figure 6.6b illustrates that it would be theoretically possible to see the Development or parts of it from sections of

the route, to a varied degree. Figure 6.7 shows that this section of the B64 is part of the Sperrins Scenic Route and, as such, views from it have been assessed as having a medium to high sensitivity.

- The greatest extent of visibility of Operational Rigged Hill Windfarm and the Development is in the vicinity of Viewpoint 9 for a distance of approximately 900 m where the magnitude of change would be medium to low and not significant.
- Actual visibility of the Development is restricted, or heavily intermittent, along the route to the south-west of this due to 681. intervening roadside and other vegetation. On leaving Dungiven, the road drops down so that roadside and other vegetation screens views towards the Site and the Development.
- Beyond this section of the route, further to the north-east, the ZTV shows that the theoretical visibility is reduced and this, 682. combined with screening by further roadside vegetation, ensures that the magnitude of change reduces to low where the route passes to the north-west of Benbradagh Mountain. The ZTV shows that theoretical visibility of the Development is limited or non-existent further to the east. There is shown to be an area of visibility of one to two turbines in the area close to the junction with the B190, however, a review of wirelines indicates that this would only be in the form of small sections of blade tip, which are unlikely to be noticed. This is also the case in the further patchy areas of theoretical visibility further to the south. The magnitude of change in these locations would be low or negligible.
- There are areas of theoretical visibility of the Development when travelling west from Dungiven Garvagh. Initially, when travelling out of Garvagh the views in the direction of the Development are screened by the forestry on Rabbit Hill. Further west, there is shown to be a patch where there would be no or limited theoretical visibility and, thereafter, some theoretical visibility from the road. A review of wirelines shows that until in the vicinity of the cluster of properties at Churchtown the theoretical visibility would be of blade tips only and unlikely to be noticed.
- Around Churchtown, however, wirelines show that there would be theoretical visibility of all seven turbines with the closest of 684. these visible as hubs and parts of towers. In reality this theoretical visibility would be screened by the intervening blocks of forestry as well as the roadside properties.
- It is assessed that the magnitude of change in the views obtained ahead of west bound users of the B64 would be low to negligible, resulting in effects that would be not significant.

6.7.5.20.13 B68 (Limavady to Dungiven).

- This route runs broadly in a north to south orientation with the closest point being at a distance of just over 6 km to the west of the nearest turbine of the Development. The road runs alongside the eastern edge of the valley of the River Roe and parallel to the B192. The ZTV on Figure 6.6b illustrates that there would be theoretical visibility from long sections of the route and no visibility from other sections.
- There is existing visibility of Operational Rigged Hill Windfarm from parts of this route. The sensitivity of the route is assessed 687. as medium as it does not form part of a scenic route or lie within a landscape planning designation.
- Within the settlement of Limavady there would not be theoretical visibility of the Development from the B68 due to the 688. intervening urban area. Once beyond the settlement edge, visibility of Operational Rigged Hill Windfarm and other cumulative windfarms would be similar to that shown on Viewpoints 3 and 4, which illustrate views of the Development from the edge of Limavady at distances of 6.1 km and 8.3 km respectively. The magnitude of change assessed for both of these viewpoints was medium. The Development would be seen at a range of approximately 6.9 km from the edge of Limavady on the B68 and the magnitude of change would also be medium for a section of the route of approximately 1 km to the south.
- Further to the south, there is shown to be continuous theoretical visibility of the Development, however, roadside and other 689. vegetation and properties provide intermittent screening. In addition, views of the Development from the closest section of the route are located in a direction that is perpendicular to the direction of travel from both the north and south, and landform restricts theoretical visibility along stretches of the route. It is assessed that the magnitude of change from the route between Dungiven is medium to low, or lower, up to within approximately 1 km of Limavady, largely due to the intermittent nature of the views of the Development.
- The effect on the B68 between Limavady and Dungiven would be significant for a 1 km stretch of the route to the south of Limavady and not significant elsewhere.

6.7.5.20.14 B70 (Garvagh to Ringsend)

- an area with a landscape planning designation. The ZTV on Figure 6.6b illustrates that there would be theoretical visibility from the majority of this route at ranges of between approximately 5 km and 7.75 km. The ZTV indicates that there would be no theoretical visibility from the route when users leave Garvagh until they are round the landform upon which Garvagh Forest would be located.
- From this point onwards, there is some intermittent screening of Operational Rigged Hill Windfarm from the route by roadside properties and thereafter, substantial woodland around a former quarry and storage area. This generally screens views towards the Development until approximately 1 km beyond the edge of the forest. From this point onwards, the Development would be seen from similar locations to Operational Rigged Hill with the turbines seen as larger moving forms across a wider horizontal extent of the view of the long ridgeline. From this point on the route, just to the south of Glenkeen Bridge, the Development would be visible at a distance of approximately 6.9 km off to the west-north-west.
- The ZTV shows theoretical visibility to be intermittent and actual visibility would be more restricted by intermittent screening by roadside trees and intervening woodland and buildings. However, some long stretches of the route would gain clear visibility of the Development over a stretch of approximately 5 km and at ranges of between 6.9 km and 5 km the magnitude of change in the views would be medium. This would give rise to effects on the B70 that would be intermittently significant from approximately 1 km north of Garvagh Forest to Ringsend. The effect on all remaining sections would be not significant.

6.7.5.20.15 The North Sperrins Scenic Driving Route

- is shown at a larger scale with the ZTV and viewpoints on Figure 6.6b.
- The closest sections of the North Sperrins Scenic Driving Route with clear visibility of Operational Rigged Hill Windfarm and 695 the Development are represented by Viewpoints 7, 8, 9 and 16. The most northerly section of the route has been assessed separately as it follows the B64. The findings of the corresponding assessments have taken account of the higher value and, therefore, sensitivity attributed to the North Sperrins Scenic Driving Route.
- The assessments of the viewpoints and the B64 found that there would be a **not significant** effect on the views from a section 696. of the route in the vicinity of Viewpoint 9 for approximately 900 m. The effects on the other sections of the B64 and the viewpoints were also assessed as not significant due to low or medium to low magnitudes of change.
- Other sections of the North Sperrins Scenic Driving Route are located at a greater distance to the Development whilst the south-easterly section runs through the Brockaghboy Windfarm and would be characterised by views of this. It is assessed that the magnitude of change in the views from these more distant sections would be less than for the closer viewpoints and therefore the effects would be not significant.

6.7.5.20.16 National Cycle Network (NCN) routes and Links within 15 km radius

NCN 93 runs through the west of the Study Area in a generally north-east to south-west alignment, whilst NCN 96 runs generally north-south on the east side of the Study Area. The users of these cycle routes are considered generally to have a higher susceptibility than road users and have therefore been assessed as being of medium to high sensitivity.

6.7.5.20.17 NCN 93

Glenconway Windfarms. It is shown on the ZTV (Figure 6.6b) to run through almost continuous theoretical visibility between there and where it crosses over Binevenagh. The majority of the locations from where the Development is actually visible, would currently have visibility of Operational Rigged Hill Windfarm. Visibility from the section of the route that runs to the west of the B192 (Viewpoint 11) is intermittent, with Carrick Woodland providing a substantial screen. Further pockets of woodland, roadside planting and localised low points in the road restrict and filter visibility along the route. This means that the magnitude of change would be medium to low or lower to the west of the B192 and the effects on the NCN 93 would be not significant along this stretch. This takes into account the additional cumulative effect of the Development in the context of the Altahullion and Glenconway Windfarms.

This route runs to the east of the Site. The sensitivity is assessed as medium as the route is not part of a scenic trail or within

The route is readily identifiable on Figure 6.7 and shown on Figure 6.10 with the ZTV. A more detailed version of the mapping

The route of NCN 93 generally follows minor roads. It enters the 15 km radius area just to the south of Altahullion and

- Viewpoint 11 is located along the route where it crosses the B192. The magnitude of change in the view there was assessed as medium to low during the construction/decommissioning and operational phases. This resulted in not significant effects during the combined decommissioning/construction and operational phases.
- The section of NCN 93 that follows the B68 south of Limavady was assessed as having a medium magnitude of change in the view and a significant effect over an approximately 1 km stretch of the route and such magnitudes of change and effects would continue from south of Limavady until the crossing of the River Roe, a distance of approximately 1.1 km along the NCN 93.
- Through Limavady itself, the actual visibility of the Development would be limited due to intervening built form. Visibility 702 towards the Development to the north-east of the urban edge is also restricted by the woodland of the Drenagh Estate.
- ^{703.} From the north heading south towards Limavady, views are not theoretically possible from NCN 93 from north of Binevenagh. Heading south from Binevenagh, the views are largely screened by intervening commercial forestry except for short sections such as that illustrated by Viewpoint 13. The magnitude of change in the view from the Viewpoint was assessed as low and the effect assessed as not significant.
- Along the sections of the route where it runs off the south facing slope of Binevenagh, then heads to the west and then again 704. to the south towards the A2, crossing at Limavady, views towards the Development are intermittently screened. From the section of the route on either side of the A2 crossing, the views towards the Development would be similar to those shown in Viewpoint 12 and mostly seen by north-bound cyclists. The assessment for Viewpoint 12 concluded that there would be a not significant effect on the view during the combined decommissioning and construction and operational phases due to a medium to high sensitivity, and a medium to low magnitude of change.
- ^{705.} Further south, around the cluster of houses at Ballycastle, the properties themselves, along with roadside vegetation, screen views. Nearer to the crossing of the A2 the views are often screened and are partially characterised by views of industrial and commercial development in the form of large buildings set within fenced grounds. The magnitude of change would be medium to lowor lower from this stretch of the route and the effect **not significant**.

6.7.5.20.18 NCN 96

This route only runs within the 15 km radius from the Development in the vicinity of Coleraine. The majority of the route is through the urban area from where there would be no actual visibility of the Development. The route leaves the urban area in the vicinity of Viewpoint 14, which is representative of the views towards Operational Rigged Hill Windfarm and the Development from NCN 93. The viewpoint was assessed as having a medium to high sensitivity and a low magnitude of change resulting in effects that would be not significant. This assessment is applicable to the section of the route of NCN 96 to the north-west of Coleraine. Elsewhere along the route the magnitude of change would be lower and the effects also not significant.

6.7.5.20.19 The Ulster Way Long Distance Route

- The Ulster Way Long Distance Route is assessed as having a medium to high sensitivity to the Development. It is assessed, based on the findings of the viewpoint assessment that effects beyond a range of 15 km would be not significant.
- The route runs through the 15 km radius Study Area from Castlerock in the north, to east of Corick Mountain in the south.
- The route generally follows minor roads and hill tracks although some short sections run alongside major roads such as at 709 Dungiven (A6) and the A29. It runs through areas of open moorland, commercial forestry, small settlements (Dungiven) and in close proximity to operational windfarm developments.
- The large scale ZTV on Figure 6.8b represents theoretical visibility of the blade tip height of the Development in conjunction 710. with the Ulster Way LDR. Figure 6.11 illustrates the locations where the ZTVs for the Development and the Operational Rigged Hill Windfarm coincide or, otherwise, where the Development would introduce visibility of a windfarm where this is currently not the case as a result of Operational Rigged Hill Windfarm. Where this occurs, the views towards the Development tend to be of smaller parts of it, rather than the full extent.
- The Development would introduce turbines of larger scale and across a slightly larger horizontal extent of the views, when compared with those that are currently available towards Operational Rigged Hill Windfarm on the same Site.

The route and the changes to the views from it, are described from south to north between Corick Mountain and the Development, and from north to south from Castlerock to the Development. This reflects the direction of travel within which the Development would be most apparent in views.

Corick Mountain to the Development

- This section of the route begins south of the A6 in the Sperrin AONB. The route ascends the open moorland of the north 713 facing slopes towards the A6 along rough tracks and rural access roads. Along this section of the route there would be no visibility of the Development, due to the intervening landform of Benbradagh Mountain, however, Figure 6.15 illustrates that there would be visibility of the Glenconway and Altahullion Windfarm group to the north-west, ahead of walkers, at a range of approximately 10 km.
- Once walkers descend to the A6 and through Dungiven, there is shown to be theoretical visibility of the Development. 714. However, screening is provided in views aligned in the direction of the Site by intervening roadside vegetation and buildings.
- Open views in the direction of the Development from the Ulster Way LDR occur once beyond the housing on O'Cahan Place, where the views open out across open playing fields. From there, the view towards Operational Rigged Hill Windfarm and the Development are similar to those obtained at Viewpoint 16, although fewer turbines would be visible from this location on the Ulster Way, due to the screening effect of Donald's Hill. The magnitude of change from this location and the following 0.5 km of the route would be **medium to low**. Thereafter, there would be no visibility of the Development as walkers continue along Curragh Road and ascend the westerly slopes of Benbradagh Mountain via a minor road. The minor road crosses over a saddle between Benbradagh and the hills to the south. Once near to the high point, it becomes possible to see the Development over the top of Donald's Hill at a range of approximately 9.5 km. The baseline and proposed views are slightly more distant and less elevated than are shown in Viewpoint 10, however it provides a useful indication of the type of view that would be available from here and for the following 3 to 3.5 km. The magnitude of change would be medium to low from this section of the route, where it descends the north facing slopes of Benbradagh Mountain and from where it is also possible to see the Brockaghboy Windfarm, as well as other more distant windfarms, from some sections to the east.
- At the base of the slope, a minor road is crossed before the Ulster Way joins another minor road heading northwards to meet the B64. It follows this road for a short section as it passes to the north of the Gortnamoyagh Forest. Thereafter, the route follows minor roads to traverse east and then west along Killhoyle Road and Gortnarney Road, along the lower slopes of Donald's Hill. It then strikes north through farm fields and up the steep south facing slope of Donald's Hill. Along this section of the Ulster Way there would be little or no visibility of the Development.
- Once the summit of Donald's Hill is reached there is clear visibility of Operational Rigged Hill Windfarm and the 717 telecommunications masts at Temain Hill. There would be clear visibility of the Development at a range of around 2 km to the nearest Wind Turbine from this location. The magnitude of change would be **medium to high** from this location and for the following 4.5 km, until walkers on the Ulster Way have passed through the Development, it should be noted that this section of the Ulster Way through the Development was rerouted to utilise the Operational Rigged Hill Windfarm access track, incorporating the windfarm into the visitor/walker experience. Views from this section of the route also include the Glenconway and Altahullion group of windfarms, from part of the route once it ascends from the summit of Donald's Hill and where it traverses across the western slopes of Craiggore and Temain Hill.

Castlerock to the Development

- The first section of the route traverses the lower Binevenagh slopes from the coast via minor roads, through semi-improved 718. pasture, ascending along the minor Bishop's Road which turns south after the viewpoint at Gortmore, and which provides panoramic views across the coastal area.
- The route continues to climb the slopes of Binevenagh and views from it remain open and broad until approximately where the junction with Leighery Road is reached, and the surrounding landcover of commercial forestry begins to restrict views. It is only once the route of the Ulster Way changes direction, off Bishop's Road, and walkers start to move eastwards, that theoretical visibility of the Development is shown to occur for a short section of the route up to the Relay Station. However, actual visibility, in the direction of the Site, is restricted by commercial forestry. Thereafter, landform restricts theoretical visibility as the Ulster Way drops down to the north before turning eastwards and through the Ballyhannah Forest and Grange

Park Wood. Here, there is theoretical visibility of the Development for approximately 3.8 km of the route, however actual visibility is generally screened by commercial forestry along this section.

- When the route turns south along Altekeeragh Road, this continues to pass through forestry, which restricts visibility of the Development. It drops down in a southerly direction to a point on the B201 where there is no theoretical visibility of the Development but where the Ulster Way follows the route of the B201 for around 2 km. Along this, and the next sections of the Ulster Way that run to the south and west, the Dunbeg and Dunmore Windfarms are adjacent and appear prominent in views from the Ulster Way. Whilst there is some theoretical and actual visibility of the Development along parts of this section of the route between the B201 and the A29, the extent of the visibility is of blade tips, which are likely to be missed in this partially forested and windfarm developed context. The magnitude of change would be negligible.
- South of the A29, the Ulster Way ascends the north facing slopes of Keady Mountain, passing through large forestry plantations, which would screen the theoretical visibility shown on the ZTV. This is until the route begins to descend south down the south facing slopes of Keady Mountain, through Cam Forest and Springwell Forest, where there are more open areas that allow actual visibility towards the Development at a range of approximately 3.5 km. The view from the following 1.2 km of the route aligns with the direction of the view towards the Development, until the path reaches the B66. The magnitude of change as a result of the Development would be medium along this 1.2 km section of the route with views that are similar to those illustrated in Viewpoint 19.
- 722. South of the B66 the route traverses the lower north facing slopes of Boyds Mountain, which are open with a landcover of partially improved pasture, transitioning to grass moorland and forestry on higher ground. Ascending south and then east from the road, the theoretical and actual visibility are reduced to a low magnitude of change by the landform and intervening forestry on Boyds Mountain, respectively, until the route passes to the north-east of Boyds Mountain. For a short (0.5 km) section of the route, the magnitude of change would be medium at a range of approximately 2.4 km, as the Development would be partially screened by landform and intervening forestry.
- Thereafter, the route once again passes through commercial forestry following forestry roads to traverse Boyds Mountain and onto Rigged Hill. Parts of this section of the route are shown to have theoretical visibility of the Development at close range, although this would be largely screened by intervening forestry cover, resulting in low magnitudes of change. There are short sections of open areas, where there is the possibility of visibility of the Development. The most southerly section of the route aligns directly with the direction of the view towards the Development, so that within 1 km of the Development, and for approximately 1.5 km through it, the magnitude of change would be medium to high as a result of the Development.

Significance of Effect

- The effect on walkers on the Ulster Way LDR would be significant when moving north towards, and through the 724. Development, from the summit of Donald's Hill, for a distance of approximately 4.5 km.
- When walking south towards the Development, the effect would be significant for a short (0.5 km) section of the route, where 725. it passes across open ground to the north-east of Boyds Mountain, and for approximately 2.5 km of the route, where it rises up onto Rigged Hill through the forestry and through the Development.
- The effects on the other parts of the route would be **not significant**. 726.

6.7.5.21 Summary of Effects on Visual Amenity

- The assessment of the effects of the Development has found that significant effects would occur during the decommissioning and construction phase at five of the 19 viewpoints and during the operational stage at six of the 19 viewpoints
- 728. Of the views from the 18 routes and settlements, which were identified as having the potential to undergo significant effects on visual receptors, there is the possibility of significant effects on the views from parts of the settlements of Drumsurn, Ringsend and Limavady from locations where there would be open views of the Development during its operation. The effects during the combined decommissioning and construction phases would also be significant from parts of Drumsurn and Limavady but would be not significant from Ringsend due to the screening influence of intervening forestry, which would screen most of the decommissioning and construction activities. From the routes assessed as visual receptors there would be significant effects along a section of the A66 where the road runs north of the site at relatively close proximity. There would also be significant effects on views from sections of the B68, B70, NCN 93 and the Ulster Way during the combined construction and

decommissioning and the operational phases. This tends to occur over relatively short sections of these routes or would be intermittent along a longer section (B70).

- The viewpoints where it has been identified there may be significant visual effects all lie within 7 km of the Development. The 729 most distant part or section of a settlement or route where the visual effect was assessed as being significant is at a range of 6.9 km from NCN 93 to the east of the River Roe and south of Limavady, during a section from where there would be intermittent clear visibility of the Development for a distance of approximately 1.1 km of the route.
- This illustrates that the locations identified where there are likely to be significant visual effects are all representative of close to middle range views. There are several factors that are worth noting in relation to this finding. The distance over which significant effects may arise is not as widespread as might have been expected to arise if the Development was a new influence on the Site and not a repowering project. The baseline views are characterised by the ten, 57 m to blade tip, turbines of the Operational Rigged Hill Windfarm so that a windfarm in this location is already a familiar influence in views. At greater distances the scale of the Development becomes less influential and the fact that there was previously a windfarm on the Site reduces the magnitude of change than would otherwise have been the case.
- 731. At closer ranges the magnitude of the change in the views between the baseline views of Operational Rigged Hill Windfarm and the Development is more marked due to its larger turbines and slightly wider horizontal spread. In close views from the west there is also the additional influence of decommissioning and construction activity and influences across the hillside along the access tracks. Therefore, significant visual effects can arise at closer proximity where visibility of these elements and activity is obtained.
- Within the wider landscape, although there are many visual receptors within the settled valleys to the west and east, these areas are not remote or undeveloped and they are influenced by infrastructure and buildings as well as views of windfarms and single turbines. The part of the north to south running ridgeline upon which the Development is located is unremarkable and lower than the more notable forms of the hills at either end of the ridge so that the Development does not generally influence the key focus of views from these locations. This further reduces the potential magnitude of change in the views from the west and east as a result of the Development.
- The more sensitive and valued upland areas of the Binevenagh and Sperrin AONBs are located to the north and south of the Development respectively. Intervening landform largely screens views available to visual receptors within these locations. In locations where the Development would be visible it would be seen across its shorter width as part of a relatively large scale upland landscape. Closer proximity locations are also often characterised by forestry or other windfarms. These factors all contribute to limiting the spread of significant effects on visual amenity.

6.8 Cumulative Effect Assessment

- All operational windfarms have been included as part of the baseline situation in the main assessment. This means that their influence on the main assessment has been taken into account in relation to the landscape and visual receptors assessed in detail in the 'Assessment of effects on landscape character' and 'Assessment of effects on visual amenity' respectively.
- The cumulative effect of the Development is assessed in this section, in relation to two different cumulative scenarios.
 - Cumulative Scenario 1 assesses the effects of adding the Development to a cumulative situation comprising all operational and consented (and including Smulgedon) windfarms.
 - Cumulative Scenario 2 assesses the effects of adding the Development to a cumulative situation comprising all operational, consented and application windfarms.
- Figure 6.12 illustrates all of the cumulative windfarms located within the 30 km radius Study Area. Table 6.5 sets out which of the cumulative windfarms are to be included in the assessment and which scenarios they are to be considered within.
- In this instance, the Development constitutes the repowering of Operational Rigged Hill Wind Farm and, therefore, to a large degree the cumulative interaction between a windfarm on this Site, and the other operational, consented and application stage windfarms, may already arise. In the case of the operational windfarms and those at the application stage, Operational Rigged Hill Windfarm will have been or will be part of the cumulative windfarm baseline considered in the decision making process for these other sites.

- Figure 6.11: Comparative ZTV with Operational Rigged Hill Windfarm, illustrates that Operational Rigged Hill Windfarm is theoretically visible from the majority of the Study Area where there would also be theoretical visibility of the Development. It is also notable that parts of the areas within 10 km of the Development, that would have theoretical visibility of the Development but no theoretical visibility of Operational Rigged Hill Windfarm, are characterised by commercial forestry or other operational windfarms and, therefore, the additional influence of the Development is unlikely to be notable.
- Therefore, following the assessment of the landscape and visual effects of the Development in the context of the operational 739. windfarms, it is valid to give some further consideration to the potential for a significant cumulative effect to arise as a result of the Development.
- 740. The magnitude of change of the Development, itself, would need to be of a sufficiently high level in order to instigate a material change to the current and accepted, potential future cumulative situation. For this reason, it is considered that this could only occur where the magnitude of change in relation to the Development, itself, results in a medium or higher level of magnitude of change during the operational phase, as occurs in relation to the following landscape and visual receptors:

6.8.1 Landscape Character Receptors

Immediate landscape setting (including the landscape character of the LCAs located within 2 km of the Development turbines).

6.8.2 Viewpoints and Visual Receptors

- Viewpoint 1: Terrydoo Road;
- Viewpoint 2: Temain Road to Aghansillagh and Temain Hill; ٠
- Viewpoint 3: Edenmore Road, Limavady;
- Viewpoint 4: Roe Park Resort driveway, Limavady; ٠
- Viewpoint 5: Drumsurn, Beech Road; ٠
- Viewpoint 6: Ringsend;
- Viewpoint 19: B66, west of Ringsend, north of site;
- Drumsurn: ٠
- Ringsend; ٠
- ٠ Limavady;
- B66 (Limavady to Aghadowey); ٠
- B70 (Garvagh to Ringsend); ٠
- NCR 93; and
- Ulster Way LDR.

6.8.3 Methodology for the Cumulative Assessment

- The methodology used in the assessment of cumulative effects differs in some respects from that used in the rest of the assessment. The full methodology for the cumulative assessment is described in Technical Appendix A6.1.
- 742. It is important to remember that the objective of the cumulative assessment is different from the assessment of effects of the Development as carried out previously in this chapter; here, the intention is to establish whether or not the addition of the Development, in combination with other relevant existing and proposed wind farms, may lead to a landscape character or view where windfarm developments become a prevailing characteristic as a result of the addition of the Development, albeit that they may become one of a number of prevailing characteristics.
- It should be noted that even if the Development itself is assessed to have a significant effect, it does not necessarily follow that 743. the cumulative effect will also be significant.
- Cumulative ZTVs that show the visibility of the cumulative site, or group of sites, along with the visibility of the Development 744. have been run for all of the operational, under construction, consented and application windfarms that are considered relevant in the cumulative assessment, as shown in Figures 6.13 to 6.27. These show the extent of visibility of each windfarm in conjunction with the Development and are referred to in the following detailed assessments.
- The cumulative sites are shown in the cumulative wirelines for each of the representative viewpoints, as shown in Figures 745. 6.28 to 6.46 In these wirelines, the Development turbines are shown in red; operational in black, under-construction windfarms are shown in purple; consented windfarms are shown in green and application (or appeal) stage windfarms are shown in blue.

In some instances, windfarms show up in the wirelines although they are not included in the cumulative assessment as they are beyond the radius within which it may contribute to a significant cumulative effect.

6.8.4 Assessment of Cumulative Effects on Landscape Character 6.8.4.1 Immediate landscape setting

- This comprises mostly of the Binevenagh LCA with a small area of the Roe Basin LCA occurring in the western part of the 747 Immediate Landscape Setting. The Binevenagh LCA as assessed as having a medium to high sensitivity and the Roe Basin LCA was assessed as having a medium sensitivity to the Development.
- The operational Terrydoo Road turbines are the only ones that are operational within the immediate landscape setting. 748.

6.8.4.1.1 Cumulative Magnitude of Change – Scenario 1

- There are no Scenario 1 cumulative windfarms located within the Immediate Landscape Setting of the Development. 749.
- The Craiggore Windfarm lies to the south of the Immediate Landscape Setting, whilst Upper Ballyrogan and Smulgedon are located at a distance of approximately 4.5 km to the Development. All of these cumulative windfarms are located within the Local Landscape Setting but would be visible from parts of the Immediate Landscape Setting, as shown on Figures 6.20 to 6.22, which are the cumulative ZTVs for each of these windfarms. This visual influence on character would occur within the Binevenagh LCA part of the Immediate Landscape Setting.
- Other Scenario 1 windfarms are also shown to be visible from the Immediate Landscape Setting at greater distances, but these would not have a material influence on the cumulative magnitude of change that would occur as a result of the Development.
- The cumulative magnitude of change to the Immediate Landscape Setting would be medium within the area to the south and 752. south-east of the Development. Here, there would be a higher level of influence from the Development, in the context of the cumulative windfarms, when compared with that of Operational Rigged Hill Windfarm. Elsewhere, the cumulative magnitude of change would be medium to low or lower.

6.8.4.1.2 Significance of cumulative effect – Scenario 1

753. the Development as a result of the medium cumulative magnitude of change and the medium to high sensitivity of the Binevenagh LCA, where this change occurs. Elsewhere within the Immediate Landscape Setting, the cumulative effects would be not significant.

6.8.4.1.3 Cumulative magnitude of change – Scenario 2

- Development. It is located within the Local Landscape Setting but would be visible from parts of the Immediate Landscape Setting as shown on Figure 6.13.
- The cumulative magnitude of change to the Immediate Landscape Setting to the north, south and south-east of the 755. Development. Here, there would be a higher level of influence from the Development, in the context of the cumulative windfarms, when compared with that of Operational Rigged Hill Windfarm. Elsewhere within the Immediate Landscape Setting, the cumulative magnitude of change would be **medium to low** or lower.

6.8.4.1.4 Significance of cumulative effect – Scenario 2

east of the Development as a result of the medium cumulative magnitude of change and the medium to high sensitivity of the Binevenagh LCA, where this change occurs. Elsewhere within the Immediate Landscape Setting, the cumulative effects would be not significant.

6.8.5 Assessment of Cumulative Effects on Visual Amenity 6.8.5.1 Viewpoint 1: Terrydoo Road

This viewpoint is assessed as having a medium to high sensitivity to the Development. 757.

There would be a significant cumulative effect in the area of the Immediate Landscape Setting to the south and south-east of

The Dunbeg South Windfarm lies to the north of the Immediate Landscape Setting at a distance of approximately 4 km to the

There would be a significant cumulative effect in the area of the Immediate Landscape Setting to the north, south and south-

6.8.5.1.1 Cumulative Magnitude of Change – Scenario 1

- The cumulative wirelines in Figures 6.28b-e illustrate that the single Temain Road (37) turbine would be visible on the skyline to the south of the Development on a slightly lower part of the ridge and at a range 2.12 km from the Viewpoint. In addition, Ballyhanedin Windfarm would be visible at a range of over 18 km from this viewpoint. It would be located in a completely different part of the view and landscape to the Development, positioned in the upland area which forms the containment on the other side of the settled valley of the Roe Basin. It would lie on the Sperrin Foothills, separated slightly from the Glenconway and Altahullion Windfarm group, which are located in the Loughermore Hills. There would be very limited influence on this viewpoint by the Scenario 1 windfarms visible in the wider view.
- The cumulative magnitude of change would be low.

6.8.5.1.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development in the context of the Scenario 1 windfarms would be not significant.

6.8.5.1.3 Cumulative magnitude of change – Scenario 2

- The wirelines show that there would be some influence by the Scenario 1 Windfarms as part of the wider view. The Dunbeg South Windfarm would be seen above the forestry and hill slopes of Keady Mountain, directly to the north along Terrydoo Road at a distance of 3.86 km from the viewpoint.
- The cumulative magnitude of change to Viewpoint 1, as a result of the Development would be **medium to low**. This is as a result of the proximity and visibility of the Dunbeg South Windfarm in a different part of the view from the Development, however the level of cumulative magnitude of change is tempered by the fact that there is the influence of a windfarm on the Site already,

6.8.5.1.4 Significance of cumulative effect – Scenario 2

The cumulative effects of the Development on Viewpoint 1, in relation to the Scenario 2 Windfarms would be not significant.

6.8.5.2 Viewpoint 2: Temain Road to Aghansillagh and Temain Hill

This viewpoint is assessed as having a medium to high sensitivity to the Development.

6.8.5.2.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines and baseline photographs in Figures 6.29b-d illustrate that there would be very limited actual influence on this viewpoint by the Scenario 1 windfarms, visible in the wider view from this precise location. If the hedge was to be cut, or the viewpoint moved slightly to the west, views would be possible beyond the hedge in the direction of the Evishagaran Windfarm. However, there is a succession of more distant mature trees, located within the intervening landscape to the south of the viewpoint, and these would tend to obscure the majority of Evishagaran Windfarm from this location, albeit to a lesser extent when the trees are not in leaf. The Ballyhanedin Windfarm may be visible at a range of over 16.7 km. This windfarm is located in a completely different part of the view and landscape to the Development.
- The Development would increase the windfarm influence from that which currently exists as a result of Operational Rigged Hill Windfarm. This would be in the context of the wider view of the operational Glenconway and Altahullion Windfarm group and some visibility of the Evishagaran Windfarm and Ballyhanedin Windfarm, at a moderate distance, in a different part of the view with Evishagaran Windfarm located between the more marked landforms of Donald's Hill and the summit of Benbradagh Mountain.
- The cumulative magnitude of change would be medium to low.

6.8.5.2.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on Viewpoint 2, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.2.3 Cumulative magnitude of change – Scenario 2

As described above there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the 769. Dunbeg South Wind Farm may be visible above Keady Mountain to the north at a range of 5.4 km. The Dunbeg South Windfarm is seen on a more distant section of the upland ridge landscape than the Development with the two Terrydoo Road turbines seen on the intervening skyline.

The cumulative magnitude of change to Viewpoint 2, as a result of the Development, would be medium to low. This is largely due to the fact that the influence of a windfarm on the Site already occurs, along with the physical distance and visual separation between it and the Dunbeg South Windfarm and the limited visibility of the Evishagaran Windfarm.

6.8.5.2.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on Viewpoint 2, in the context of the Scenario 2 windfarms, would be not significant.

6.8.5.3 Viewpoint 3: Edenmore Road, Limavady

This viewpoint is assessed as having a medium to high sensitivity to the Development. 772

6.8.5.3.1 Cumulative magnitude of change – Scenario 1

- 773. would increase the horizontal extent of turbines in the vicinity of the operational Dunmore and Dunbeg Windfarms adding to turbine density. The Dunmore Extension would not bring windfarm development closer to the Development and it would remain separated from it by Keady Mountain.
- Parts of two turbines of the Craiggore Windfarm and the Temain Road (37) turbine would be seen above the same ridgeline 774. as the Development is located, on either side of the masts on Temain Hill. Whilst the blades passing above the skyline may be noticeable at this range of 8.3 km they would often be obscured by intervening trees and add little to the cumulative context. The Temain Road (37) turbine appears similar in scale to the Terrydoo Road turbines located to the north of the Development and adds little to the cumulative context of the Development at this range.
- The cumulative magnitude of change would be low. 775.

6.8.5.3.2 Significance of cumulative effect – Scenario 1 776 The cumulative effect of the Development on Viewpoint 3, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.3.3 Cumulative magnitude of change – Scenario 2

- As described above there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the 777. Smulgedon Windfarm would be partially theoretically visible at a range of 9.5 km from this viewpoint. It would be largely obscured by intervening trees and buildings. The Dunbeg South Windfarm would add further windfarm development close to the Dunbeg and Dunmore cluster of turbines, however its larger turbines and site on the side of Keady Mountain brings turbines out of the valley onto the hill making it appear slightly discordant with those adjacent turbines.
- Although Dunbeg South Windfarm brings further turbines closer to the Development it is separated from the Development by approximately 4 km of upland which consists of hill land and a further valley.
- The cumulative magnitude of change would be medium to low.
- 6.8.5.3.4 Significance of cumulative effect Scenario 2 The cumulative effect of the Development on Viewpoint 3, in the context of the Scenario 2 windfarms, would be not 780. significant.

6.8.5.4 Viewpoint 4: Roe Park Resort driveway, Limavady This viewpoint is assessed as having a medium to high sensitivity to the Development. 781.

6.8.5.4.1 Cumulative magnitude of change – Scenario 1

- 782. would increase the horizontal extent of turbines in the vicinity of the operational Dunmore and Dunbeg Windfarms, adding to the turbine density. The Dunmore Extension would not bring windfarm development closer to the Development and it would remain separated from it by Keady Mountain.
- Parts of two turbines of the Craiggore Windfarm and the Temain Road (37) turbine would be seen above and on the same ridgeline as the Development is located, on either side of the masts on Temain Hill albeit distant. Whilst the blades passing

The cumulative wirelines in figures 6.30b-c illustrate that within the wider context to the Development, the Dunmore Extension

The cumulative wirelines in figures 6.31b-c illustrate that within the wider context to the Development, the Dunmore Extension

above the skyline may be noticeable at this range of 10.3 and 8.5 km respectively, they would often be obscured by intervening trees and add little to the cumulative context.

- The Evishagaran Windfarm is theoretically visible within the wider view at a range of 13.7 km but would actually be largely obscured by intervening trees and woodland.
- 785. The cumulative magnitude of change would be low.

6.8.5.4.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on Viewpoint 4, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.4.3 Cumulative magnitude of change – Scenario 2

- 787. As described above there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the Smulgedon Windfarm would be partially visible above intervening woodland at a range of 11.3 km from this viewpoint. It would be located directly ahead of the line of travel when moving south along the driveway, which is likely to make it more noticeable. The Dunbeg South Windfarm would add further windfarm development close to the Dunbeg and Dunmore cluster of turbines, however its larger turbines and siting on the side of Keady Mountain brings turbines out of the valley onto the hill making it appear slightly discordant with those adjacent.
- 788. Although Dunbeg South Windfarm brings further turbines closer to the Development it is separated from the Development by approximately 4 km of upland which consists of hill land and a further valley.
- The cumulative magnitude of change would be medium to low. 789.

6.8.5.4.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on Viewpoint 4, in the context of the Scenario 2 windfarms, would be not significant.

6.8.5.5 Viewpoint 5: Drumsurn, Beech Road

This viewpoint is assessed as having a medium to high sensitivity to the Development. 791.

6.8.5.5.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines in figures 6.32b-d illustrate that, within the wider context to the Development, it would not be possible to see the additional large Scenario 1 windfarms from this location. However the Cloghan Road (16) and the Temain Road (37) will be visible in the immediate context of the Development. The different scale of the Temain Road (37) turbine in close proximity to the Development turbines appears discordant whilst the smaller Cloghan Road turbine is part of a different landscape, its closer proximity makes it appear of a similar scale to the Development turbines in this view.
- The consideration of the possibility of people within Drumsurn being able to see the Scenario 1 windfarms is considered in Section 6.8.5.8.1.
- The cumulative magnitude of change would be low.

6.8.5.5.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on Viewpoint 5, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.5.3 Cumulative magnitude of change – Scenario 2

- The cumulative wirelines in figures 6.32b-d illustrate that, within the wider context to the Development, it would not be possible to see the additional Scenario 2 windfarms from this location. The consideration of the possibility of people within Drumsurn being able to see the Scenario 2 windfarms is considered in Section 6.8.5.8.3
- ^{797.} The cumulative magnitude of change would be **negligible**.

6.8.5.5.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on Viewpoint 5, in the context of the Scenario 2 windfarms, would be not significant.

6.8.5.6 Viewpoint 6: Ringsend

This viewpoint is assessed as having a medium to high sensitivity to the Development. 799

6.8.5.6.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines in figures 6.33b-c illustrate that within the wider context to the Development it would be possible to 800 see the Upper Ballyrogan turbines above intervening woodland at a range of 4.7 km. In addition, the Craiggore Windfarm would be visible on the skyline between this and the Development on the same upland ridge. The Belraugh Road (25) and Craigmore Road (149) turbines would be visible on the lower slopes, at distances of approximately 1.5 km.
- The operational Garves, Glenbuck and Long Mountain Windfarms create another more distant cluster of windfarms to the east in this view.
- The consented windfarms would effectively create a pattern of windfarm development on the skyline between the 802 Development and the Brockaghboy Windfarm and its extension, with the Development further widening the horizontal extent of the windfarm developed skyline. The possibility of perceived windfarm views across nearly 150 degrees of the 180 degree panoramic view from this location, therefore, becomes more likely. There is some visibility of Operational Rigged Hill Windfarm in this view, however, it is not a prominent feature due to the level of screening by intervening forestry. The replacement of the Operational Rigged Hill Windfarm with the Development would make a windfarm on this part of the skyline more prominent, particularly due to its closer proximity and larger scale, compared with the other cumulative windfarms visible.
- The cumulative magnitude of change in this view would be **medium**. 803.

6.8.5.6.2 Significance of cumulative effect – Scenario 1

804. would be significant.

6.8.5.6.3 Cumulative magnitude of change – Scenario 2

- 805. possible to see the additional Scenario 2 windfarms from this location.
- The cumulative magnitude of change would be as Scenario 1. 808

6.8.5.6.4 Significance of cumulative effect – Scenario 2

807. Scenario 1. No further significant cumulative effects would arise.

6.8.5.7 Viewpoint 19: B66, west of Ringsend, north of site This viewpoint is assessed as having a medium sensitivity to the Development. 808.

6.8.5.7.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines in Figures 6.46b-c illustrate that, within the wider context to the Development, the Ballyhanedin Windfarm would be visible at a range of 20.5 km from this viewpoint. It is located in a completely different part of the view and landscape to the Development. It is positioned on the upland area which forms the containment on the other side of the settled valley of the Roe Basin. It would lie on the Sperrin Foothills separated slightly from the Glenconway and Altahullion Windfarm group, which is located in the Loughermore Hills. Whilst it would be more distant than the taller turbines of Ballyhanedin Windfarm, this would mean that it would appear of a similar scale to some of those turbines.
- 810. Development. The cumulative magnitude of change to Viewpoint 19, as a result of the Development in the context of the existing Operational Rigged Hill Windfarm, would be low.

The cumulative effect of the Development on Viewpoint 6 at a distance of 4.67 km, in the context of the Scenario 1 windfarms,

The cumulative wirelines in figures 6.33b-c illustrate that, within the wider context of the Development, it would not be

The cumulative effect of the Development on Viewpoint 6, in relation to the Scenario 2 Windfarms, would be the same as for

It would not be possible to see any other Scenario 1 windfarms that are material to the cumulative magnitude of change of the

6.8.5.7.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on Viewpoint 19, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.7.3 Cumulative magnitude of change – Scenario 2

- The cumulative wirelines in figures 6.346b-c illustrate that, within the wider context to the Development, it would not be 812 possible to see the additional Scenario 2 windfarms from this location.
- 813. The cumulative magnitude of change would be as Scenario 1.

6.8.5.7.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on Viewpoint 19, in the context of the Scenario 2 windfarms, would be not 814. significant.

6.8.5.8 Drumsurn

This settlement is assessed as having a medium to high sensitivity to the Development. 815.

6.8.5.8.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines in figures 6.32b-d indicate that, within the wider context to the Development, it may be possible to see the additional Scenario 1 windfarms from parts of Drumsurn. This may occur successively in views from other locations or sequentially as people move around the village.
- 817. In addition to the operational windfarms to the south and the single turbine at 28 Betts Road, the other Scenario 2 windfarm that is shown to be theoretically visible is the Evishagaran Windfarm, which lies on the lower slopes of the Benbradagh Mountain at 7 km to the south-south-east of the village. It would be visible to people moving south through the village and from open areas and properties with views in this direction. It would be potentially visible in a very different part of the view to the Development and separated from it by Donald's Hill and the landform where Gortnamoyagh Forest is located. It would, however, often be obscured by intervening woodland and buildings.
- The cumulative magnitude of change in this view would be medium to low. 818.
- This is largely due to the fact that the influence of a windfarm on the Site already occurs, along with the visual separation 819. between it and the Evishagaran Windfarm.

6.8.5.8.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on Drumsurn, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.8.3 Cumulative magnitude of change – Scenario 2

- As described above there would be some influence by the Scenario 1 Windfarms as part of the wider view. In addition, the 821. Smulgedon Windfarm may be visible at a range of around 4 km above intervening woodland in views to the south-east from this village. It would be visible to people moving south through the village and from open areas and properties with views in this direction. It would be potentially visible in a different part of the view to the Development and separated from it by Donald's Hill. The Dunbeg South Windfarm would be visible to the north-north-east above Keady Mountain at a range of 7.7km from the north-easterly parts of the village
- The cumulative magnitude of change would be **medium to low.** 822.

6.8.5.8.4 Significance of cumulative effect – Scenario 2

- The cumulative effect of the Development on Drumsurn, in the context of the Scenario 2 windfarms, would be not significant. 823.
- This is largely due to the fact that the influence of a windfarm on the Site already occurs in largely the same part of views from Drumsurn so the cumulative effect already arises, although it is appreciated that the Development is more prominent. This along with the visual separation between it and the Scenario 2 windfarms ensures that the cumulative effect is not significant.

6.8.5.9 Ringsend

This settlement is assessed as having a medium to high sensitivity to the Development. 825.

6.8.5.9.1 Cumulative magnitude of change – Scenario 1

- The cumulative wirelines in **figures 6.33b-c** illustrate that, from the higher properties, within the wider context to the Development it would be possible to see the Upper Ballyrogan turbines above intervening woodland at a range of 4.7 km. In addition, the Craiggore Windfarm would be visible on the skyline between this and the Development on the same upland ridge. The 25 Belraugh Road and 149 Craigmore Road turbines would be visible on the lower slopes at distances of approximately 1.5 km.
- The operational Garves, Glenbuck and Long Mountain Windfarms create another more distant cluster of windfarms to the east 827 in this view.
- The consented windfarms would effectively create a pattern of windfarm development on the skyline between the 828. Development and the Brockachboy Windfarm and its extension with the Development further widening the horizontal extent of the windfarm developed skyline. The possibility of perceived windfarm views across nearly 150 degrees of the 180 degree panoramic view from this location therefore becomes more likely. There is some visibility of the Operational Rigged Hill Windfarm in this view, however, it is not a prominent feature due to the level of screening by the intervening forestry. The repowering of this with the Development will make a windfarm on this part of the skyline substantially more prominent, particularly due to its closer proximity and larger scale compared with the other cumulative windfarms visible.
- The cumulative magnitude of change in the views from the hamlet of Ringsend would be medium.

6.8.5.9.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on the settlement of Ringsend, in the context of the Scenario 1 windfarms, would be 830. significant.

6.8.5.9.3 Cumulative magnitude of change – Scenario 2

- to see the additional Scenario 2 windfarms from this settlement.
- The cumulative magnitude of change would be as Scenario 1.

6.8.5.9.4 Significance of cumulative effect – Scenario 2

833 Scenario 1. No further significant cumulative effects would arise.

6.8.5.10 Limavady

- This settlement is assessed as having a medium to high sensitivity to the Development.
- The assessment of the effects on Limavady is set out in Section 6.7.5.20 It found that the magnitude of change in the views 835. would be medium from the following residential receptors along the southern and south-easterly edge of Limavady, where there may be clear views of the Development from the properties and their gardens:
 - Approximately ten houses (generally two storey and front aspects) and their gardens along the southern extent of Edenmore Road where it leaves the town;
 - The properties and gardens of the houses east of Rosedale Gardens and that back onto the minor road that runs parallel and south of Rossair Road, which are generally single or 1.5 storey; and
 - The houses at the southerly extents of the road off Drummond Manor where there are two storey houses with their rear and side aspects towards the Development.
- ^{836.} Viewpoint 3 is the most representative of the views from these locations and the assessment of the cumulative effects on these parts of the settlement has drawn on that assessment.

6.8.5.10.1 Cumulative magnitude of change – Scenario 1

The cumulative wirelines in figures 6.30b-c illustrate that, within the wider context to the Development, the Dunmore 837. Extension would increase the horizontal extent of turbines in the vicinity of the operational Dunmore and Dunbeg Windfarms, adding to the turbine density. The Dunmore Extension would not bring windfarm development closer to the Development and it would remain separated from it by Keady Mountain.

The cumulative wirelines in figures 6.33b-c illustrate that within the wider context to the Development it would not be possible

The cumulative effect of the Development on Ringsend, in relation to the Scenario 2 Windfarms, would be the same as for

- Parts of two turbines of the Craiggore Windfarm would be seen above the same ridgeline as where the Development would be located, on the other side of the masts on Temain Hill. Whilst the blades passing above the skyline may be noticeable at this range of 8.3 km, they would often be obscured by intervening trees and add little to the cumulative context.
- ^{839.} The cumulative magnitude of change would be **low**.

6.8.5.10.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on residential receptors along the southern and south-easterly edge of Limavady, as identified above, in the context of the Scenario 1 windfarms, would be not significant.

6.8.5.10.3 Cumulative magnitude of change – Scenario 2

- As described above, there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the Smulgedon Windfarm would be partially theoretically visible at ranges of around 9.5 km. It would be largely obscured by intervening trees and buildings. The Dunbeg South Windfarm would add further windfarm development close to the Dunbeg and Dunmore cluster of turbines, however its larger turbines and site on the side of Keady Mountain brings turbines out of the valley onto the hill making it appear slightly discordant with those adjacent.
- Although Dunbeg South Windfarm brings further turbines closer to the Development it is separated from the Development by 842. approximately 4 km of upland which consists of hill land and a further valley.
- 843. The cumulative magnitude of change would be medium to low.

6.8.5.10.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on residential receptors along the southern and south-easterly edge of Limavady, 844. as identified above, in the context of the Scenario 2 windfarms, would be not significant.

6.8.5.11 B66 (Limavady to Aghadowey)

- The views from receptors using the route are assessed as having a medium sensitivity to the Development.
- The closest point of the route to the Development is represented by Viewpoint 19: B66, west of Ringsend, to the north of site. The section of the route further east, is represented by Viewpoint 6: Ringsend, as it is also close to the B66 and, therefore, the cumulative magnitude of change on the views from the route near to this would be similar. Viewpoint 3: Edenmore Road, Limavady, provides an indication of the type of view available towards the site at the western extremity of the B66, as it is from a similar range and direction.
- Wireline views, as well as the cumulative magnitudes of change assessed for each of the above viewpoints, have been used to further inform the assessment of the effects on this route. These viewpoints also provide a good indication of the level and nature of the existing visibility of Operational Rigged Hill Wind Farm, whilst also illustrating the Development. Figure 6.11 illustrates that the majority of the route, where it would be theoretically possible to see the Development, it is currently theoretically possible to see Operational Rigged Hill Windfarm. Forestry would, however, tend to partially obscure views from the central to eastern section of the route.
- In the context of the operational windfarms, it is assessed that the magnitude of change in the section between the A29 848. junction and approximately where the Ulster Way LDR crosses the road, (a distance of approximately 6 km of the route), would range between medium and medium to high during operation and higher during the combined decommissioning and construction phase. There would be a medium magnitude of change as a result of the Development in the views from a 1.2 km stretch of the road from west of the farm (located to the west of the Recycling Centre) to Ringsend, due to the Development being apparent in views close to the alignment of the direction of travel when moving westwards.

6.8.5.11.1 Cumulative magnitude of change – Scenario 1

The cumulative wirelines in Viewpoint 3 Figures 6.30b-c illustrate that, from the western extents of the route, within the wider context to the Development, the Dunmore Extension would increase the horizontal extent of turbines in the vicinity of the operational Dunmore and Dunbeg Windfarms, adding to the turbine density. The Dunmore Extension would not bring windfarm development closer to the Development and it would remain separated from it by Keady Mountain.

- Parts of two turbines of the Craiggore Windfarm would be seen above the same ridgeline as the Development is located, on the other side of the masts on Temain Hill. Whilst the blades passing above the skyline may be noticeable at this range, albeit at a distance of 8.3 km they would often be obscured by intervening trees and add little to the cumulative context. The cumulative magnitude of change would be low.
- The cumulative wirelines in Viewpoint 19 Figures 6.46b-c illustrate that, within the wider context to the Development, it would 851 not be possible to see any Scenario 1 windfarms that are material to the cumulative magnitude of change of the Development from Viewpoint 19 and this represents the cumulative magnitude of change within the stretch of the route that runs closest to the Development. The cumulative magnitude of change would be negligible.
- 852. possible to see the Upper Ballyrogan turbines above intervening woodland at a range of 4.7 km. In addition, the Craiggore Windfarm would be visible on the skyline between this and with the Development on the same upland ridge. The 25 Belraugh Road and 149 Craigmore Road turbines would be visible on the lower slopes at distances of approximately 1.5 km.
- The operational Garves, Glenbuck and Long Mountain Windfarms create another, more distant cluster of windfarms to the east in this view.
- The consented windfarms would effectively create a pattern of windfarm development on the skyline between the Development and the Brockaghboy Windfarm and its extension with the Development further widening the horizontal extent of the skyline developed by windfarms. The possibility of perceived windfarm views across nearly 150 degrees of the 180 degree panoramic view from this location, therefore becomes more likely. There is some visibility of Operational Rigged Hill Windfarm in this view, however, it is not a prominent feature due to the level of screening by intervening forestry. The Development would make a windfarm on this part of the skyline substantially more prominent, particularly due to its closer proximity and larger scale compared with the other cumulative windfarms visible. The cumulative magnitude of change in this view would be **medium**.
- 855. farm that lies to the west of the Recycling Centre and Ringsend, when travelling in a westerly direction, would be medium largely as a result of the successive cumulative windfarm views that include the Development. Thereafter, the Development would be prominent in views from the route up until it passes to the north of Boyds Mountain. Along this stretch of the route the cumulative effect of the Development would be as a result of more prominent sequential views that give rise to a medium cumulative magnitude of change between Ringsend and Boyds Mountain. This results in a medium cumulative magnitude of change over approximately 5 km of the B66 when travelling in a westerly direction.
- When travelling east, there would be visibility of the Development between the junction with the A29 to approximately where the Ulster Way LDR crosses the B66. Beyond Boyds Mountain Figure 6.23 illustrates that the Cam Burn Windfarm would start to appear in the views east, progressively becoming closer to the road until it passes south of it close to the Recycling Centre. Travelling east, Upper Ballyrogan Windfarm would also become visible to the south, along with operational Brockaghboy Windfarm and its extension, as well as the Garves, Glenbuck and Long Mountain Windfarm group at greater distances from the route to the south and east respectively.
- The cumulative magnitude of change as a result of the addition of the Development to this sequence of windfarm visibility, 857. which, in the context of a baseline which includes Operational Rigged Hill Windfarm, would give rise to a medium to low cumulative magnitude of change.

6.8.5.11.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on the B66, in the context of the Scenario 1 windfarms, would be significant when travelling west between the farm to the west of the Recycling Centre and Boyds Mountain, a distance of approximately 5 km. Elsewhere on the route, and when travelling eastwards, the cumulative effect would be not significant. This difference in the journeys east and west relates largely to the existing influence of Operational Rigged Hill Windfarm, which is more visible as part of the baseline views when travelling east, compared with the baseline views when travelling west, which are partially obscured by intervening forestry.

The cumulative wirelines in Viewpoint 6 Figures 6.33b-c illustrate that within the wider context to the Development it would be

It is assessed that the cumulative magnitude of change in the views from a 1.2 km stretch of the B66, located between the

6.8.5.11.3 Cumulative magnitude of change – Scenario 2

- As described above, there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the Dunbeg South Windfarm would add further windfarm development close to the Dunbeg and Dunmore cluster of turbines, however its larger turbines and site on the side of Keady Mountain brings turbines out of the valley onto the hill making it appear slightly discordant with those adjacent and bringing them closer to the Development in views from the west along the B66.
- ^{860.} When travelling from the east from Ringsend there would be some visibility of the Dunbeg South Windfarm along this stretch, however, the forestry along the north side of the route is likely to make this intermittent.
- ^{861.} The cumulative magnitude of change as a result of the addition of the Development to this sequence of windfarm visibility, which, in the baseline includes Operational Rigged Hill Windfarm, would give rise to a **medium** cumulative magnitude of change along this route due to the sequential visibility of the windfarms at relatively close range.

6.8.5.11.4 Significance of cumulative effect – Scenario 2

1862. The cumulative effect of the Development on the B66, in the context of the Scenario 2 windfarms, would be not significant.

6.8.5.12 B70 (Garvagh to Ringsend)

- This route runs to the east of the Development Site. The sensitivity is assessed as medium as the route is not part of a scenic trail or within an area with a landscape planning designation. The ZTV on Figure 6.6b illustrates that there would be theoretical visibility from the majority of this route at ranges of between approximately 5 km and 7.75 km. The ZTV indicates that there would be no theoretical visibility from the route when users leave Garvagh until they are round the landform upon which Garvagh Forest would be located.
- ^{864.} The cumulative ZTV on **Figure 6.11** illustrates that locations on the route from where the Development would be, generally have visibility of Operational Rigged Hill Windfarm. However, in views from the northern section of this route, the lower parts of the Operational Rigged Hill Windfarm turbines are screened, making it less prominent than would otherwise be the case.
- The ZTV shows theoretical visibility to be intermittent and actual visibility would be more restricted by intervening screening by roadside trees, woodland and buildings. However, some long stretches of the route would gain clear visibility of the Development over a stretch of approximately 5 km and at ranges of between 6.9 km and 5 km. The magnitude of change as a result of the Development in the context of the operational windfarms, would be medium intermittently from approximately 1 km north of Garvagh Forest to Ringsend.

6.8.5.12.1 Cumulative magnitude of change – Scenario 1

- ^{866.} Smulgedon, Craiggore, Upper Ballyrogan and Evishagaran Windfarms (**Figures 6.20, 6.21, 6.22 and 6.24** respectively) illustrate that these Scenario 1 windfarms would be theoretically visible to the west and south west of this route, either on, or behind the high ground ridgeline that provides the westerly containment to the Garvagh Farmland. A review of wirelines indicates that Smulgedon is largely hidden, except for blade tips, due to intervening landform. Upper Ballyrogan is the most prominent due to its close proximity to the route at a range of only 2.5 km. The Craiggore Windfarm sits at a slightly greater distance (4.75 km) from the route whilst the Evishagaran Windfarm lies at a greater distance of 10 km to the south-west.
- ^{867.} To the north of the route, the Cam Burn Windfarm would also be theoretically visible at relatively close range, as shown on Figure 6.23. Visibility of the Development and the cumulative windfarms from the route would be intermittent due to intervening roadside and other vegetation. However, at times, the higher ground locations or the tall structures of the Scenario 1 windfarms, would ensure that they would be visible intermittently from stretches of the route, where not hidden by other landforms. The Development would increase the windfarm prominence in the views from this route, particularly in the northern section. This would occur in the context of these other windfarms, which are separate to it but may be both successively and sequentially visible. This also occurs in the context of the more distant visibility of the operational windfarms located to the east and south of the B70.
- ^{868.} There would be **medium** cumulative magnitude of change as a result of the Development increasing the windfarm influence, and due to the sequential and successive views of the Development in the context of views of the Scenario 1 Windfarms. This would occur from north of Garvagh Forest to Ringsend, a stretch of approximately 5 km. The cumulative magnitude of change to the south of Garvagh Forest would be **negligible**.

6.8.5.12.2 Significance of cumulative effect – Scenario 1

^{869.} The cumulative effect of the Development in the context of the Scenario 1 windfarms, would be **significant** along approximately 5 km of the route as a result of the medium sensitivity and the medium cumulative magnitude of change in views from the B70 from north of the Garvagh Forest to Ringsend and **not significant** elsewhere.

6.8.5.12.3 Cumulative magnitude of change – Scenario 2

- 870. As described above, there would be some influence from the Scenario 1 Windfarms as part of the wider view. In addition, the cumulative ZTV on Figure 6.13 and wirelines illustrate that it would be possible to see parts of the turbines of the Dunbeg South windfarm ahead of north bound travellers on the B70 between Garvagh and Ringsend. This visibility would be intermittent due to roadside vegetation.
- The cumulative magnitude of change as a result of the addition of the Development to this sequence of windfarm visibility, which, in the baseline includes Operational Rigged Hill Windfarm, would give rise to a medium cumulative magnitude of change along this route due to the sequential visibility of the windfarms at relatively close range and ahead of travellers.

6.8.5.12.4 Significance of cumulative effect – Scenario 2

^{872.} The cumulative effect of the Development in the context of the Scenario 2 windfarms, would be **significant** as a result of the medium sensitivity and the medium cumulative magnitude of change in views from the B70 from north of the Garvagh Forest to Ringsend over a 5km section, and **not significant** elsewhere.

6.8.5.13 NCR 93

^{873.} The sensitivity of users of NCR 93 has been assessed as medium to high. The assessment of the effects of the Development on the views from the route found that there would be a medium magnitude of change from parts of the route lying between Limavady and the crossing of the B192.

6.8.5.13.1 Cumulative magnitude of change – Scenario 1

- ^{874.} The cumulative ZTVs for Smulgedon, Craiggore and Evishagaran Windfarms (**Figures 6.20, 6.21 and 6.24** respectively) illustrate that it would be theoretically possible to see parts of these windfarms to the east from sections of the NCR 93.
- 875. A review of Viewpoint 11 and other cumulative wirelines indicates that the Craiggore Windfarm would not be visible from lower lying locations to the north-east, whilst Evishagaran Windfarm is largely obscured from NCR 93 due to the intervening landform of Benbradagh Mountain. Ballyhanedin Windfarm is shown on Figure 6.26 to be theoretically visible along the southern section of this route, which comes to within 0.75 km of the Ballyhanedin Windfarm as it passes it between the A6 and the B74. Such close-range windfarm visibility would occur at some considerable distance from the close-range views of the Development, which would reduce its influence on the cumulative magnitude of change.
- ^{876.} Visibility from the route would be intermittent due to intervening roadside and other vegetation. However, at times the higher ground locations of the Scenario 1 windfarms and the Ballyhanedin Windfarm would ensure that they are visible intermittently from stretches of the route, where not hidden by other landforms.
- ^{877.} The Development would result in an increases windfarm influence where views are obtained from this route, particularly in the north. This would occur in the context of these other windfarms, which are separate to it but may be both successively and sequentially visible. This also occurs in the context of the visibility of the operational windfarms located to the west of NCR 93.
- 878. As illustrated by Figure 6.11, the Development would be seen from locations on the route where Operational Rigged Hill Windfarm is currently visible, although it would have a more prominent influence on the cumulative situation. The Scenario 1 Windfarms would be seen across slightly different parts of the upland area, separate from the Development Site.
- B79. It is assessed that the cumulative magnitude of change in the views from NCR 93 would be medium to low or lower due to the introduction of the Development. This is largely as a result of the baseline influence of Operational Rigged Hill Windfarm in closer range views, and the fact that the Development and the other Scenario 1 Windfarms become progressively more distant and, therefore, less influential in the south-westerly part of the route, whilst the further influence of the Ballyhanedin Windfarm occurs at a distance of over 18 km from the Development

6.8.5.13.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on NCR 93 in the context of the Scenario 1 windfarms, would be not significant as a result of the medium to high sensitivity and the medium to low or lower cumulative magnitude of change in views, as a result of the Development.

6.8.5.13.3 Cumulative magnitude of change – Scenario 2

- As described above, there would be some influence from the Scenario 1 Windfarms as part of the views from this route. In 881. Scenario 2, the only cumulative windfarm that would materially alter the cumulative context of the Development is Dunbeg South. It is shown on wirelines and Figure 6.13 to be theoretically visible along the southern section of this route, which comes to within 5 km of the Dunbeg South Windfarm as it passes to the north of the B201 from where it ascends Benbradagh Mountain.
- Visibility from the route would be intermittent due to intervening roadside and other vegetation.
- The Development would increase the windfarm influence in the views from this route, where these are obtained, particularly in the north. This would occur in the context of these other windfarms, which are separate to it but may be both successively and sequentially visible. This also occurs in the context of the visibility of the operational windfarms located to the west of NCR 93.
- It is assessed that the cumulative magnitude of change in the views from NCR 93 would be medium to low or lower due to 884 the introduction of the Development. This is largely as a result of the existing baseline influence of Operational Rigged Hill Windfarm in closer range views and the separation of the Development and Dunbeg South Windfarm by an area of upland and a valley so that they are generally not seen in the same part of views.

6.8.5.13.4 Significance of cumulative effect – Scenario 2

The cumulative effect of the Development on NCR 93, in the context of the Scenario 2 windfarms, would be not significant as a result of the medium to high sensitivity and the medium to low or lower cumulative magnitude of change.

6.8.5.14 Ulster Way LDR

The effects of the Development on the users of this route are assessed in Section 6.7.5.20 of this chapter. The sensitivity is assessed as medium to high.

6.8.5.14.1 Cumulative magnitude of change – Scenario 1

The cumulative ZTVs (Figures 6.20, 6.21, 6.22 and 6.24 respectively) indicate that the Smulgedon, Craiggore, Upper Ballyrogan and Evishagaran Scenario 1 Windfarms would be theoretically visible to the east of the southern section of this route. The cumulative ZTV with Cam Burn (Figure 6.23) illustrates that it may be theoretically visible from the northern section of this route. These windfarms would be visible in addition to the operational windfarms that are already visible from the route at greater distances.

Corrick Mountain to the Development

- Ballyhanedin Windfarm is shown on Figure 6.26 to be theoretically visible along the southern section of this route at ranges of 8 km to 14.5 km, often seen in the opposite direction to the Development and from sections of the route where the Development would not be visible.
- The Ballyhanedin Windfarm would result in further windfarm visibility from the southern section of the Ulster Way, this would 889. occur in a completely different part of the views and landscape when compared with those affected by the Development. The Ballyhanedin windfarm would also be visible from locations that have the operational windfarms at Altahullion and Glenconway visible in the same part of the landscape.
- When travelling north, views of further consented Scenario 1 windfarms would occur from close to where the Ulster Way reaches the saddle between Benbradagh Mountain and the hills to the south. At this location, and for approximately 2 km of the route, the Ulster Way passes in close proximity to the Evishagaran Windfarm. Furthermore, from this stretch of the route and for approximately 1.5 km further to the south it is also possible to see the Development in the immediate context of the Smulgedon and Craiggore Windfarms, with Upper Ballyrogan visible beyond the skyline. The Development would be seen in

the same part of the view that is currently affected by Operational Rigged Hill Windfarm, and its scale would appear similar to the scale of Smulgedon and Craiggore in this view.

- From approximately half way down the slope, the Development and Craiggore Windfarm become less visible, however the 891 Smulgedon Windfarm would remain partially visible on the skyline for a further 2.5 km, until the route rounds the hill on which Smuggledon is located and runs along the B64 for a short section. From this section of the route, the Craiggore Windfarm is located ahead of walkers for a distance of 2.7 km of the route. Thereafter, the route turns to traverse westwards along the route of Killhoyle Road, where views of Craiggore Windfarm become progressively more screened by the intervening landform of Donald's Hill. From this section of the route, it would, however, be possible to gain views of the Smulgedon Windfarm to the south, at relatively close range. This would continue to be possible from certain parts of the steep ascent up Donald's Hill.
- Once at the summit of Donald's Hill, it would be possible to gain close range views of the Development and the Temain Road (37) single turbine from the section of the route that leads to and through the Development. Smulgedon and Craiggore Windfarms are largely screened by intervening landform from this section.
- The further incidence of sequential and successive windfarm visibility from this route results in a medium to low cumulative 893 magnitude of change as a result of the Development. This would occur in the section of the route that runs from the saddle, to the south of Benbradagh Mountain, to the north of the Development. This is not assessed at a higher level due to the existing visibility of a windfarm on the Site and in a similar part of the skyline to that affected by the Smulgedon and Craiggore Windfarms, in views from the Benbradagh slopes.

Castlerock to the Development

- 894. alter the cumulative context of the Development, would be the Cam Burn Windfarm. However, a review of the cumulative ZTV on Figure 6.23 indicates that there would be theoretical visibility of Cam Burn Windfarm from parts of the Ulster Way. However, a review of the areas with theoretical visibility has shown that it would not actually be possible to see the Cam Burn Windfarm to any material extent, due to intervening forestry and other woodland from these locations.
- Therefore, the cumulative magnitude of change would be low to negligible.

6.8.5.14.2 Significance of cumulative effect – Scenario 1

The cumulative effect of the Development on the Ulster Way LDR, in the context of the Scenario 1 windfarms, would be not 896. significant as a result of the medium to high sensitivity and the medium to low or lower cumulative magnitude of change as a result of the repowering of the Operational Rigged Hill Windfarm with the Development.

6.8.5.14.3 Cumulative magnitude of change – Scenario 2 Corrick Mountain to the Development

- As described above, there would be some influence from the Scenario 1 Windfarms as part of the views from this route. In Scenario 2, the only cumulative windfarm that would materially alter the cumulative context of the Development would be Dunbeg South Windfarm. It is shown in wirelines and on Figure 6.13 to be theoretically visible along the southern section of this route from around Benbradagh and on the approach to the Development to the north of Craggore. often seen in a similar direction to the Development and from sections of the route where the Development would also be visible.
- 898. occur in a similar part of the views and landscape when compared with those affected by the Development. It is assessed that, due to the fact that the Development would occur within a part of the views and from similar parts of the route to those affected by Operational Rigged Hill Windfarm, the addition of Dunbeg South Windfarm would not be sufficient to substantially alter the cumulative magnitude of change assessed for the Scenario 1 windfarms. Therefore, the magnitude of change would remain as medium to low or lower, along this section of the Ulster Way.

Castlerock to the Development

The Dunbeg South Windfarm would add further windfarm visibility to the section of the route where it also has close range visibility of the Dunbeg and Dunmore windfarms. It would extend the duration of the windfarm experience so that the time

When travelling south, the only consented Scenario 1 windfarm that would be sufficiently close to the Ulster Way to materially

The Dunbeg South Windfarm would result in further windfarm visibility from the northern section of the Ulster Way, this would

taken between leaving this group of windfarms and gaining close range visibility of the Development would reduce as a result. The fact that the Dunbeg South Windfarm turbines ascend out of the valley and they are taller than those of Dunbeg and Dunmore would increase their prominence within views particularly due to their location on the more distinguished form of Keady Mountain.

It is assessed that the cumulative magnitude of change in the views from this section of the Ulster Way would be **medium to** low or lower due to the introduction of the Development. This is largely as a result of the baseline influence of Operational Rigged Hill Windfarm in closer range views and the existing influence of the Dunbeg and Dunmore Windfarms in a similar part of the landscape to that which would be affected by Dunbeg South.

6.8.5.14.4 Significance of cumulative effect – Scenario 2

^{901.} The cumulative effect of the Development on the Ulster Way LDR in the context of the Scenario 2 windfarms, would be **not significant** as a result of the medium to high sensitivity and the medium to low or lower cumulative magnitude of change as a result of the repowering of the Operational Rigged Hill Windfarm with the Development.

6.9 Summary of Effects

- ^{902.} The potential effects on the, landscape and visual receptors that would arise as a result of the Development have been assessed in this chapter. The process taken involved identifying those receptors with the potential to be significantly affected and assessing the potential effects that the initial decommissioning, construction and operational phases of the Development would give rise to. The significance of these effects has been assessed through combining the sensitivity of each receptor with a prediction of the magnitude of change that would occur as a result of the proposed Development. The findings of the assessment are presented in **Table 6.6**.
- ^{903.} The Development comprises the decommissioning of Operational Rigged Hill Windfarm which involves the removal of the existing ten turbines (57m to blade tip) and select associated infrastructure, and the construction of the Development, which involves the erection of the seven proposed turbines (137m to blade tip) and associated infrastructure, including access tracks, control building, external transformers, Energy Storage Unit, substation and meteorological mast. The Development would replace Operational Rigged Hill Windfarm on the same Site on Rigged Hill. The Site layout is shown on an aerial image that illustrates the land cover in **Figure 6.2a**.
- The Study Area for the Development covers a radius of 30 km and within this area, those receptors with the potential incur significant effects have been assessed in detail. This has included one landscape element, four landscape character areas (LCAs), three designated landscape areas, 19 representative viewpoints and 18 settlements and routes where concentrations of visual receptors are found. Photomontages have been prepared for the viewpoints with the exception of Viewpoint 18 which lies at a range of approximately 26 km. All the viewpoints include a wireline of the Development on its own and a wireline with all other cumulative developments. These visualisations have helped assist in the assessment process. Figures 6.1 to 6.27 show plans of the Study Area, landscape receptors, visual receptors and ZTVs of the Development on its own, in comparison with the Operational Rigged Hill Windfarm and in combination with other cumulative windfarms, while Figures 6.28 to 6.46e show the photographs, wirelines and photomontages from the representative viewpoints. Table 6.6 provides a summary of the effects assessed in detail within this chapter.

Table 6.6: Summary of Effects

Receptor	Sensitivity	Decommissioning Construction Magnitude of Change	Decommissioning Construction Significance of Effect	Operation Magnitude of Change	Operation Significance of Effect
Landscape Elements					
Rough Grass Moorland	Medium	Medium to low	Not significant	Medium to low	Not significant
Landscape Character					
Immediate Landscape Setting: Binevenagh LCA	Medium to high	Medium from open areas, medium to low in forest areas	Significant	Medium	Significant
Immediate Landscape Setting: Roe Basin LCA	Medium	Medium	Significant	Medium	Signifcant

Receptor	Sensitivity	Decommissioning Construction Magnitude of Change	Decommissioning Construction Significance of Effect	Operation Magnitude of Change	Operation Significance of Effect
Local Landscape Setting: Binevenagh LCA	Medium to high	Medium to low	Not significant	Medium to low	Not significant
Local Landscape Setting: Roe Basin LCA	medium	Medium	Not significant	Medium to low	Not significant
Local Landscape Setting: Eastern Binevenagh Slopes LCA	medium	Medium to low	Not significant	Medium to low	Not significant
Landscape Setting: Binevenagh LCA	Medium to high	Low or lower	Not significant	Low or lower	Not significant
Landscape Setting: Roe Basin LCA	medium	Medium to low or lower	Not significant	Low or negligible	Not significant
Landscape Setting: Eastern Binevenagh Slopes LCA	medium	Low or lower	Not significant	Low or negligible	Not significant
Landscape Setting: Glenshane Slopes LCA	Medium to high	Low or lower	Not significant	Low or negligible	Not significant
Sperrin AONB	Medium to high	Low or lower	Not significant	Low or lower	Not significant
Binevenagh AONB	Medium to low	Medium to low or lower	Not significant	Medium to low or lower	Not significant
Dog Leap SS	Medium to high	Medium to low	Medium to high	Medium to low	Not significant
Viewpoints and Visual R	eceptors				
Viewpoint 1: Terrydoo Road	Medium to high	High	Significant	Medium to high	Significant
Viewpoint 2: Temain Road to Aghansillagh and Temain Hill	Medium to high	High	Significant	Medium to high	Significant
Viewpoint 3: Edenmore Road, Limavady	Medium to high	Medium	Significant	Medium	Significant
Viewpoint 4: Roe Park Resort driveway, Limavady	Medium to high	Medium	Not significant	Medium	Not significant
Viewpoint 5: Drumsurn, Beech Road	Medium to high	Medium to high	Significant	Medium	Significant
Viewpoint 6: Ringsend	Medium to high	Low	Not significant	Medium	Significant
Viewpoint 7: Glenullin Bog Viewpoint, Glenullin Resource Centre	Medium to high	Low	Not significant	Medium to low	Not significant
Viewpoint 8: Magheramore Road, south-west of Garvagh	Medium to high	Low	Not significant	Medium to low	Not significant
Viewpoint 9: Legavallon Road	Medium to high	Medium to low	Not significant	Medium to low	Not significant

Receptor	Sensitivity	Decommissioning Construction Magnitude of Change	Decommissioning Construction Significance of Effect	Operation Magnitude of Change	Operation Significance of Effect
Viewpoint 10: Benbradagh Mountain	Medium to high	Medium to low	Not significant	Medium to low	Not significant
Viewpoint 11: Polly's Brae Road junction with B192	Medium to high	Medium to Low	Not significant	Medium to low	Not significant
Viewpoint 12: A2, north of Limavady	Medium to high	Medium to Low	Not significant	Medium to low	Not significant
Viewpoint 13: Binevenagh Mountain, minor road and NCR	Medium to high	Low	Not significant	Low	Not significant
Viewpoint 14: Wheatsheaf Road, Coleraine	Medium to high	Low	Not significant	Low	Not significant
Viewpoint 15: A26 near Seacon (Ballymoney)	Medium	Low	Not significant	Low	Not significant
Viewpoint 16: Garvagh Road, Dungiven	Medium to high	Medium to low	Not significant	Medium to low	Not significant
Viewpoint 17: Scotchtown Road, Magilligan	Medium to high	Low	Not significant	Low	Not significant
Viewpoint 18: Greenbank Church, Quigley's Point, Republic of Ireland	Medium to high	Low to negligible	Not significant	Low	Not significant
Viewpoint 19: B66, west of Ringsend, north of Site	Medium to high	Medium to high	Significant	Medium to high	Significant
Drumsurn	Medium to high	Medium to high where there are open views from properties and recreational areas	Significant where there are open views from properties and recreational areas	Medium to high where there are open views from properties and recreational areas	Significant where there are open views from properties and recreational areas
Ringsend	Medium to high	Medium to low	Not significant	Medium for a small number of properties in the upper, western part of settlement	Significant for a small number of properties in the upper, western part of settlement
Limavady	Medium to high	Medium for residential receptors along the southern and south-easterly edge of the settlement.	Significant for residential receptors along the southern and south-easterly edge of the settlement	Medium for residential receptors along the southern and south-easterly edge of the settlement.	Significant for residential receptors along the southern and south-easterly edge of the settlement
Garvagh	Medium to high	Low or negligible	Not significant	Low or negligible	Not significant
Dungiven	Medium to high	Medium to low	Not significant	Medium to low	Not significant

Receptor	Sensitivity	Decommissioning Construction Magnitude of Change	Decommissioning Construction Significance of Effect	Operation Magnitude of Change	Operation Significance of Effect
Ballykelly	Medium to high	Medium to low	Not significant	Medium to low	Not significant
Coleraine	Medium to high	Low	Not significant	Low	Not significant
Kilrea	Medium to high	Low	Not significant	Low	Not significant
Ballymoney	Medium to high	Low	Not significant	Low	Not significant
Port Stewart	Medium to high	Low	Not significant	Low	Not significant
B66 (Limavady to Aghadowey)	Medium	Medium or medium to high from A29 junction to the crossing of the Ulster Way when travelling east. Medium when travelling west from the farm that lies west of the Recycling Centre and approximately 1.6 km west of the junction with the B70. Medium to low or lower elsewhere.	Significant along 6 km when travelling east and 2.9 km when travelling west. Not significant elsewhere	Medium or medium to high from A29 junction to the crossing of the Ulster Way when travelling east. Medium when travelling west from the farm that lies west of the Recycling Centre and approximately 1.6 km west of the junction with the B70. Medium to low or lower elsewhere. East bound in the vicinity of Viewpoint 9 for a distance of approximately 900 m where the magnitude of change would be medium to low Westbound low and negligible Medium for a section of the route of approximately 1 km to the south of Limavady. Lower elsewhere. Medium when travelling north from just to the south of Glenkeen Bridge to Ringsend. Lower elsewhere.	Significant along 6 km when travelling east and 2.9 km

Receptor	Sensitivity	Decommissioning Construction Magnitude of Change	Decommissioning Construction Significance of Effect	Operation Magnitude of Change	Operation Significance of Effect
				Medium to low or lower Medium for 1.8 km of the route, when travelling generally in a northwards direction, in the vicinity of the crossing of the A2 to the foot of Binevenagh	
B64 (Dungiven to Garvagh)	Medium to high	East bound in the vicinity of Viewpoint 9 for a distance of approximately 900 m where the magnitude of change would be medium to low Westbound low and negligible	Not significant		
B68 (Limavady to Dungiven)	Medium	Medium for a section of the route of approximately 1 km to the south of Limavady. Lower elsewhere.	Significant from Limavady for 1 km of the route. Not signicant elsewhere.	Medium for a section of the route of approximately 1 km to the south of Limavady. Lower elsewhere	Significant from Limavady for 1 km of the route. Not signicant elsewhere.
B70 (Garvagh to Ringsend)	Medium	Medium when travelling north from just to the south of Glenkeen Bridge to Ringsend. Lower elsewhere.	Significant intermittently along 5 km section of the route between just south of Glenkeen Bridge to Ringsend when travelling north. Not significant elsewhere	Medium when travelling north from just to the south of Glenkeen Bridge to Ringsend. Lower elsewhere.	Significant intermittently along 5 km section of the route between just south of Glenkeen Bridge to Ringsend when travelling north. Not significant elsewhere
The North Sperrins Scenic Driving Route	Medium to high	Medium to low or lower	Not significant	Medium to low or lower	Not significant
NCN 93	Medium to high	Medium for 1.1 km of the route, between the south of Limavady and the River Roe. Medium to low or lower elsewhere.	Significant for 1.1 km of the route to the south of Limavady to the crossing of the River Roe. Not significant elsewhere.	Medium for 1.1 km of the route, between the south of Limavady and River Roe. Medium to low or lower elsewhere.	Significant for 1.1 km of the route to the south of Limavady and the crossing of the River Roe. Not significant elsewhere.

Receptor	Sensitivity	Decom Constr Magnit Change	missioning uction ude of e	Decommiss Construction Significance Effect	sioning on :e of	Operation Magnitude of Change		Operation Significance of Effect
NCN 96	Medium to high		low	Not signi	ficant	low		Not significant
The Ulster Way Long Distance Route - Corick Mountain to the Development	Medium to high	Medium to high from the summit of Donald's Hill for the following 4.5 km, until walkers on the Ulster Way have passed through the Development.		Significan Donald's H for 4.5	t from ill north km	Medium to hig from the summi Donald's Hill for following 4.5 kr until walkers on Ulster Way hav passed through Development	h the n, the ve the	Significant from Donald's Hill north for 4.5 km
The Ulster Way Long Distance Route - Castlerock to the Development	Medium to high	Mediu Cam Spring for 1.2 path r Medi north-e Mou shor section Mediu from 1 the De a approx km 1 Mediu lower	um through Forest and well Forest, km until the eaches the B66. ium to the ast of Boyds ntain for a t (0.5 km) of the route. um to high km north of evelopment, and for kimately 1.5 through it m to low or elsewhere	Significant Cam Fore Springwell for 1.2 km of path reach B66, to the east of B Mountain short (0.9 section of th from 1 km the Develo and for approxima km through signific elsewho	through st and Forest, until the nes the e north- ioyds of for a 5 km) ne route, north of pment, or tely 1.5 i it. Not ant ere.	Medium throug Cam Forest ar Springwell Fore for 1.2 km until path reaches th B66. Medium to the north-east of Bo Mountain for a short (0.5 km section of the rou Medium to hig from 1 km north the Developme and for approximately 1 km through it Medium to low lower elsewher	h h st, he he yds a ute. h nt, .5 or re	Significant through Cam Forest and Springwell Forest, for 1.2 km until the path reaches the B66, to the north- east of Boyds Mountain for a short (0.5 km) section of the route, from 1 km north of the Development, and for approximately 1.5 km through it. Not significant elsewhere.
able 6.7: Summary of C Receptor	umulative Effect Cumulative Sce 1 Magnitude of	ts enario	Significanc Cumulative	e of Effect	Cumula 2 Magn	ative Scenario itude of	Sig Cu	nificance of mulative Effect
Immediate landscape setting	Medium to south south-east of	n and	Significant to south-east of	o south and	Medium and sou	to north, south th-east of	Sig	nificant to north, th and south-east of

Receptor	Cumulative Scenario 1 Magnitude of Change	Significance of Cumulative Effect (Scenario 1)	Cumulative Scenario 2 Magnitude of Change	Significance of Cumulative Effect (Scenario 2)
Immediate landscape setting	Medium to south and south-east of Development. Medium to low or lower elsewhere.	Significant to south and south-east of Development. Not significant elsewhere.	Medium to north, south and south-east of Development. Medium to low or lower elsewhere.	Significant to north, south and south-east of Development. Not significant elsewhere.
Viewpoint 1: Terrydoo Road	Low	Not significant	Medium to Low	Not significant
Viewpoint 2: Temain Road to Aghansillagh and Temain Hill	Medium to low	Not significant	Medium to low	Not significant
Viewpoint 3: Edenmore Road, Limavady	Low	Not significant	Medium to low	Not significant
Viewpoint 4: Roe Park Resort driveway, Limavady	Low	Not significant	Medium to low	Not significant

Receptor	Cumulative Scenario 1 Magnitude of Change	Significance of Cumulative Effect (Scenario 1)	Cumulative Scenario 2 Magnitude of Change	Significance of Cumulative Effect (Scenario 2)
Viewpoint 5: Drumsurn, Beech Road	Llow	Not significant	Negligible	Not significant
Viewpoint 6: Ringsend	Medium	Significant	As Scenario 1	No further significant effects
Viewpoint 19: B66, west of Ringsend, north of site	Low	Not significant	As Scenario 1	Not significant
Drumsurn	Medium to low	Not significant	Medium to low	Not significant
Ringsend	Medium	Significant	As Scenario 1	No further significant effects
Limavady	Low	Not significant	Medium to low	Not significant
B66 (Limavady to Aghadowey)	Medium to low	significant travelling west between the farm to the west of the Recycling Centre and Boyds Mountain, a distance of approximately 5 km. Not significant elsewhere or travelling east.	Varies negligible to medium	No further significant effects
B70 (Garvagh to Ringsend)	Varies negligible to medium	significant from north of the Garvagh Forest to Ringsend. Not significant elsewhere.	Medium	No further significant effects
NCR 93	Medium to low or lower	Not significant	Medium to low or lower	Not significant
Ulster Way LDR (Corrick Mountain to the Development)	Medium to low	Not significant	Medium to low or lower	Not significant
Ulster Way LDR (Castlerock to the Development)	Low to negligible	Not significant	Medium to low or lower	Not significant

6.10 Statement of Significance

- In respect of effects on landscape elements, the assessment found no significant effects would arise in relation to the loss of the rough grass moorland as a result of the initial decommissioning and construction phases of the Development. The losses would comprise only a small proportion of a much wider landscape element and would occur in an area where an operational windfarm is currently sited. Effects have been minimised by deploying a design strategy to utilise existing infrastructure associated with Operational Rigged Hill Windfarm wherever practical. Rough grass moorland would be reinstated in those areas where infrastructure would be removed following completion of the construction phase.
- In respect of effects on landscape character, the assessment found there would be significant effects within a localised 2 km 906. radius of the Development where views are obtained during the combined decommissioning and construction phases and the operational phase of the Development. These effects would arise within the Binevenagh LCA and the Roe Basin LCA, where they lie within the area defined as the Immediate Landscape Setting (0 to 2 km radius). The effects on landscape character would be moderated by the existing, baseline presence of Operational Rigged Hill Windfarm which would be replaced by the Development. Not all areas within this 2 km radius would incur significant effects owing largely to the screening effect of landform and forestry. All LCAs beyond this radius would not incur significant effects.

- ^{907.} In respect of landscape designations, the assessment found that the effects on the Binevenagh and Sperrin AONBs and the Dog Leap SS would be not significant.
- The effects would be not significant on all other designated areas in the Study Area during the decommissioning of 908. Operational Rigged Hill Windfarm and the construction and operational phases of the Development.
- In respect of effects on visual amenity, the assessment of the effects of the Development has found that significant effects 909 would occur during the initial decommissioning and construction phases at five of the 19 viewpoints and during the operational stage at six of the 19 viewpoints.
- 910. Of the views from the 18 routes and settlements, which were identified as having the potential to undergo significant effects on visual receptors, there is the possibility of significant effects on the views from parts of the settlements of Drumsurn, Ringsend and Limavady from locations where there would be open views of the Development during its operation. The effects during the combined decommissioning and construction phases would also be significant from parts of Drumsurn and Limavady but would be not significant from Ringsend due to the screening influence of intervening forestry, which would screen most of the construction processes. From the routes assessed as visual receptors there would be significant effects along a section of the A66 where the road runs north of the site at relatively close proximity. There would also be significant effects on views from sections of the B68, B70, NCN 93 and the Ulster Way LDR during the combined construction and decommissioning and the operational phases. This tends to occur over relatively short sections of these routes or would be intermittent along a longer section (B70).
- These viewpoints and locations of the visual receptors are listed below.
 - Viewpoint 1: Terrydoo Road
 - Viewpoint 2: Temain Road to Aghansillagh and Temain Hill
 - Viewpoint 3: Edenmore Road, Limavady
 - Viewpoint 5: Drumsurn, Beech Road
 - Viewpoint 6: Ringsend (combined decommissioning and construction phase only)
 - Viewpoint 19: B66, west of Ringsend, north of Site
 - Drumsurn
 - Ringsend (Operational phase only)
 - Limavady
 - B68 •
 - B70 •
 - NCN 93 •
 - Ulster Way LDR
- The viewpoints where it has been identified there may be significant visual effects all lie within 7 km of the Development. The 912. most distant part or section of a settlement or route where the visual effect was assessed as being significant is at a range of 6.9 km from NCN 93 from south of Limavady to the crossing of the River Roe where there would be intermittent clear visibility of the Development along a 1.2 km section of the route.
- This illustrates that the locations identified where there are likely to be significant visual effects are all representative of close to middle range views. Effects beyond this range are unlikely to be significant.
- There are several factors that are worth noting in relation to this finding. The distance over which significant effects may arise 914. is not as widespread as might have been expected to arise if the Development was a new influence on the Site and not a repowering project. The baseline views are characterised by the ten, 57 m to blade tip, turbines of the Operational Rigged Hill Windfarm so that a windfarm in this location is already a familiar influence in views. At greater distances the scale of the Development becomes less influential and the fact that there was previously a windfarm on the Site reduces the magnitude of change than would otherwise have been the case.
- 915. At closer ranges the magnitude of the change in the views between the baseline views of Operational Rigged Hill Windfarm and the Development is more marked due to its larger turbines and slightly wider horizontal spread. In close views from the west there is the additional visibility of the access tracks across the hillside. Therefore, significant visual effects can occur at closer proximity where views are obtained.

- Within the wider landscape, although there are many visual receptors within the settled valleys to the west and east, these areas are not remote or undeveloped and they are influenced by infrastructure and buildings as well as views of windfarms and single turbines. The part of the north to south running ridgeline upon which the Development is located is unremarkable and lower than the more notable forms of the hills at either end of the ridge so that the Development does not generally influence the key focus of views from these locations. This further reduces the potential magnitude of change in the views from the west and east as a result of the Development.
- The more sensitive and valued upland areas of the Binevenagh and Sperrin AONBs are located to the north and south of the Development respectively. Intervening landform largely screens views available to visual receptors within these locations. In locations where the Development would be visible it would be seen across its shorter width as part of a relatively large scale upland landscape. Closer proximity locations are also often characterised by forestry or other windfarms. These factors all contribute to limiting the spread of significant effects on visual amenity.
- The identified effects of the Development take into account the baseline operational windfarms that are located within the 918. wider area. Operational Rigged Hill Windfarm currently contributes to the overall cumulative windfarm distribution and presence so that the cumulative magnitude of change is reduced as a result of the Development and the difference this makes to an existing cumulative situation. The Development has fewer but taller turbines than the Operational Rigged Hill Windfarm and it covers a slightly wider extent with the further visibility of access tracks seen to the west, more visible during the decommissioning and construction phases. However, it is located within the same part of views as the existing so that its influence as a windfarm in this location is not new.
- The magnitude of change of the Development, itself, would need to be of a sufficiently high level in order to instigate a 919. material change to the current and accepted, potential future cumulative situation. For this reason, it is considered that this could only occur where the magnitude of change in relation to the Development, itself, results in a medium or higher level of magnitude of change during the operational phase, as occurs in relation to the following landscape and visual receptors.
- Landscape character receptors 920.
 - Immediate landscape setting.
- Viewpoints and visual receptors 921.
 - Viewpoint 1: Terrydoo Road;
 - Viewpoint 2: Temain Road to Aghansillagh and Temain Hill;
 - Viewpoint 3: Edenmore Road, Limavady;
 - Viewpoint 4: Roe Park Resort driveway, Limavady;
 - Viewpoint 5: Drumsurn, Beech Road;
 - Viewpoint 6: Ringsend;
 - Viewpoint 19: B66, west of Ringsend, north of site; ٠
 - ٠ Drumsurn
 - Ringsend
 - Limavady ٠
 - B66; ٠
 - B70; ٠
 - NCR 93;
 - Ulster Way LDR. ٠
- The cumulative effects of the Development on these identified receptors was considered for two potential future baseline 922. scenarios. Scenario 1 adds in the consented and under construction windfarms to the baseline containing the operational wind farms and Scenario 2 adds application or appeal stage windfarms to Scenario 1. It was assessed in Table 6.5 which of the cumulative windfarms shown on Figure 6.12 may contribute to a cumulative context where the effect of the Development would be significant. This discounted some of the smaller or more distant windfarms from the scenarios assessed.
- The most relevant windfarms to the potential future cumulative situation are those that are consented and under construction. 923.

- Significant cumulative effects would arise only in the context of the Scenario 1 windfarms at Viewpoint 6: Ringsend, in views from a 5 km section of the B66 when travelling west and in views from the section of the route between Ringsend and north of the Garvagh Forest.
- settlements.
- The effects assessed for the Development would be short term and temporary during the initial decommissioning and 926 construction phases and permanent, long term yet reversible during the operational phase.

No further significant effects would arise in the context of the Scenario 2 windfarms or in views from other viewpoints, routes or

6.11 Glossary Table 6.8 Glossary of Terminology

Term	Definition
The Site	Refers to all land that falls within the Site Boundary
The Site Boundary	Refers to the Site Boundary at the time of Scoping.
Operational Rigged Hill Windfarm	Refers to the existing Rigged Hill Windfarm at the Site, which has been operational since 1995.
The Development	Refers to all elements of the application for the repowering of the Operational Rigged Hill Windfarm the details of which are set out within Chapter 3: Development Description . These elements include the wind turbines, all site infrastructure, access tracks, energy storage etc.
Study Areas	Refers to areas which are considered as part of the assessment process. In the LVIA this is measured from the turbine positions.
The Council	Refers to the Causeway Coast and Glens Borough Council.
The Applicant	Refers to ScottishPower Renewables.
EIA Regulations	Refers to The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017.
Energy Storage Unit	Refers to the Energy Storage Element. Energy Storage is defined as the capture of energy produced at one time for use at a later time.
The Onsite Substation and Control Building	Refers to the Onsite Substation and Control Building including the compound in which it is located.
The Scoping Opinion	The comments prepared by the statutory consultees in response to The Scoping Request.
The Scoping Request	The report prepared by consultants on behalf of the Applicant for comments from the statutory consultees.
T1, T2 etc	Refers to individual Wind Turbines within the Development.
Wind Turbine	The individual machines that generate electricity form wind power.
Northern Ireland	Refers to the Regional Level.

Table 6.9 Glossary of Acronyms

Acronym	
AHSV	Area of High Scenic Value
AONB	Area of Outstanding Natural Beauty
CIA	Cumulative Impact Assessment
DAERA	Department of Agriculture, Environment and Rural Affairs
DoENI	Department of the Environment Northern Ireland
ES	Environmental Statement
GIS	Geographical Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
LCA	Landscape Character Area
LI	Landscape Institute
LVIA	Landscape and Visual Impact Assessment
NIEA	Northern Ireland Environment Agency
NILCA	Northern Ireland Landscape Character Assessment
NIRLCA	Northern Ireland Regional Landscape Character Assessment
RS	Registered Site
SDL	Settlement Development Limits

Acronym	
SNH	Scottish Natural Heritage
SPG	Supplementary Planning Guidance
SS	Supplementary Site
ZTV	Zone of Theoretical Visibility



7 Hydrology, Hydrogeology, Geology, **Soils and Peat**

7.1 Introduction

- This Chapter of the Environmental Statement (ES) evaluates the effects of the Development on the hydrology, hydrogeology, geology, soils and peat resource. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus).
- The assessment considers the potential effects of the Development during the following phases of the Development: 2.
 - Decommissioning of the Operational Rigged Hill Windfarm (Initial Phase of the Development); ٠
 - Construction of the Development (likely to occur in tandem with the above phase);
 - Operation of the Development; and
 - Decommissioning of the Development (Final Phase)
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly 3. in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worst-case scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these first two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.
- This Chapter of the ES is supported by the following Technical Appendices documents provided in Volume 3 of this ES: 5.
 - A3.1: Outline Decommissioning/Construction Environmental Management Plan (DCEMP); ٠
 - A3.2: Draft Habitat Management Plan;
 - A7.1: Peat Slide Risk Assessment (PSRA);
 - A7.2: Water Construction and Environmental Management Plan (WCEMP), this will form an appendix to the Outline DCEMP however for ease of reference has been included as an appendix to this chapter for the purposes of the ES;
 - A7.3: Dipwell Monitoring Results; and
 - A7.4: Peat Management Plan
- This Chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Conditions:
 - Embedded Mitigation;
 - Assessment of Potential Effects;
 - Mitigation and Residual Effects;
 - Cumulative Effect Assessment;
 - Summary of Effects:
 - Statement of Significance;

http://www.legislation.gov.uk/nisr/2017/81/contents/made. [Accessed on 09/10/2017]

⁵ The Private Water Supplies Regulations (Northern Ireland) 2009. Available online at:

- References; and
- Glossary.

Legislation Policy and Guidance 7.2

The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (the EIA Regulations)¹ establish in broad terms what is to be considered when determining the effects of development proposals on hydrology, hydrogeology, this assessment.

7.2.1 Legislative Background

- The Water Framework Directive (WFD) (2000/60/EC)² establishes a framework for the protection, improvement and sustainable use of all water environments. It is transposed in Northern Ireland by The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017³ and subsidiary Regulations.
- Other relevant legislation includes:
 - The Fisheries Regulations (Northern Ireland) 2014⁴;
 - The Private Water Supplies Regulations (Northern Ireland) 2009⁵; and
 - The Water Supplies (Water Quality) (Amendment) Regulations (Northern Ireland) Regulations 2017⁶.
- A detailed assessment of land use planning legislation, policy and guidance relating to the Development can be found in Chapter 5: Planning Policy Context of this ES.

7.2.2 Northern Ireland Planning Policy and Guidance

- The Strategic Planning Policy Statement for Northern Ireland (SPPS)⁷ was published in 2015, and replaces the previous Planning Policy Statements (PPS). SPPS sets out the Northern Ireland Government's policy on how nationally important land use planning matters should be addressed.
- Annex D: Assessing Flood Risk and Drainage Impact of the Revised Planning Policy Statement 15 'Planning and Flood Risk' (PPS 15)⁸ and The Regional Development Strategy 2035 (RDS)⁹ sets out guidance for development within areas of flood risk, including the responsibilities of planning authorities in regulating and controlling development in such areas, in order to prevent increased risk of flooding in the future.
- PPS 15 advises that (in relation to flood risk and drainage impact assessments "...The detail of the Assessment should be 13. proportionate to the scale and nature of the proposed development and the risks involved" and that "A FRA must consider the flood risk from all sources of flooding where the proposed development is located within or in proximity to the fluvial (river) flood plain".
- Annex D of PPS 15 also states that "A Drainage Assessment should consider the flood risk mainly from pluvial flooding where 14. the proposed development is located beyond the fluvial and / or coastal flood plain".

geology and peat resources. The following legislation, guidance and information sources have been considered in carrying out

¹ The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017. Available online at: http://www.legislation.gov.uk/nisr/2017/83/made [Accessed 09/10/2017]

² European Commission, The Water Framework Directive (2000/60/EC). Available online at: http://ec.europa.eu/environment/water/waterframework/index_en.html. [Accessed on 09/10/2017]

³ The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017. Available online at:

⁴ Fisheries Regulations (Northern Ireland) 2014. Available online at: http://www.legislation.gov.uk/nisr/2014/17/made . [Accessed on 09/10/20171

http://www.legislation.gov.uk/nisr/2009/413/contents/made . [Accessed on 09/10/2017]

⁶ The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2015. Available online at: http://www.legislation.gov.uk/nisr/2017/211/contents/made. [Accessed on 14/01/2019] ⁷ Strategic Planning Policy Statement for Northern Ireland 2015. Available online at: https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf. [Accessed on 16/10/2017] ⁸ Department of the Environment - Revised Planning Policy Statement 15 'Planning and Flood Risk' [online] Available at: http://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/pdf - final_revised_pps_15_-_18th_september_2014.pdf [Accessed 18/10/2017]

⁹ The Regional Development Strategy 2035 (RDS) [ONLINE] Available at: https://www.planningni.gov.uk/index/policy/rds2035.pdf [Accessed 13/11/2017]

7.2.3 Guidance for Pollution Prevention (GPPs)

- The hydrology and hydrogeology assessment of the Development will be undertaken in accordance with good practice guidance for Northern Ireland, Scotland and Wales (Guidance for Pollution Prevention (GPPs) which replace Pollution Prevention Guidelines (PPGs))¹⁰, which includes:
 - PPG1: General guide to the prevention of water pollution (July 2013);
 - GPP2: Above ground oil storage tanks (January 2017);
 - GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (October 2017);
 - GPP5: Works and maintenance in or near water (January 2017);
 - PPG6: Working at construction and demolition sites (2012);
 - GPP8: Safe storage and disposal of used oils (July 2017);
 - PPG18: Managing fire water and major spillages (June 2000);
 - GPP21: Pollution incident response planning (July 2017); and
 - GPP22: Dealing with spills (October 2018).

Other Guidance 7.2.3.1

- Other relevant guidance and regulation comprises the following:
 - Planning Policy Statement (PPS) 18: Renewable Energy¹¹;
 - The Construction Industry Research and Information Association (CIRIA) Report C689 Culvert Design and Operation Guide¹²:
 - CIRIA Report C532 Control of water pollution from construction sites ¹³;
 - CIRIA Report C648 Control of water pollution from linear construction proposed developments: technical guidance¹⁴;
 - CIRIA Report C741 Environmental Good Practice on Site Guide¹⁵:
 - CIRIA Report C753 The SuDS Manual¹⁶;
 - Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments¹⁷;
 - Forest and Water, UK Forestry Standard Guidelines¹⁸;
 - UKTAG. Guidance on the Identification and Risk Assessment of Groundwater Dependent Terrestrial Ecosystems¹⁹;
 - Wind farms and groundwater impacts A guide to EIA and Planning considerations²⁰;
 - Best Practice Guidelines for the Irish Wind Energy Industry²¹; and
 - Standing Advice Note 4 Pollution Prevention Guidance²².

Assessment Methodology and Significance Criteria 7.3

- This assessment has involved the following elements, further details of which are provided in the sections:
 - Consultation with relevant statutory and non-statutory bodies;
 - Desk study, including review of available maps and published information;
 - Site walkover:
 - Input to design process to minimise effects;
 - Identification and evaluation of potential effects;
 - Evaluation of the significance of these effects;
 - Identification of measures to avoid and mitigate potential effects;
 - Assessment of residual effects;

¹⁰ Netregs, 2017. Guidance for Pollution Prevention (GPPs)-Full List. Available at:: <u>http://www.netregs.org.uk/environmental-topics/pollution-</u> prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/. [Accessedon 22/11/2017] ¹ NI Planning Service, 2009. Planning Policy Statement 18: Renewable Energy. Available at: http://www.netregs.org.uk/environmentaltopics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/. [Accessed on 22/11/2017] ¹² CIRIA, 2010. Report C689 Culvert Design and Operation Guide. Available for purchase at: https://www.ciria.org/CIRIA/Sign_In.aspx?WebsiteKey=3f18c87a-d62b-4eca-8ef4-

<u>9b09309c1c91&returnurl=%2fResources%2fFree_publications%2fC689.aspx</u>. [Accessed on 22/11/2017]. ¹³ CIRIA, 2001. ReportC532 Control of Water Pollution from Construction Sites. Available for Purchase at:

https://www.ciria.org/ItemDetail?iProductCode=C532&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91. [Accessed on 22/11/2017]

¹⁴ CIRIA, 2006. Report C648 Control of water pollution from linear construction proposed developments: technical guidance. Available for purchase at: https://www.ciria.org/Search?SearchTerms=report%20C648. [Accessed on 22/11/2017].

¹⁵ CIRIA, 2015. Report C741 – Environmental Good Practice on Site Guide. Available for purchase at:

https://www.ciria.org/Search?SearchTerms=report+C648. [Accessed on 22/11/2017].

¹⁶ CIRIA, 2007. The SUDS Manual. Available at: https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx. [Accessed on 22/11/2017].

- Evaluation of potential cumulative effects;
- Proposed monitoring; and
- Statement of significance.

Scoping Responses and Consultation 7.3.1

Information has been provided by a number of consultee organisations during the assessment, and this is summarised in Table 7.1. The response to each point raised by consultees is also presented within the table, demonstrating where the design of the Development has changed in response to specific issues indicated by Northern Ireland Environment Agency (NIEA), Northern Ireland Water (NIW), Department of Agriculture Environment and Rural Affairs Northern Ireland (DAERA NI), Drinking Water Inspectorate (DWI) and Causeway Coast and Glens Borough Council (CCGBC).

Consultee	Response	Response to Consultee
Northern Ireland Environment Agency	Advised that there is potential for hydrological connectivity to Lough Foyle SPA Ramsar site and River Roe SAC.	The presence of designated features has been taken into account in determining the sensitivity of receptors as outlined in Section 7.6.10 .
Northern Ireland Water	Made no comment relating to hydrology, geology or peat.	-
The Drinking Water Inspectorate	Provided information regarding Private Water Supplies.	Properties were contacted by post to ascertain the location of the supply. This information has been used to inform the design of the Development as necessary.
Department of Agriculture, Environment and Rural Affairs Northern Ireland	 Water Management Unit are of the opinion that, based on the information presented, impacts on the surface water environment generated by this proposal are unlikely to be significant subject to best practice and appropriate mitigation being applied during the construction, operation and decommissioning phases. The Water Management Unit refer the applicant to NIEAs suite of advice notes. Water Management Unit request that any future application clearly demonstrate the following: How any foul sewage (from compound) will be dealt with; How surface water will be disposed of during the construction phase of the development; Compliance with The Oil Storage Regulations; Clear details of any works in, near or liable to affect a watercourse. Including the length and position of any proposed culverts; and 	Measures relating to foul sewage and surface water disposal are outlined in Section 2 of the WCEMP. Culvert design will be provided at the detailed design stage. Details of compliance with the Oil Storage Regulations Standing Advice Note No.4 are outlined throughout the WCEMP.

¹⁷ Scottish Government, 2006. Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments. Available at: <u>http://www.gov.scot/Publications/2006/12/21162303/0</u>. [Accessed on 22/1//2017]. ¹⁸ Forestry Commission, 2011. UK Forestry Standard. Available at: <u>https://www.forestry.gov.uk/ukfs</u>. [Accessed on 22/11/2017]. ¹⁹ UKTAG, 2004. Guidance on the Identification and Risk Assessment of Groundwater Dependent Terrestrial Ecosystems. Available at: https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Risk%20assessment%20of%20terre strial%20ecosystems%20groundwater_Draft_210104.pdf. {Accessed on 16/01/2019] ²⁰ DOE and NIEA. 2015. Available at:

https://www.planningni.gov.uk/index/advice/northern ireland environment agency guidance/wind farms and groundwater impacts-3.pdf [Accessed on 14/01/2019].

²¹ Irish Wind Energy Association, 2012. Best Practice Guidance for the Irish Wind Energy Industry. Available at: http://www.iwea.com/iweabestpracticeguidelines. [Accessed on 22/11/2017]. ²² DAERA Standing Advice, Pollution Prevention Guidance, 2017. Available at: https://www.daerani.gov.uk/sites/default/files/publications/daera/DAERA%20%20Standing%20Advice%20-%20WTR%20-%20Pollution%20preventing%20guidance%20-%20November%202017.pdf. [Accessed on 19/03/2019].

Consultee	Response	Response to Consultee
	 The application should clearly demonstrate compliance with all the relevant precepts contained in Standing Advice Note No.4 – Pollution Prevention Guidance. 	
Geological Survey of Northern Ireland	Due to the available geological maps and information suggesting the presence of peat, GSNI have asked that a Peat Slide Hazard Risk Assessment be undertaken. In particular, it is noted that a large proportion of the Study Area is underlain by peat, covering high ground and moderate steep slopes. Your Environmental Impact Assessment should therefore include a full Peat Slide Hazard Risk Assessment, following the recommendations made by Scottish Nature (Scottish Nature, 2007)*	Peat Slide Risk Assessment included as Technical Appendix A7.1.
Department for Infrastructure (DfI) – Rivers Planning Advisory Unit	Dfl Rivers remit is limited to commenting on flood risk and drainage matters in accordance with planning Policy Statement 15 Planning and Flood Risk (PPS 15). Paragraph 5.8 of PPS 15 requires that flood risk and drainage assessment are addressed in the Environmental Statement.	Consideration has been given to flooding and increase in surface runoff in Section 7.8.1.8 as part of the assessment of potential effects.
Loughs Agency	Provided advice on environmental best practice.	Relevant environmental best practice is adopted as embedded mitigation as outlined in the WCEMP.
Causeway Coast and Glens Borough Council	Made no comment relating to hydrology, geology or peat.	

*This document is superseded by Scottish Government, 2017 Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments.

7.3.2 Scope of Assessment

7.3.2.1 Elements Scoped In to Assessment

- The following effects on the hydrological and hydrogeological resources related to the Development will be considered within the EIA due to the potential for significant effects:
- Potential chemical pollution effects on the hydrological environment;
- Potential sedimentation as a result of the decommissioning/construction phase;
- Potential acidification of watercourses;
- Potential impediments to watercourse and near-surface water flow; ٠
- Potential effects on private water supplies;
- Potential for an increase in run-off and flood risk;
- Potential migration of pollutants from contaminated land / previously developed areas;
- Potential compaction of superficial deposits;
- Potential for peat destabilisation;
- Potential for peat disturbance;
- Potential effects on groundwater table and flow paths from decommissioning of existing infrastructure; and
- Potential for contaminated land to be encountered during decommissioning of the existing windfarm.
- The potential effects relating to peat that are to be considered during this assessment are: 20.
 - Potential peat slide risk;

- Potential effects relating to active peatlands as presented within Chapter 8: Ecology and Fisheries; and
- · Potential Effects relating to excavations and Management of peat and peaty soils.
- Details of embedded mitigation and restoration relative to peatlands are described in Technical Appendix A3.2 Draft Habitat 21. Management Plan.

7.3.2.2 Elements Scoped out of Assessment

- Receptors beyond the 10 kilometres (km) Study Area will not be considered further, as beyond this distance, it is considered that developments of this nature are unlikely to have potential chemical or sedimentation effects, due to natural attenuation and dilution of potentially polluting chemicals and sediments in the water environment. This approach was set out in Section 11.2.1 of the Scoping Report submitted as part of this consultation phase (provided in Technical Appendix A2.1).
- No known areas of soil contamination were identified within the Development site during the site walkovers or desk studies. As 23. no areas were identified within the Site Boundary, no effects are anticipated. Should potentially contaminated land be encountered during excavations or decommissioning, appropriate action will be taken in accordance with The Environmental Protection Act 1990 and in accordance with Technical Appendix A3.1 Outline Decommissioning and Construction Environmental Management Plan (DCEMP). Potential effects arising from contaminated land have, therefore, been scoped out of this assessment.

7.4 Study Area

- The hydrology and hydrogeology Study Area is based on the Site Boundary at the time of Scoping (the Study Area), and a 24. second wider study area includes a 10 km radius from the Study Area (the Wider Study Area) in order to assess the potential effects of the Development on the wider hydrological environment. Both Study Areas are shown in Figure 7.1 of this ES. At distances greater than 10 km within upland catchments, it is considered that schemes are unlikely to contribute to a hydrological effect, in terms of chemical or sedimentation effects, due to attenuation and dilution over distance of potentially polluting chemicals.
- The Study Area for potential effects on public and private water supplies is defined as a 2 km radius of the Site Boundary (Private Water Supply Study Area). This approach was set out in Technical Appendix A2.1 Scoping Report, Section 11.2.1 submitted as part of the consultation phase.
- These defined study areas are informed by professional judgement and experience assessing similar scale developments 26. within similar hydrological catchments.

7.4.1 Baseline Survey Methodology

- 7.4.1.1 Desk Study
- The desk study included: 27
 - Identification of underlying geology and hydrogeology;
 - Collation of data provided through consultations;
 - 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.

Reference was also made to the following sources of information: 28.

- The Ordnance Survey Northern Ireland (OSNI) 1:50,000 Discoverer Series (Sheet s5, 8 and 9);
- National River Flow Archive (NRFA)²³; •
- Flood Maps (NI) 2017²⁴; •
- Meteorological Office Rainfall Data²⁵; and
- The Geological Survey of Northern Ireland (GSNI) Geology Map (Digital²⁶).

²⁵ Met Office, (current), Weather and Climate data. Available online at: https://www.metoffice.gov.uk/public/weather/climate/gcexz7nuj [Accessed 09/10/2017]

²⁶ Available for purchase from BGS at http://www.bgs.ac.uk/products/onshore/home.html?src=topNav [accessed 06/10/2015]

²³ National River Flow Archive. Available online at: <u>https://nrfa.ceh.ac.uk/</u>. [Accessed 09/10/2017]

²⁴ Flood Maps (NI). Available online at:

http://riversagency.maps.arcgis.com/apps/webappviewer/index.html?id=fd6c0a01b07840269a50a2f596b3daf6. [Accessed 09/10/2017]

7.4.1.2 Site Walkover

- A site walkover was undertaken on the 29th June 2017 to verify the location and nature of watercourses and water bodies within the immediate hydrological catchment of the Development. The site walkover covered the area of the Operational Rigged Hill Windfarm, and an area 700 metres (m) to the west, down gradient of the Operational Rigged Hill Windfarm. Weather was overcast during the walkover; weather during the preceding week had been changeable.
- Properties served by Private Water Supplies were contacted by post requesting information on the 28th August 2017. 30. Responses from residents were reviewed and are discussed in Section 7.6.7.
- Engineers from Arcus also conducted peat probing and site recognisance visits in May and June 2017. Information from these 31. visits has been used to inform this assessment and is detailed in Technical Appendix A7.1 of this Chapter.

7.4.2 Methodology for the Assessment of Effects

The methodology outlined in the following section has been has been developed by Arcus in consultation with several 32. regulatory bodies, including NIEA, DAERA, CCGBC, the Scottish Environment Protection Agency (SEPA) and the Environment Agency. As outlined in the Scoping Report, with no further comments raised by the Council in response to the Scoping Opinion, the assessment is based on a source-pathway-receptor methodology, where the sensitivity of the receptors and the magnitude of potential change upon those receptors identified within the Study Areas.

7.4.2.1 Sensitivity

- The sensitivity of the receiving environment is defined as its ability to absorb an effect without perceptible change and can be 33. classified as high, moderate or low. These classifications are dependent on factors such as the quality of the subsurface water within the receptor, their purpose (e.g. whether used for drinking, fisheries, etc.) and existing influences, such as land-use.
- These criteria are outlined in **Table 7.2** and are based on professional judgement and experience. 34.

Table 7.1: Receptor Sensitivity Criteria

Receptor Sensitivity	Sensitivity Description
High	 A large, medium or small waterbody with an NIEA water quality classification of 'High' or 'Good'. The hydrological receptor and downstream environment has limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes. 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). The receptor acts as an active floodplain or other flood defence. The receptor is located within an active flood plain, in accordance with PPS 15 2014. Groundwater Dependent Terrestrial Ecosystems (GWDTEs), as classified by UKTAG, which are classified as having "high groundwater dependency" have no functional impairment by man-made influence (such as drainage or forestry). Hydrological public water supply or private water abstractions. Abstractions used for the production of mass produced food and drinks. Areas containing geological or geomorphological features considered to be of national importance (e.g. geological ASSIs). Local groundwater constitutes a valuable resource because of its high quality and yield. Aquifer(s) of local or regional value. Statutorily designated nature conservation sites (e.g. SACs and ASSIs) dependent on groundwater. 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	 A large, medium or small waterbody with a NIEA water quality classification of 'Moderate'. The hydrological receptor and downstream environment will have some capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics / natural processes.

Receptor Sensitivity	Sensitivity Description
	 The hydrological receptor is of regional environmentation of the hydrological receptor does not act as a GWDTEs which are classified as having "high have functional impairment by man-made in GWDTEs which are classified as "moderate man-made influence (such as drainage or for Areas containing geological features of desi Geological/geomorphological Sites (RIGS), importance. Aquifer of limited value (less than local) as we uses. Exploitation of local groundwater is not be sensitive to groundwater effects. Pristine or active peat bog habitat; evidence that peat could recover to pristine status.
Low	 A large, medium or small waterbody with a l The hydrological receptor and downstream fluctuations in hydrochemistry but can absord characteristics / natural processes. The hydrological receptor is not of regional, The hydrological receptor is not designated GWDTEs which are classified as having "low UKTAG, but have functional impairment by The hydrological receptor does not act as an The hydrological receptor is not used for receptor does not support abstractions. Geological features or geology not protected Poor groundwater quality and / or very low p Changes to groundwater not expected to aff Degraded or inactive peat; small isolated arr grazed; shallow, evidence of widespread error in ongoing dewatering of peat.

7.4.2.2 Magnitude

Re

Se

The magnitude is determined by the timing, scale, size and duration of the potential effect resulting from the Development. The magnitude of potential effects can be classified as major, moderate, minor or negligible, as outlined in Table 7.2.

Γable 7.2: Criteria for Determining Magnitude					
Magnitude of Effect	Magnitude Description				
High	 A short or long term major shift in hydrocher change the ecology of the receptor. This chall classification by two classes e.g. from 'High A sufficient material increase in the probab which requires protection by flood prevention to attenuate the effects of flooding by storin A major (greater than 50%) or total loss of a be complete severance of a site such as to hydrological connectivity). 				

rironmental importance (such as Local Nature Reserves), as

- in active floodplain or other flood defence.
- gh groundwater dependency", as classified by UKTAG, but nfluence (such as drainage or forestry).
- ely groundwater dependent" have no functional impairment by orestry).
- ignated regional importance including Regionally Important considered worthy of protection for their historic or aesthetic

water quality does not allow potable or other quality sensitive ot far-reaching. Local areas of nature conservation known to

that peat body has an intact hydrological system or possibility

NIEA water quality classification of 'Poor' or 'Bad'. environment will have capacity to attenuate natural rb any changes without fundamentally altering its baseline

- national or international environmental importance.
- for supporting freshwater ecological interest.
- w or moderate groundwater dependency", as classified by man-made influence (such as drainage or forestry).
- n active floodplain or other flood defence.
- creational use.
- abstractions for public water supply or private water

d and not considered worthy of specific protection.

- permeability make exploitation of groundwater unfeasible.
- fect local ecology.
- eas of peat; soil not sensitive to change, e.g. degraded /
- osion. Significant active land drainage has occurred resulting

mistry or hydrological conditions sufficient to negatively ange will equate to a downgrading of a NIEA water quality ' to 'Moderate'.

ility of flooding onsite and offsite, adding to the area of land on measures or affecting the ability of the functional flood plain g flood water (in accordance with PPS).

a geological receptor or peat habitat site, or where there will fundamentally affect the integrity of the site (e.g. blocking

Magnitude of Effect	Magnitude Description
	 A major loss of (greater than 50% of study area) or total loss of highly dependent and high value GWDTE, or where there will be complete hydrological severance which will fundamentally affect the integrity of the feature. A major permanent or long term negative change to groundwater quality or available yield. A major permanent or long term negative change to geological receptor, such as the alteration of pH or drying out of peat. Changes to groundwater quality or water table level that will negatively alter local ecology or will lead to a groundwater flooding issue.
Medium	 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). A loss of part (approximately 5% to 50%) of a geological receptor or peat habitat site, major severance, major effects to its integrity as a feature, or disturbance such that the value of the site will be affected, but could still function. A loss of part (approximately 10% to 50% of study area) of a moderately dependent and moderate value GWDTE – significant hydrological severance affects the integrity of the feature, but it could still function. Changes to the local groundwater regime that may slightly affect the use of the receptor. The yield of existing supplies may be reduced or quality slightly deteriorated. Fundamental negative changes to local habitats may occur, resulting in impaired functionality.
Low	 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). A detectable but non-material effect on the receptor (up to 5%) or a moderate effect on its integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. A detectable effect on a GWDTE (loss of between 5% - 10% of study area) or a minor effect on a GWDTE's integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. Changes to groundwater quality, levels or yields do not represent a risk to existing baseline conditions or ecology. Small loss of soils or peatland, or where soils will be disturbed but the value not impacted. Short-term change to baseline resource. Small effect on a geological site or mineral deposit, such that the value of the site would not be affected.
Negligible ²⁷	 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. A slight or negligible change from baseline condition of geological resources. Change hardly discernible, approximating to a 'no change' in geological condition. Minimal detectable effect on a GWDTE (between to 0.1% - 5% of study area) or no discernible effect on its integrity as a feature or its functionality. Minimal or no change to soils or peatlands A very slight change from the baseline conditions. The change is barely distinguishable, and adopts a 'no-change' situation. Minimal or no change to a geological site or mineral deposit.

²⁷Negligible magnitude of change includes magnitude of effects that would be assessed as no change to the baseline scenario.

7.4.2.3 Significance

- 36. judgement, considering both the sensitivity of receptor and the magnitude of the potential effect as defined in Table 7.3.
- It is considered that there are no limitations to the assessment methodology used to identify potential hydrological effects 37 arising from the Development. Baseline conditions were ascertained through a site visit.

Fable 7.3:	Significance	Matrix
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Magnitude of Effect	Sensitivity of Receptor				
	High	Medium	Low		
High	Major	Major	Moderate		
Medium	Major	Moderate	Minor		
Low	Moderate	Minor	Negligible		
Negligible	Negligible	Negligible	Negligible		

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA 38. Regulations, and are shaded in light green in the above table.

7.4.3 Cumulative Assessment Methodology

- 38. A cumulative effect is considered to be an additional effect on hydrological resources arising from the Development in combination with other proposed developments (either under construction, consented but not built or at application stage) likely to affect the hydrological environment. At distances greater than 10 km, it is considered that schemes are unlikely to catchment and hydrological regime, only proposed developments within the Wider Study Area have been considered. These developments have been identified through consultation with the relevant local authorities and statutory consultees, and are discussed in more detail in Section 7.8.4 of this Chapter.
- The methodology followed to assess the cumulative effects is the same as that used for the Development in isolation. 40.

7.5 Assessment Limitations

All data considered necessary to identify and assess the potential significant effects resulting from the Development was 41. available and was used in the assessment reported in this Chapter.

7.6 Baseline Conditions

7.6.1 Topography and Land Use

- approximately 370 m AOD in the east of the Site then falling towards the west to a lower elevation of approximately 130 m AOD.
- Rough grazing was evident across much of the Study Area and the most easterly parts of the site were occupied by the 43. Operational Rigged Hill Windfarm infrastructure and rural upland habitat.

7.6.2 Climate

44. approximately 9 km 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 15 km east of the Development, reporting 1270 mm AAR (1961 - 1990).

The predicted significance of the effect is determined through a standard method of assessment and based on professional

contribute to a cumulative hydrological effect due to attenuation and dilution over distance of potentially polluting chemicals, as outlined in the Scoping Report. Therefore, for the purposes of the assessment of potential cumulative effects on the immediate

The Site is located to the west of Cam Forest and is situated on the ridge of Rigged Hill. The Site is located at an elevation of

The National River Flow Archive (NRFA) (reports Average Annual Rainfall (AAR) at the Roe at Ardnargle gauging station,

As monthly long term climate data is not freely available from the NRFA, long term average rainfall data (1981 to 2000) obtained by the Meteorological Office at the Portrush gauging station, approximately 23 km north-east of the Development, are presented in Table 7.5.

Table 7.5: Long term average rainfall data (1981 to 2000), Portrush gauging station.

Month	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	85.6	68.7	69.4	57.3	58.4	67.0	73.4	85.4	82.2	98.9	112.2	111.2

7.6.3 Solid Geology

The available online Geological Survey of Northern Ireland (GSNI)²⁸ information the underlying bedrock was indicated to belong to the Upper Basalt Formation comprising Paleocene aged Basalt. Within the western area, the rocks are shown as layered, comprising Hibernian Greensands Formation and Ulster White Limestone Formation, Mercia Mudstone Group and most westerly Sherwood Sandstone Group. These rocks consist of Chalk, Argillaceous Rock and Sandstone respectively. An extract of the solid geology is shown in Figure 7.2.

7.6.4 Superficial Geology

The available online Geological Survey of Northern Ireland (GSNI)²⁹ information indicates the majority of the Study Area to comprise glacial till with some areas of shallow rock expected. Peat is identified in the vicinity of the existing wooded areas and should be anticipated in low lying topographic areas. An illustration of the superficial geology is shown in Figure 7.3. This data was utilised to inform the peat assessment work within the Site.

7.6.5 Peat Investigations

- It has been recognised that the design of the Development is likely to be influenced by the presence of peat, both as a physical consideration in terms of stability and engineering properties, and as a habitat resource. Active peatland is identified as a priority habitat in accordance with the EC Council Directive 92/43/EEC Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive) which is implemented by law in Northern Ireland through Article 3 of the Planning (Northern Ireland) Order 1991 and Planning Policy Statement 18, August 2009 by Department of the Environment (DOENI)³⁰.
- Initial site surveys took place at a pre-scoping stage to ascertain the extent and nature of peat within the Study Area, through a robust investigation approach suitable to the identification of active peat characteristics. Initial desk-based research and coordination with the project ecologist defined extents of active, possibly active and not-active peat. This approach was discussed and agreed with NIEA in May 2017, the conclusions of the discussions, informed the enhanced Phase 1 peat probing and National Vegetation Classifications (NVC) survey, as discussed in Chapter 8: Ecology and Fisheries.

7.6.5.1 Enhanced Phase 1 Peat Investigations

- Acknowledging the influence that peat classification will have on Development design, an enhanced Phase 1 peat depth survey has been completed. A total of 294 probes were sunk during Phase 1 works and Figure 7.4 indicates the interpolated peat depths across the extent of survey. The Phase 1 study area was based on the initial NVC assessment to ensure the scope is aligned as closely as practicable to baseline conditions. The classification details are covered in Chapter 8: Ecology and Fisheries.
- Based on the initial NVC assessment, the enhanced peat survey was undertaken as follows: 51.
 - Likely active peat areas: Probes at 50 m spacing at the boundary with possibly active peat/transition zones and further probes within the active peat zone for verification;
 - Possibly active peat: 50 m peat probe and inspection grid; and
 - Not active peat: 100 m peat probe and inspection grid.

- The enhanced Phase 1 peat depth survey included a visual inspection of characteristics at or adjacent to each probe location, a photographic record, and the following data was recorded:
 - Peat depth;
 - Proximity to shallow (less than 0.3 m) or deep (greater than 0.3 m) surface water drainage; and Presence of common cottongrass (Eriophorum angustifolium) and the categorising of it as abundant, little or absent.

Peat was generally thickest to the east of the proposed access track, within the flatter topographic area at the top of Rigged Hill, as shown on Figure 7.4. This area showed key indicators of blanket bog and this is discussed in detail in Chapter 8: Ecology and Fisheries. The peat depths in this area were generally greater than 1.5 m. Thinner peat aligned with steeper topography, to the north, south and west of the existing wind farm infrastructure with much of the probing recording 0-0.5 m. Zones of peat with depths of between 0.5 m and 1.0 m were recorded locally.

7.6.5.2 Phase 2 Peat Investigations

- Following the interim design freeze, a further 817 probes were undertaken over two phases, concentrated on the site layout design (which is provided in Figure 3.2). The spacing of probing was between 10 m and 25 m centres covering the proposed track alignments and a micro-siting corridor either side to give an indication of any changes in depths, while capturing the turbine locations and other infrastructure.
- flatter topographic areas of Rigged Hill, particularly the most easterly area between the proposed T2 and T3. Pockets of deep peat, 1.5 m or greater, were recorded within the Site, specifically east of the proposed T1 and underlying a proposed track section between T5 and T6, which was subsequently revised to avoid this area. Thinner peat was recorded on the steeper topographic areas and in the area west of the existing windfarm spine road, where peat was consistently less than 0.50m. The peat depths and percentage of total probes which fall within these depths are summarised in Table 7.6 while Interpolated Peat Depths are shown on Figure 7.4.

Peat Depth Summary Peat Depth Summary Peat Depth France Percentage of Total Probes (%)				
0 – 0.50 m	813	73.2		
0.51 m – 1.00 m	174	15.7		
1.01 m – 1.50 m	46	4.1		
1.51 m – 2.00 m	54	4.9		
2.01 m – 3.50 m	24	2.1		
Total	1111	100		

As part of the 'active Peat Assessment' further field surveys were carried out by NM Ecology through National Vegetation Classification and a detailed quadrat survey at select locations. The details of this survey and assessment are included in Chapter 8: Ecology and Fisheries.

7.6.6 Peat Stability

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.

³⁰ Department of the Environment Northern Ireland (2009) accessed at: https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_18_ren ewable_energy.pdf

The findings from the Phase 2 peat probing were consistent with the Phase 1 findings with the deepest peat confirmed to the

²⁸ Geological Survey of Northern Ireland, Available online at: http://mapapps2.bgs.ac.uk/GSNI_Geoindex/home.html [Accessed on 23/06/2017] ²⁹ Geological Survey of Northern Ireland, Available online at: http://mapapps2.bgs.ac.uk/GSNI_Geoindex/home.html [Accessed on 23/06/2017]

- 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.
- Peat varies across the proposed Study Area ranging between 0.1 m and 3.1 m. However, significantly deep areas comprising 57 of peat in excess of 1.5 m were consistent in the area between T2 and T3 and east of T1. The final layout has been developed to utilise as much of the existing windfarm infrastructure as possible with proposed turbine locations and any new areas of infrastructure sited to avoid the deepest areas of peat.

A Peat Slide Risk Assessment is included in Technical Appendix A7.1.

7.6.7 Hydrogeology

The groundwater body under the Study Area is an unnamed waterbody within extrusive rocks of paleogene age, which is classified by the DAERA as a 'moderately productive aquifer'.

7.6.8 Surface Hydrology

- The Development is located in the overall catchments of the Castle River (a tributary of the River Roe) which is in the North West River Basin District and the Aghadowey River, which is located in the Neagh Bann River Basin District.
- A review of the River Basin Management Plan (RBMP) data indicates that there are two classified water bodies within the 60. Wider Study Area namely the Castle River and the Aghadowey River.
- The Castle River, located approximately 1.7 km to the west of the Study Area, is classified as possessing good overall status 61. while the Aghadowey River, located approximately 5.8 km east of the Study Area, is classified as having moderate overall status. The main watercourses and their catchments are shown in Figure 7.5.
- Minor unnamed watercourses drain the Development and discharge into Castle River, while the headwaters of Gamlaght 62 River issue approximately 250 m east of the Study Area before discharging into Curaghglass River, which in turn discharges into Aghadowey River.
- The Castle River discharges into the River Roe approximately 6.5 km north-west of the Study Area, which is designated as an 63. SAC for supporting otter and Atlantic salmon.
- The site walkover recorded the presence / absence of hydrological features and focused on the Development infrastructure 64. shown in Figure 7.5.
- Few natural drainage features are present in the vicinity of the existing windfarm. There are a number of drainage ditches and 65. minor ephemeral watercourses approximately 500 m to the west of the Study Area, which originate from marshy areas and channels on the shoulder of the topographical ridge which bisects the Study Area.
- A steeply incised tributary of Castle River was observed within the south-west section of the Study Area, which measures 66. approximately 2 m in width. Baseline hydrochemistry data was obtained from unnamed tributaries of Castle River, where they are culverted under Terrydoo road, by taking in-situ measurements using a hand-held water quality meter. The data suggests the watercourses to the west of the Site are typical of upland rural areas i.e. of good water quality with parameters within the expected ranges. Water quality information collected as part of the hydrological site walkover will be provided for use in the Fisheries Assessment.
- Figure 7.5 shows the main surface watercourses and their associated catchments within the Study Area. 67.

7.6.1 Surface Water Continuity

Surface watercourses within the Study Area appear to be relatively continuous and free from blockages.

7.6.2 Near-surface Water

- the peat assessment. Data has been collected on three occasions incorporating a wet period (periods of rainfall within the previous 14 days) and a dry period (little or no rainfall within the previous 14 days). Data are detailed in **Technical Appendix** A7.3. Dipwell locations are shown in Figure 7.6.
- 70 A number of bog water table metrics indicative of intact bog have been considered based on relevant literature and Arcus professional judgement based on experience of peatland restoration:
 - The water table should not be >20 centimetres (cm);
 - The water table should not be >10 cm except with the exception of sustained dry conditions; and
 - The water table should normally be sustained within 5 cm of the top of the acrotelm³¹.
- Results recorded during June 2017 showed 17 dipwells recorded water levels greater than 20 cm, three dipwells had water 71. levels between 10 cm and 20 cm depth, and 10 dipwells recorded water levels between 10 cm and 0 cm depth.
- During May 2018, no dipwells recorded depths greater than 20 cm depth. four dipwells recorded depths between 10 cm and 72 20 cm depth and 26 dipwells recorded depths of less than 10 cm.
- During June 2018, 20 dipwells recorded depths greater than 20 cm depth. Eight dipwells recorded depths between 10 cm and 20 cm depth and one dipwell recorded depths of less than 10 cm. Dipwell number 33 was not recorded during June 2018.
- Results recorded during wet periods (June 2017 and May 2018) show that areas in the west and south-west of the Study Area 74. have water tables greater than 20 cm in depth, as shown in Technical Appendix A7.3, suggesting that active accumulation of peat is not taking place at these locations as a result of modification to the hydrology of the Study Area caused by extensive drainage for agriculture.

7.6.3 Site Drainage

- A network of linear drainage ditches was observed in the southern section of the Study Area. Water was not observed within the ditches, suggesting the peat and superficial geology in these areas is well drained and the ditches convey near-surface water quickly in response to precipitation events.
- There are a number of drainage ditches 10 to 50 m to the east of the main Operational Rigged Hill Windfarm track on the ridge of Rigged Hill, all of which were dry at the time of the survey. One drainage ditch is culverted beneath the access track approximately 20 m north of existing turbine 6. The culvert is a circular 0.3 m concrete culvert which appeared visually to be in good condition.

7.6.4 Hydrological Regime and Surface Water Morphology

- Morphology is typical of upland watercourses, which are generally evenly dispersed through flat boggy ground from their 77. upper reaches, becoming increasingly steep and faster flowing as they progress downstream to the primary rivers.
- Site observations in the south of the Study Area indicate that morphology is relatively typical of dendritic drainage network 78 watercourses, which are steeper in their upper reaches and become increasingly flatter as they progress down slope.

7.6.5 Hydrological Function of Wetland Habitats

- A Phase 1 habitat survey was undertaken to identify wetland habitats occurring within the Study Area and surrounding 79 environment. Where wetland habitats were confirmed through Phase 1 survey, further detailed habitat assessment was undertaken, with identification of National Vegetation Classification (NVC) communities. The survey methods employed for this assessment are outlined in Chapter 8: Ecology and Fisheries.
- habitat and National Vegetation Classification (NVC) surveys.

Dipwells were installed by the Applicant during June 2017 in order to determine water levels in superficial deposits as part of

Figure 8.3 shows the location of wetland habitats in relation to the Development infrastructure, as identified from the Phase 1

³¹ Labadz et al, 2010. Peatland Hydrology. IUCN UK Peatland Programme. Available at: http://www.uplandhydrology.org.uk/wpcontent/uploads/2013/12/Review-6-Peatland-Hydrology_0.pdf. [Accessed 22/11/2017].

- Blanket Bog was identified on the crest of Rigged Hill and in the eastern section of the Study Area as detailed in Section 8.5.4 of Chapter 8: Ecology and Fisheries. Blanket bog is listed on Annex 1 of the EC habitats directive and blanket bog and wet modified bog are NI Priority Habitats.
- Blanket Bog is classified as having low dependence on groundwater in the UKTAG guidance on characterising Groundwater 82 Dependent Terrestrial Ecosystems (GWDTEs). GWDTEs are protected under Article 4 of the Water Framework Directive.
- The Blanket Bog identified on Site was described as having been significantly degraded by drainage and peat cutting. As 83. Blanket Bog typically occurs as part of ombrogenous systems and the habitat in the Study Area has been substantially degraded by man-made drainage and is not considered that there is potential for groundwater dependency. As such the hydrological function of bog communities is not considered further in this chapter.

7.6.6 Flooding

Flood Maps (NI) show that the Study Area is located outside floodplains for river and coastal flooding.

7.6.7 Public and Private Water Supplies

- Consultation with CCGBC, the DWI, NIW and local landowners has been undertaken to identify all public and private water supplies within the Private Water Supply Study Area.
- During consultation, CCGBC identified one abstraction for private water supply (PWS) within 2 km of the Study Area. A 86. questionnaire was sent to the occupier who confirmed the use of a PWS, the details of this supply are outlined in Table 7.6.
- Following discussions between the Applicant and landowners of properties east of Terrydoo Road, consultation was carried 87. out by questionnaire with residents. Responses have been received from two properties as outlined in Table 7.6 and shown in Figure 7.5.

Table 7.6 Private Water Supplies within 2km of the Study Area

Receptor	Source of Supply	In / outwith Development Catchment	Distance from Development	Comment
20 Terrydoo Road	Spring	Within Catchment	300 m north of Development boundary	Confirmed by resident of 20 Terrydoo Road
90 Terrydoo Road	Spring	Within Catchment	480 m west of access track between proposed T5 and T6	Confirmed by resident of 90 Terrydoo Road
Unknown Abstraction 1	Spring	Within Catchment	740 m west of proposed T6	Location Provided by Applicant
Unknown Abstraction 2	Spring	Within Catchment	900 m west of proposed access track between T6 and T7	Location Provided by Applicant

Each water supply will be assessed to determine if any potential significant effects are likely to occur as a result of the Development.

Designations and Fisheries 7.6.8

7.6.8.1 Designations

There are no statutory designations relating to water within the Study Area. There are 17 statutory designations relating to water within the Wider Study Area, identified through the use of NIEA GIS datasets and these are presented in Table 7.7.

able fill Otalatory	sesignations within the		
Designation	Distance from Development	Qualifying Interest	Hydrologically linked to Development?
Coolnasillagh ASSI	Approximately 2.7 km south-east	Purple moor-grass and rush pastures	No
Ballyrisk More ASSI	Approximately 3.1 km north	Purple moor-grass and rush pastures	No
Castle River Valley ASSI	Approximately 3.3 km south	Purple moor-grass and rush pastures, lowland meadow	No
Smulgedon ASSI	Approximately 3.6 km south	Purple moor-grass and rush pastures	No
River Roe and Tributaries SAC and ASSI	Approximately 3.8 km north	Atlantic Salmon and otters	Yes
Gortcorbies ASSI	Approximately 3.9 km north	Purple moor-grass and rush pastures	No
Brockagh Quarry ASSI	Approximately 4.4 km south-east	Scarce blue-tailed Damselfly	No
Ballymacallion ASSI	Approximately 6 km south	Purple moor-grass and rush pastures, Lowland meadow.	No
Aghanloo Wood ASSI	Approximately 6.7 km north-west	Mixed Ashwoods, wet woodland	No
Errigal Glen ASSI	Approximately 7.1 km south-east	Oakwood	No
Bovevagh ASSI	Approximately 8.4 km south-west	Pleistocene deltaic formation	No
Altikeeragh ASSI	Approximately 9 km north	Blanket Bog	No
Binevenagh ASSI and SAC	Approximately 9.1 km north	Inland rock, tertiary igneous. Calcareous grassland	No
Carn/Glenshane Pass SAC and ASSI	Approximately 9.3 km south	Blanket Bog	No

89. The hydrological designations are considered to be hydrologically disconnected from the Development (in terms of surface and sub-surface water effects, as development is proposed in areas that are hydrologically up-gradient) or are of sufficient distance to remain unaffected by the Development, with the exception of River Roe and Tributaries SAC and ASSI.

able 7.7 Statutory Designations within the Wider Study Area

7.6.8.2 Fisheries

- A fish survey was undertaken in September 2017 by Paul Johnston Associates and the report is provided in Chapter 8: 90 Ecology and Fisheries of this ES.
- 91 and trout river and has been designated as a SAC for Atlantic salmon. The Castle River is not included as part of the designation, as it carries a low stock of salmon which are restricted to lower reaches of the sub-catchment, although it does support a significant stock of brown trout. A recent Condition Assessments for the River Roe and Tributaries SAC have classified the salmon stock as of Favourable status (2007 & 2011). In terms of salmon spawning stock the Roe has significantly exceeded its conservation limit each year since 2007.
- 92 upstream waterbody (2045) was consistently classified as of Moderate Ecological Status in each year, while the downstream waterbody (2044) ranged from Poor to Good Ecological Status during this period. From 2015, the two waterbodies have been

The Development is located in the headwaters of the Castle River, a tributary of the River Roe. The River Roe is a key salmon

Under the WFD, the Castle River catchment was divided into two waterbodies during the first cycle of RBMPs (2009-14) - the

combined into a single unit (4061) which was assessed as of Good Ecological Status in 2015³². In each case classifications of less than Good status have been due to sub-standard benthic inverts and/or fish classification.

- The streams within the Study Area are very small in size and are on steep slopes, therefore it is highly unlikely that they would 93. support significant populations of fish or other aquatic fauna.
- The three streams draining the southern section of the Study Area merge to form a single stream complex within 2 km of the 94. site boundary. The most southerly stream flowing close to Temain Road is the most superior, in terms of fish habitat, of the six tributary streams draining the Study Area and is likely to be populated with trout along the southern edge of the site to within 1 km of the proposed windfarm infrastructure. The three northern streams are much smaller and unlikely to be populated with fish within the Study Area or in the immediate downstream reaches i.e. within 500 m of the Study Area. These three streams merge within 1.7 km of the Study Area to form a second stream complex which improves in quality and is of good fisheries potential and almost certain to contain trout in the area of Ballyavelin Road 2.5 km from the Study Area.

7.6.9 Assessment Limitations

All data considered necessary to identify and assess the potential significant effects resulting from the Development were available and used in the assessment reported in this Chapter.

7.6.10 Sensitivity of Receptors

The sensitivities of the identified receptors, and their relationship to the potential effects from the initial decommissioning/construction phases of the Development, are outlined in Table 7.8.

Table 7.8 Sensitivity of Hydrological Receptors

Receptor	Potential Effects	Sensitivity	Comment
Watercourses	Increased run-off, erosion and sedimentation, stream flow impediments and pollution as a result of decommissioning/construction groundworks and chemical handling / storage.	High	Considered High sensitivity as the Castle River ('good' overall status) discharges into the River Roe, which is designated as an SAC for Atlantic Salmon. (although the Aghadowey River is classified as having a 'moderate' overall classification).
Groundwater	Pollution as a result of erosion and sedimentation from decommissioning/construction activities and uncontained spills from chemical handling / storage.	High	Considered High sensitivity as hydrocarbon pollution in bedrock fissures has a lengthy attenuation period.
Near-surface water	Diversion of near-surface flows as a result of track construction and removal and the installation and removal of turbine foundations / hardstanding.	High	Considered High sensitivity as near-surface water supplies flow to the watercourses within the Study Area, which in turn discharge into the Castle River and Aghadowey River (classed as High sensitivity receptors).
Soils / Superficial geology (excluding peat)	Pollution as a result of track construction and chemical handling / storage.	Medium	Considered Medium sensitivity as the receptor has some capacity to filter and attenuate most potentially polluting chemicals and sediment over time.
Solid Geology (bedrock)	Loss of strata as a result of turbine excavations.	Low	Considered low sensitivity as the receptor is not designated or of limited resource across Northern Ireland and can function normally throughout all phases of the Development.
Peat	Pollution as a result of track construction and uncontained	High	Considered high sensitivity as the function of receptor could be permanently altered by

³² NIEA River Basin View. Available online at: <u>http://appsd.daera-ni.gov.uk/RiverBasinViewer/</u>

Receptor	Potential Effects	Sensitivity	Comment
	spills from chemical handling / storage. Drying out or destabilisation of peat as a result of construction activities.		construction activities or chemical impact effects. However, the receptor has some capacity to filter and attenuate most potentially polluting chemicals and sediment over time. Reinstatement / re-wetting of this receptor is possible.
Peat	Effect on active peat and carbon rich soils	High	
PWS	Pollution as a result of erosion and sedimentation from construction activities and uncontained spills from chemical handling / storage. Diversion / reduction of water supply as a result of track	High	Classed as High sensitivity in accordance with Table 7.6 of this Chapter.
	construction and the installation of turbine foundations / hardstanding.		

7.7 Embedded Mitigation

- Embedded mitigation measures are set out within the Outline DCEMP (provided as Technical Appendix A3.1). This 97. document is supplemented by the Water Construction and Environmental Plan (WCEMP), which will ultimately form part of the final DCEMP, provided as **Technical Appendix A7.2**, which sets out specific mitigation which relates to this Development. The WCEMP contains additional good practice methods that are established and effective measures focused of the hydrological environment. There is sufficient confidence in the effectiveness of the measures set out in both documents for them to be treated as part of the Development for the purposes of this assessment, and therefore embedded mitigation. The requirement of a DCEMP and WCEMP, secured as part of a planning condition, is considered standard practice for Developments of this nature. For ease of reference throughout this Chapter, reference to specific sections in the DCEMP and WCEMP, detailing the appropriate embedded mitigation measures, are provided.
- Accordingly, the identification of likely significant effects from the Development is considered following implementation of the 98 measures in Technical Appendix A3.1 and Technical Appendix A7.2. Effectively the measures outlined therein form an inherent part of the Development.
- 99. A buffer zone distance of 50 m has been established for proposed turbine bases and ancillary structures / infrastructure around watercourses (natural) mapped at a 1:50,000 scale at the Development. A buffer zone distance of 20 m has been applied to anthropogenic drains and smaller natural watercourses mapped at a 1:50,000 scale.
- 100. As described in Chapter 4: Site Selection and Design, disturbance and excavation of peat has been treated as a constraint during the design process. As a result the Development infrastructure will be sited in areas of little or no peat or in areas of previously disturbed ground where existing infrastructure for the Operational Rigged Hill Windfarm will be reused. Disturbance, excavation and management of peat are discussed in Technical Appendix A3.1.
- 101. The existing network of access tracks which serve the Operational Rigged Hill Windfarm have been utilised, where possible, limiting the requirement to disturb peaty soils to access the Development. The access tracks have been designed to avoid crossing watercourses, where possible. Further description of this is provided in Chapter 4: Site Selection and Design of this ES.
- The Outline DCEMP and WCEMP describes water management measures to control surface water run-off and drain hardstandings and other structures during the construction and operation of the Development. This will form part of a Pollution

Prevention Plan (PPP) to be implemented for the Development under planning condition, prior to the initial Decommissioning / Construction phases.

- The 50 m buffer zone of watercourses mapped at the 1:50,000 scale and 20 m buffer zone of drains and smaller watercourses, in conjunction with the measures set out in both the Outline DCEMP and WCEMP (provided as Technical Appendix A3.1 and Technical Appendix 7.2) will be sufficient to avoid potential effects on the hydrological and hydrogeological resource, as their effectiveness has been demonstrated on the Applicant's windfarm construction sites for which Arcus have provided technical advice for and for which there have been no pollution incidents where measures are implemented to standards outlined in CIRIA guidance.
- Conclusions state whether the residual significance will be major, moderate, minor or negligible, once appropriate mitigation (beyond that specified in the DCEMPs) has been implemented. This assessment relies on professional judgment to ensure that the effects are appropriately assessed.
- 105. A residual effect is considered to be a likely significant effect in accordance with the EIA Regulations if assessed as moderate or major following the preceding methodology.

7.7.1 Good Practice

- Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a PPP as described in Section 7.8., which will be incorporated into a full DCEMP, to be agreed with NIEA prior to the decommissioning/construction phases.
- The PPP will set out measures to be employed to avoid or mitigate potential effects for all phases of the Development, and will also include an Incident Plan to be followed should a pollution event occur. This plan will be produced following consultation and agreement with NIEA and all appropriate personnel working on the construction site will be trained in its use. The Construction Project Manager will have specific responsibility for implementation of the PPP.
- Method statements will also be applied, which will follow the principles laid out in the relevant GPPs and PPGs¹⁰. 108.

7.8 Assessment of Potential Effects

The effect of the Development on hydrological receptors has been considered for both the initial decommissioning/construction phases and the operational phase of the Development. Effects occurring during the decommissioning/construction phases are considered to be short term effects, with those occurring as a result of the operational phase of the Development being considered to be permanent, however these effects are reversible upon final decommissioning.

7.8.1 Potential Decommissioning/Construction Effects

- The nature and magnitude of effects that could result from decommissioning/construction activities, as described in Chapter **3:** Development Description, are assessed in the following paragraphs, which includes:
 - The upgrade of existing access tracks where necessary from the operational Rigged Hill Windfarm for the construction of the Development;
 - Establishment of temporary decommissioning/construction compounds comprising a hardstanding area, waste management area, temporary facilities and a fuel storage area;
 - Decommissioning of the operational Rigged Hill Windfarm; and
 - Construction of new access tracks where necessary, turbines and associated infrastructure and hardstandings for the Development.

7.8.1.1 Chemical Pollution

Potential effects involved with the management of decommissioning/construction are more a risk management issue, with the 111. effects being assessed should the risk be realised. Should the Development proceed as described in Chapter 3: **Development Description**, e.g., with no spills, there would be no effects.

https://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/wind_farms_and_groundwater_impacts-3.pdf [Accessed on 11/01/2019]

¹¹² Potential risks include the spillage or leakage of chemicals, fresh concrete, foul water, fuel or oil, during use or storage onsite. These pollutants have the potential to adversely affect soils, subsurface water quality, peat, surface water quality, and groundwater, and hence effects on the biodiversity of receiving watercourses.

7.8.1.1.1 Surface Hydrology

- Watercourses could be at risk from a pollution incident during initial decommissioning/construction phases. All surface watercourses and surface water bodies are considered to be of High sensitivity.
- Buffer distances between the proposed construction works and watercourses have been maximised to reduce the potential for 114 chemical pollutants to be transferred to the water environment. A 50 m buffer between watercourses and infrastructure (excluding watercourse crossings) and a 20 m buffer between man-made drains and smaller watercourses and infrastructure has been adopted.
- Appendix A7.2 will effectively limit the uncontained release of chemicals to minor fugitive releases. These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.
- have the potential to be of negligible magnitude and therefore (in accordance with Table 7.34) of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.1.2 Groundwater and Near-surface Water

- 117 chemical alterations to groundwater are difficult to rectify due to the fractured nature of the rock and the lengthy attenuation and dispersal of chemicals. As noted previously, due to the underlying superficial geology consisting of glacial till and peat, groundwater is unlikely to be present near the surface, meaning there is limited potential for pollutants to come into contact with groundwater.
- Measures such as spill pads, impermeable geotextile membranes and measures described within **Technical Appendix A7.2**: WCEMP will effectively limit the uncontained release of chemicals to minor fugitive releases. Therefore, effects on nearsurface water and groundwater have the potential to be of negligible magnitude for receptors of High sensitivity and therefore (in accordance with Table 7.34) of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.1.3 Private Water Supplies

- PWS could be at risk from a pollution incident during initial decommissioning / construction activities. All PWS within the catchment of the Development infrastructure are considered to be of High sensitivity.
- The source of 20 Terrydoo Road, as outlined in Table 7.6, is not within 250 m of proposed Development infrastructure and as 120. such falls outside the recommended buffer to infrastructure as detailed in the NIEA guidance on assessing the impact of developments on groundwater abstractions³³.
- access track as shown in Figure 7.5. These abstractions fall within the 250 m buffer to infrastructure, however the supplies are hydrologically upstream of the access track. As such there is no potential for pollution of these supplies as there is no pathway for pollution.
- Measures such as absorbent spill pads / kits and other measures highlighted within Sections 3 and 4 of the WCEMP found in Technical Appendix A7.2 will effectively limit the uncontained release of chemicals to minor fugitive releases, if at all. These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.

Measures such as absorbent spill pads / kits and other measures highlighted within the outline WCEMP found in Technical

Therefore, effects on these watercourses (of High sensitivity), and subsequently the River Roe and Tributaries SAC and ASSI,

Pollutants coming into contact with bedrock also have the potential to alter the quality of the groundwater resource. pH and

The source of 90 Terrydoo Road and the two unnamed abstractions are between 85 and 210 m east of the Development

³³ Wind Farms and Groundwater Impacts, Practice Guide. NIEA (2015). Available online at:

Therefore, effects on these PWS of High sensitivity, have the potential to be of negligible magnitude and therefore (in accordance with Table 7.4) of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.2 Erosion and Sedimentation

Erosion and sedimentation can occur from excavations, de-watering, ground disturbance and overburden stockpiling. Sediment entering watercourses has the potential to affect water quality, ecology and flood storage capacity.

7.8.1.2.1 Surface Hydrology

- Given the overland distance between construction areas and watercourses, any silt or other materials carried by overland flow 125. as a result of initial decommissioning/construction activities are likely to be entrained in vegetation and man-made drainage ditches (in the absence of intervening good practice measures) before reaching watercourses. Measures such as check dams, silt traps, settlement lagoons and buffer strips will minimise sedimentation and erosion; further details of these measures are outlined in Sections 2, 5 and 6 of Technical Appendix A7.2.
- Other Sustainable Drainage System (SuDS) measures, such as the use of settlement lagoons, swales and interception bunds, will effectively prevent sediment entering watercourses via drainage ditches adjacent to access tracks. As such, there will be limited potential for sediment or erosion effects on watercourses in the Study Area, including the hydrology and water quality of offsite watercourses and subsequently the River Roe and Tributaries SAC and ASSI.
- 127. For these reasons, the magnitude of this effect will be negligible. Given the High sensitivity of the watercourses and negligible magnitude of effects, the significance of effects associated with erosion and sedimentation is assessed as being negligible. This is not significant in terms of the EIA Regulations.

7.8.1.2.2 Groundwater and Near Surface Water

- Sediment also has the potential to change near-surface water flow in superficial geology deposits and peaty soil 128 characteristics by creating a physical barrier within naturally occurring drainage micropores. Sediment entering near-surface water in superficial deposits also has the potential to impact on groundwater quality within bedrock deposits / fissures.
- Measures described in **Technical Appendix A7.2**, such as impermeable ground membrane layers and bunded areas, will effectively prevent sediment entering sub-surface water in superficial deposits (and groundwater) and peat. For these reasons, the magnitude of this effect will be negligible. Given the High sensitivity of near-surface water and groundwater and negligible magnitude of effect, the significance of the effect associated with erosion and sedimentation is considered to be minor. This is not significant in terms of the EIA Regulations.

7.8.1.2.3 Private Water Supplies

- The quality of PWS could be affected by sediment mobilisation. All PWS within the catchment of proposed Development infrastructure are considered to be of High sensitivity.
- Measures detailed in Technical Appendix A7.2 will limit the potential for the mobilisation of sediment and safeguard the 131. water environment. PWS at 90 Terrydoo Road and the two unnamed PWS detailed in Table 7.6 fall within 250 m of Development infrastructure. They are however hydrologically disconnected from the access track. Vigilance will be maintained during track construction to avoid damage to any PWS infrastructure.
- Therefore, effects on PWS of High sensitivity, have the potential to be of negligible magnitude and therefore (in accordance with Table 7.4) of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.3 Impediments to Flow

- The access tracks will require the installation of five new watercourse crossings across all sections of the Development. Additionally, the upgrade of the existing access tracks which serve the operational Rigged Hill Windfarm will involve upgrade of the existing watercourse crossings (where necessary) as shown in Figure 7.5, therefore minimising the potential for impediment to flow created by additional new crossings.
- The minimisation of the number of proposed watercourse crossings and the upgrade of the existing watercourse crossings 134. reduces one of the main activities that could give rise to impediment of flows. Additionally, measures described in Section 6.4 of Technical Appendix A7.2, such as the use of a wide bottomless-arched culverts, where appropriate, are likely to prevent impediments to flow being created. Detailed design will be carried out at the construction phase and will be agreed with NIEA.

Therefore, the effects on watercourses of High sensitivity are considered to be of negligible magnitude and, therefore of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.4 Changes in Soil and Peaty Soil Interflow Patterns

Some turbine base excavations may need temporary sub-surface water controls, such as physical cut-offs or de-watering. These temporarily divert flows away from the excavation, and temporarily lower the local water table and sub-surface water levels in peat. Localised temporary changes to soil and peat interflow patterns may therefore arise. Turbine foundations and crane hardstandings also have the potential to change sub-surface water flow by creating physical barriers within naturally occurring drainage macropores in soil or peat.

7.8.1.4.1 Soils

- The drying out of peaty soil can result from alterations to the natural drainage regime. Measures set out in the Section 8 of Technical Appendix A7.2, 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.
- Consequently, effects on soil (Medium sensitivity receptor) are considered to be of negligible magnitude and therefore negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.4.2 Groundwater and Near-surface Water

- No substantial impediments to near-surface water flow will be created as the detailed site drainage design will take into 139. account any severance of saturated areas to ensure hydrological connectivity is maintained, in accordance with SEPA / SNH 'Good practice during wind farm construction'.
- Consequently, effects on Groundwater and Near Surface Water (High sensitivity receptors) are considered to be of negligible magnitude and therefore negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.4.3 Private Water Supplies

- The quantity of PWS could be affected by changes in groundwater interflow patterns as a result of de-watering or the impact of turbine foundations and hardstandings on subsurface flow. PWS within the Development catchment are supplied by groundwater springs. All PWS within the catchment of proposed Development infrastructure are considered to be High sensitivity.
- Should dewatering be required measures detailed in Section 7.2 of the WCEMP will maintain flow paths.
- Therefore, effects on these PWS, of High sensitivity, have the potential to be of negligible magnitude and therefore (in 143. accordance with Table 7.4) of negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.5 Bedrock Excavation

The development of new access tracks, hardstandings, substation and compounds may result in a small quantity of rock being excavated from within the Development footprint. However, construction materials will be imported and borrow pits are not proposed. Therefore, in the context of the geological resource, any extraction volumes are small and for this reason, the magnitude of the loss of bedrock will be negligible.

Given the low sensitivity (as set out in Table 7.9) and negligible magnitude of effect, the significance of effects associated with the loss of bedrock is negligible. This is not significant in terms of the EIA Regulations.

7.8.1.6 Peat Disturbance

The Development layout has been designed to ensure that infrastructure is located within the shallowest peat areas possible, utilising as much of the existing infrastructure as possible. Considering the peat depths recorded and the active peat assessment, only T2 and associated infrastructure, and localised track widening, lies within the vicinity of deep and active peat. The proposed T2 and associated foundation and hardstanding area is located within an area of an existing turbine foundation and hardstanding. This area of existing infrastructure can be re-used, and supplemented by widening of existing

infrastructure at the existing levels, which will constitute a large part of the proposed construction works. Additionally, while there is deep and active peat noted surrounding this turbine position, the turbine itself is located in an area where peat depths were recorded as less than 1.0 m in depth.

- The assessment of peat disturbance has highlighted localised areas of deep peat and active peat could be at risk from the Development, in particular the area of T2. The magnitude of effect is considered to be low due to the potential for disturbance being a 'Small loss of soils or peatland, or where soils will be disturbed but the value not impacted'.
- On this basis, through design and site layout considerations, the Development is considered to result in a minor significance in 146. accordance with the EIA Regulations. Implementation of the specific mitigation and compensation proposed as part of the Draft HMP and adoption of best practice methods as included in the PMP (Technical Appendix A7.4) and Draft HMP (Technical Appendix A3.2) would further reduce the effect.

7.8.1.7 Peat Destabilisation

- Peat instability is generally the result of a combination of causative factors. Several construction 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.
- 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.
- Due to the presence of peat, a PSRA was undertaken and is included in Appendix A7.1. This PSRA was carried out in accordance with the Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, 2017,
- Peat slides can affect soils and local sensitive habitats and have the potential to affect surface water systems from soil inundation, leading to sedimentation. This can have an effect by reducing water quality and/or modify drainage patterns. Receptors identified across the Study Area are:
 - Active Peat: •
 - Existing windfarm infrastructure;
 - Existing minor watercourses; and
 - Proposed windfarm infrastructure.
- Within the Development footprint, the assessment concluded the majority of the Development infrastructure lies in an area of 'negligible risk' or 'low risk'. On this basis, in the absence of mitigation, the Development is considered to result in a potential effect of negligible significance and would therefore be not significant, in accordance with the EIA Regulations.
- Good practice measures are embedded in the design principles and adoption of further best practices, will reduce any effect of peat instability.
- 153. Details of peat destabilisation are included in Technical Appendix A7.1 Peat Slide Risk Assessment.

7.8.1.8 Increase in Runoff and Flood Risk

7.8.1.8.1 Increase in Runoff

The increase in hardstanding area associated with the initial decommissioning/construction phases and during the operation of the Development could increase the rate of localised surface run-off, although a large proportion of the proposed infrastructure, including access tracks and crane hardstandings, would be permeable to some extent. The impermeable nature of the thin soils onsite and the underlying geology, however, means that, in the baseline scenario, there will be relatively low infiltration and relatively high run-off rates, and hence the addition of the Development when considered against the existing baseline conditions, would have minimal effect on the existing run-off scenario.

- Measures, including SuDS measures, to attenuate run-off and intercept sediment prior to run-off entering watercourses are described in Section 2 of Technical Appendix A7.2 and form an inherent part of the Development.
- For these reasons, the effect on watercourses of High sensitivity are considered to be of negligible magnitude and therefore 156. negligible significance. This is not significant in terms of the EIA Regulations.

7.8.1.8.2 Flood Risk

- No construction compounds, substations or meteorological masts are located within areas described as being at risk of flooding by the published NI Flood Maps³⁴.
- 158. bases of 50 m, meaning any overtopping of minor watercourses is unlikely to reach infrastructure during extreme flooding events.
- As such, the Development is not considered to be at risk of flooding and is unlikely to contribute to the displacement of pluvial flood water.
- For these reasons, the effect on watercourses of High sensitivity is considered to be of negligible magnitude and therefore 160 negligible significance. This is not significant in terms of the EIA Regulations.

7.8.2 Potential Operational Effects

- Potential effects associated with the operation of the Development are:
 - Increased run-off rates and volume:
 - Continued erosion and sedimentation from runoff from areas of hardstanding;
 - Alterations to natural flow pathways from runoff from areas of hardstanding; and
 - A risk of a pollution event from minor spills from maintenance vehicles.
- The nature of these effects has been discussed in relation to the initial decommissioning / construction phases. 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.
- There will be a minor reduction in the potential for increased surface water run-off during the operational phase due to the reduction in hardstanding areas used during the initial decommissioning / construction phases, such as the removal of the construction compounds. Construction compounds may be temporarily reinstated to support future activities as required. The impact of reinstatement of these areas on runoff will be minimal.
- 164. decommissioning/construction phases 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 Outline DCEMP, such as cross drainage, use of shallow drainage ditches and prevention of blockages.
- As a result, the magnitude and significance of all effects associated with operation of the Development are assessed as being 165. negligible, and not significant in terms of the EIA Regulations.

7.8.3 Mitigation and Residual Effects

- Technical Appendix A7.2. The embedded mitigation and construction good practice measures are based on experience of providing detailed site design for several windfarm developments across the UK, in consultation with bodies such as NIEA, SEPA and the Environment Agency.
- With the embedded mitigation measures described in Technical Appendix A7.2, all identified potential effects have been 167. assessed as being of negligible significance. The embedded mitigation measures proposed are established measures that

The design process, resulting in the Development layout has incorporated a buffer zone between watercourses and turbine

Whilst alterations to natural flow pathways will not be introduced during the operational phase, any changes during the initial

Embedded mitigation measures and construction good practice measures are summarised in Section 7.7 and included in

³⁴ Flood Maps NI (2016). Available online at: https://www.infrastructure-ni.gov.uk/topics/rivers-and-flooding/flood-maps-ni [Accessed 11/01/2019].

are widely used in construction projects and which the Applicant and its contractors are well used to undertaking. Given the levels of certainty in the success of application of the mitigation measures and their effectiveness it is appropriate that these form an inherent part of the Development and are taken into account and assumed to be fully effective in the determination of this application.

^{168.} No significant residual effects are predicted for all phases of the Development, and are therefore **not significant** in terms of the EIA Regulations.

7.8.4 Assessment of Cumulative Effects

- ^{169.} The methodology followed to assess the cumulative effects is the same as that used for the Development in isolation.
- A cumulative effect is considered to be an additional effect on hydrological resources (within the same hydrological catchment) arising from the Development in addition to the combination of other developments likely to affect the hydrological environment. At distances greater than 10 km, it is considered that schemes are unlikely to contribute to a cumulative hydrological effect due to attenuation and dilution over distance of potentially polluting chemicals. Therefore, for the purposes of the assessment of potential cumulative effects on the immediate catchment and hydrological regime, only proposed developments, which require large scale construction / excavation, within approximately 10 km of the Development have been considered. Single wind turbine developments have not been included in the cumulative assessment due to the limited potential for decommissioning, construction or operational effects.

7.8.4.1 Cumulative Developments within 10 km (consented or under construction)

- The following cumulative developments have been identified within the Wider Study Area:
 - Craiggore windfarm (consented) 3 km south-east of the Development;
 - Upper Ballyrogan windfarm (consented) 3.5 km south-east of the Development;
 - Evishagaran windfarm (consented) 10 km south of the Development; and
 - Smulgedon windfarm (under construction) 4 km south of the Development.
- ^{172.} Operational windfarms (Brockaghboy, Dunmore, Dunbeg, Glenconway, Altahullion I and Altahullion II) are considered to form part of the baseline for the purposes of cumulative assessment.

7.8.4.2 Predicted Cumulative Effects

- The greatest potential for cumulative effects arises when the construction phase of another development overlaps with the initial decommissioning and construction phases of the Development. Cumulative effects are considered to have the potential to be significant only where such an overlap may exist, as activities that could be potentially detrimental to the hydrological environment are greatly reduced during the operational phase of developments (e.g., excavation works, concrete pouring etc.).
- 174. Smulgedon Windfarm is located in the overall catchment of the River Roe, however Smuldegon Windfarm is currently under construction. The Development is not scheduled to commence construction until 2023. Assuming an 18 month construction period for Smulgedon Windfarm there would be no overlap in construction periods and therefore no potential for in combination effects.
- ^{175.} Evishagaran Windfarm is located approximately 10 km from the Development at the limit of the Wider Study Area. At this distance it is considered that the potential for any cumulative effects is negligible due to the potential for dilution and dispersion of chemicals and sediment in the water environment.
- ^{176.} Implementation of the measures detailed in the WCEMP, provided as **Technical Appendix A7.2**, mean that the magnitude of any potential effects from the Development have been assessed as negligible as detailed in paragraphs 109 to 160 of this Chapter. Furthermore, it is assumed that cumulative developments will implement similar measures as required by NIEA.
- 177. It is anticipated that there will be a minor reduction in the potential for increase in run-off rates during the operational phase of the identified wind farm developments, when compared to the construction phase, due to the reduction in overall hardstanding areas post-construction. Therefore, the magnitude of cumulative effects during the operational phase will be negligible, and the significance of these effects will also be negligible, being **not significant** in terms of the EIA Regulations.

- 178. Effects during the decommissioning phase are likely to be the same or less than during the construction phase.
- ^{179.} Given the reasons outlined, the magnitude of cumulative impacts during the initial decommissioning / construction and operational phases will be negligible and therefore, of negligible significance. This is **not significant** in terms of the EIA Regulations.
- 180. Upper Ballyrogan Windfarm and Craigore Windfarm are both located within separate surface water catchments to the Development. Both Ballyrogan and Craigore Windfarms are in the overall catchment of the River Bann which is hydrologically disconnected from the Development and therefore there is no potential for in combination effects to occur.

7.8.4.3 Residual Cumulative Effects

181. No significant residual cumulative effects are predicted.

7.8.5 Summary of Effects by Receptor

^{182.} This section, and **Table 7.9**, provide a summary of predicted effects for each receptor type in turn, including the incombination, or inter-relationship, effects of different effect pathways on the same hydrological receptor.

7.8.6 Watercourses

183. All effects on watercourses are assessed as being negligible, given the embedded mitigation.

7.8.7 Groundwater and Near-Surface Water

^{184.} All effects on groundwater and near-surface water are assessed as being negligible, given the embedded mitigation.

7.8.8 Soils

All effects on soils are assessed as being negligible, given the embedded mitigation.

7.8.9 Peat

186. Effects on peat are assessed as being low, given the embedded and specific mitigation and compensation proposed.

7.8.10 Private Water Supplies

- 187. All effects on PWS are assessed as being negligible, given the embedded mitigation.
- ^{188.} The overall effect, being the combination of these effects, is also assessed as being negligible.

Table 7.9 Summary of Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Significance	
Initial Decommiss	Initial Decommissioning/Construction phases				
Watercourses, Groundwater and Near- surface water	Chemical Pollution	Negligible	None	Negligible	
PWS	Chemical Pollution	Negligible	None	Negligible	
Watercourses, Groundwater and Near- surface water	Erosion and Sedimentation	Negligible	None	Negligible	
PWS	Erosion and Sedimentation	Negligible	None	Negligible	
Watercourses	Impediments to Flow	Negligible	None	Negligible	

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Significance
Groundwater and Near- surface water	Changes in Groundwater Interflow Patterns	Negligible	None	Negligible
PWS	Changes in Groundwater Interflow Patterns	Negligible	None	Negligible
Watercourses	Increase in Run- off and Flood Risk	Negligible	None	Negligible
Peat	Peat Disturbance	Medium/Low	Best Practice Measures for management and storage of peat and peaty soils. Compensation through localised peat bog restoration and implementation of remediation/compensation in line with the measures outlined with the Draft HMP.	Low
Peat	Peat Stability	Low/Negligible	Implementation of drainage measures in accordance with best practice. Best Practice Measures for avoiding peat and the management of peat and peaty soils.	Negligible
Operation	1	1		I
Watercourses	Increase in Run- Off and Flood Risk	Negligible	None	Negligible
Watercourses, Groundwater and Near- surface water	Erosion and Sedimentation	Negligible	None	Negligible
PWS	Erosion and Sedimentation	Negligible	None	Negligible
Groundwater and Near- surface water	Changes in Groundwater Interflow Patterns	Negligible	None	Negligible
PWS	Changes in Groundwater Interflow Patterns	Negligible	None	Negligible
Watercourses, Groundwater and Near- surface water	Risk of a Pollution Event from Minor Spills from	Negligible	None	Negligible

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Significance
	Maintenance Vehicles			
PWS	Risk of a Pollution Event from Minor Spills from Maintenance Vehicles	Negligible	None	Negligible

7.8.11 Statement of Significance

- cumulative effect of similar developments within the Wider Study Area. The Development has been assessed as having the potential to result in effects of negligible significance.
- ^{190.} Given that only effects of moderate significance or greater are considered significant in terms of the EIA Regulations, the potential effects on hydrology and hydrogeology are considered to be **not significant**.

189. This Chapter has assessed the likely significance of effects of the Development on hydrology and hydrogeology as well as the

8 Ecology and Fisheries

8.1 Introduction

This Chapter of the Environmental Statement (ES) evaluates the effects of the Development on ecosystems and their components, including designated sites, habitats, flora and fauna. The chapter was written by NM Ecology Ltd, supported by a specialist fisheries / aquatic ecology assessment by Paul Johnston Associates. The assessment considers the potential effects of the Development during the following development stages:

- Decommissioning of the Operational Rigged Hill Windfarm (initial phase of the Development); ٠
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development; and
- Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly 2. in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worstcase scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- This Chapter of the ES is supported by the following Technical Appendix documents provided in Volume 3 Technical 3. Appendices:
 - **A8.1** Habitat and Peat Assessments; A8.2 Habitats Regulations Assessment; A8.3 Bat Report; A8.4 Bat Monitoring and Mitigation Strategy; and A8.5 Fisheries Report.
- This Chapter includes the following elements: 4.
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria; ٠
 - Baseline Description;
 - Assessment of Potential Effects; ٠
 - Mitigation and Residual Effects; ٠
 - Cumulative Effect Assessment;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary. ٠

Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4. 5.

8.2 Legislation, Policy and Guidance

- The assessment has been prepared in accordance with the Guidelines for Ecological Impact Assessment in the UK and 6. Ireland: Terrestrial, Freshwater, Coastal and Marine¹, which is the primary resource used by members of the Chartered Institute of Ecology and Environmental Management (CIEEM).
- The key legislation relating to nature conservation in Northern Ireland is as follows: 7.
 - Wildlife and Natural Environment Act (Northern Ireland) 2011;

- Environment Order (Northern Ireland) 2002;
- Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995;
- Nature Conservation and Amenity Lands Order 1985;
- Wildlife (Northern Ireland) Order 1985; and •
- Fisheries (Northern Ireland) Act 1966.

In addition, the following policy has been considered: 8.

- The Northern Area Development Plan 2016;
- Department of the Environment: Planning Policy Statement 2: Natural Heritage;
- Department of the Environment: Practice Guide: NI Biodiversity Checklist; •
- Department of the Environment: Standing Advice documents for relevant taxa; and
- Northern Ireland Environment Agency: Survey Specifications for Bats, Badgers, Habitats, Common Lizard, Smooth Newt.

8.3 **Assessment Methodology and Significance Criteria** 8.3.1 Scoping Responses and Consultations (Heading 3)

Consultation for this EIA topic was undertaken with the organisations shown in Table 8.1. Full responses to the request for a Scoping Opinion are provided in Technical Appendix A2.2.

Table 8.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Northern Ireland Environment Agency, Natural Environment Division	Meeting 31/05/17	Scoping in relation to peat and bats.	The methods for assessments of peat and bats were revised accordingly.
Department of Agriculture, Environment and Rural Affairs, Sea Fisheries Division	Written 28/09/2017	Expectations for work in the vicinity of watercourses	Pollution-prevention measures are included in this chapter and in Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat .
Shared Environmental Services, Mid and East Antrim Borough Council	Written 02/10/2017	Scoping in relation to indirect effects on designated sites.	Potential effects on designated sites are addressed in this chapter, including potential hydrological effects on distant sites.
Forest Service, Grants and Regulations Branch	Written 06/10/2017	Information on forestry and ecological records from the surrounding area, including Cam Forest, birds and designated sites	These records have been considered during the preparation of the EcIA and associated reports. No forests will be affected by the Development.
Northern Ireland Environment Agency, Natural Environment Division	Written 17/01/2018	Formal response to Scoping report, and comments on issues that should be addressed in the ES.	The comments have been taken into account during the preparation of the EcIA and associated reports.
Northern Ireland Environment Agency, Natural Environment Division	Meeting 04/12/18	Discussion of peatland habitats, habitat management, and bats.	Feedback from the NIEA-NED has assisted with the preparation of the EcIA.

8.3.2 Scope of Assessment

- Following desk studies, field surveys and consultation undertaken to date, the following non-avian ecological receptors have 10 been scoped in to the EcIA:
 - Direct effects on active peat and Northern Ireland Priority Habitats during construction and decommissioning works;

¹ Chartered Institute of Ecology and Environmental Management, 2018. Guidelines for Ecological Impact Assessment in the U.K and Ireland: Terrestrial, Freshwater, Coastal and Marine, C.I.E.E.M., Hampshire, England.

- Possible direct effects on foraging / commuting bats during the operation of the Development; ٠
- Possible direct effects on badger setts during the construction and decommissioning works; and ٠
- Possible indirect effects on fisheries and other aquatic fauna in the River Roe catchment, and on the 'River Roe and Tributaries' Special Area of Conservation (SAC).

8.3.3 Elements Scoped Out of Assessment

- All effects on non-avian ecological receptors other than those set out in Section 8.3.2 have been scoped out of the EcIA, on the basis that they will not receive significant effects or they are absent from the Study Area. In particular, the following potential receptors have been scoped out of the EcIA:
- Any designated sites other than those discussed above; ٠
- Upland acid grassland and improved grassland habitats;
- Rare or protected flora;
- All terrestrial mammals other than badger; ٠
- Common lizards and smooth newts; .
- Marsh fritillary butterflies or any other protected / priority invertebrates; and
- Direct effects on fisheries and other aquatic fauna.

8.3.4 Study Area

- Potential indirect effects on designated sites of international importance (Natura 2000 sites) and national importance (Areas of Special Scientific Interest (ASSIs), and National Nature Reserves (NNRs) were considered within a Study Area of 15 km, measured from the centre of the Site. Potential indirect effects of Sites of Local Nature Conservation Importance (SLNCIs) were considered within a Study Area of 5 km from the centre of the Site. Biological records from public databases (e.g., the National Biodiversity Atlas) were considered within 5 km of the centre of the Site. These are shown on Figure 8.1 and 8.2.
- The Study Area for most habitats, flora and fauna consisted of the Indicative Developable Area at the time of Scoping, i.e. all 13. areas under consideration for the Development, with a buffer zone of up to 200 m for relevant species. The Study Area for fisheries included downstream watercourses, notably the Castle River and River Roe. Other ecological features encountered incidentally outside the Study Area (e.g., badger setts) have also been included in this assessment.

8.3.5 Design Parameters

All relevant aspects of the design of the Development are outlined in Chapter 3: Development Description. 14.

Methodology 8.4

- This assessment has been developed using the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance, which provides a transparent and robust approach for ecological impact assessments, using the following stages:
 - Collation of baseline ecological information through desk study and field surveys: ٠
 - Identification of Important Ecological Features (IEFs) including designated sites, protected / priority species and habitats; Identification and characterisation of effects on IEFs including positive or negative, extent, magnitude, duration, timing,
 - frequency and reversibility;
 - Assessment of cumulative effects;
 - Proposals for design and mitigation measures to avoid and/or minimise effects on IEFs;
 - Assessment of residual effects following the implementation of design and mitigation measures; and
 - Identification of appropriate compensation measures to offset significant residual effects and opportunities for ecological enhancement.

8.4.1 Desk Study

A desk-based scoping study was carried out using data from the following sources:

- Plans and specifications for the Development; •
- Designated sites from the Northern Ireland Environment Agency website;
- Records of flora and fauna obtained from the Centre for Environmental Data and Recording and the National Biodiversity Atlas: and
- Records of bat roosts and activity obtained from the Northern Ireland Bat Group.

8.4.2 Field Surveys

- Where possible, peatland habitats and any other Northern Ireland Priority Habitats were classified using the National Vegetation Classification (NVC)³ system. Flora were identified using New Flora of the British Isles⁴, The Vegetation Key to the British Flora⁵, and Mosses and Liverworts of Britain and Ireland⁶. Nomenclature follows the plant crib of the Botanical Society of the British Isles⁷. In most cases the abundance of species was categorised using the DAFOR (Dominant, Abundant, Frequent, Occasional, Rare) scale, but for detailed habitat assessments the DOMIN scale was used.
- Surveys for protected / priority fauna were undertaken during the walkover surveys, and the suitability of the habitat for other protected / priority fauna was assessed. All such surveys were undertaken with reference to the Northern Ireland Environment Agency's survey specifications.

8.4.3 Active Peat Assessments

- In recognition of the high importance afforded to active peatland in the Department of the Environment's Planning Policy Statement 18: Renewable Energy (2012) and the Strategic Planning Policy Statement for Northern Ireland: Planning for Sustainable Development (2015), detailed assessments were undertaken for any habitats that could qualify as 'active peat'. It is acknowledged that the classification of active peat habitats can be complex, particularly in disturbed habitats and around the margins of peatland bodies, so a bespoke classification system has been developed for this Development, in order to provide a systematic and transparent approach. The first step involved classifying habitats into three categories, as follows:
 - Active peat: these areas supported the NVC M19 community, had a peat depth of >1 m, and intact hydrology;
 - Possible active peat: these areas supported modified blanket bog (including drained / oxidised areas on deep peat), wet heath or heath - mire transition habitat, and peat depths of >0.5 m; or
 - hydrological regime.
- Further assessments and fine-scale mapping were undertaken within the 'active peat' and 'possible active peat' zones, based 20. on the presence of indicator plant species, the depth of the underlying peat layer, and the hydrological condition of the peatland unit (based on the NIEA-NED Guidance note on Active Peat⁸). Further detail of the approach to peat surveys is outlined in Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat.
- Initial habitat and peat assessments were carried out at the locations of all proposed turbines and hardstands in order to 21. characterise the habitat. This comprised five randomly-located quadrats (of 1 m x 1 m dimensions) across the extent of the hardstand and access tracks. A patchwork of active peat was observed at the at the proposed locations of T1 and T3, so an additional 25 guadrats (providing 30 in total) were taken within the footprint of the hardstand and access track, in order to determine whether or not the majority of the area was active peat. The following data was collected for each quadrat:
 - Peat depth, accurate to 0.1 m;
 - The coverage of vascular plants and bryophytes, measured using the DOMIN scale;
 - The cover of each Sphagnum and Eriophorum species, and their combined total;
 - Cover of atypical plants (e.g. grasses, rushes) and bare peat; •
 - Hydrological condition, including anthropogenic modifications (e.g. vertical peat banks caused by turf cutting or erosion), • and micro-topographical features (hummocks and hollows); and

⁵ Poland, J., Clement, E., 2009. The Vegetation Key to the British Flora. John Poland and the Botanical Society of the British Isles, Southampton

⁶ British Bryological Society, 2010 (eds Atherton, I., Bosanquet, S., & Lawley, M.). Mosses and Liverworts of Britain and Ireland – a field guide. British Bryological Society, UK.

⁷ Botanical Society of the British Isles, 2007. Plant species nomenclature checklist. Botanical Society of the British Isles, Southampton ⁸ NIEA 2012. Development Management Team Advice Note: Active Peatland and PPS18

Habitat surveys were carried out using the methods and classification system of the Handbook for Phase 1 habitat survey².

Not active peat: these areas did not support heath or bog vegetation, had a peat depth of <0.5 m, and/or a highly-modified

² Joint Nature Conservation Committee (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit. JNCC, Peterborough, UK

³ JNCC 2001 (eds Elkington, T., Dayton, N., Jackson, D.L., Strachan, I.M.). National Vegetation Classification: field guide to mires and heaths. JNCC, Peterborough, UK.

⁴ Stace, C., 2010. New Flora of the British Isles, 3rd Edition. Cambridge University Press
• A decision on whether or not the habitat could be classified as active peat, and a rationale for the decision.

8.4.4 Bats

- Bat surveys were scoped using the 3rd edition of the Bat Conservation Trust (BCT) (2016) guidelines⁹, with reference to Chapter 10 of the BCT (2012) guidelines¹⁰ regarding assessments of windfarm developments. It is noted that the BCT (2016) guidelines have recently been superseded by new guidelines published by Scottish Natural Heritage in 2019¹¹, but the SNH guidelines had not been published when the surveys were carried out in 2017 and 2018, so all survey methods discussed in this report are based on the BCT (2012 and 2016) guidelines.
- The minimum survey effort for windfarms in the UK is outlined in Table 10.2 of the BCT (2012) guidelines, with different levels 23. of survey effort for sites with low, moderate or high suitability for bats. Using this approach, the Study Area was initially considered to have low suitability for bats. However, in order to provide a more accurate baseline assessment, the applicant elected to carry out a significantly higher level of automated-detector surveying, with sampling periods of 30 nights in spring, summer and autumn 2017. Transect surveys were carried out during the spring, summer and autumn survey periods in 2017, as outlined in the BCT (2016) guidelines. A second year of bat surveys was carried out in 2018, using automated detectors placed at 15 locations for a minimum of 10 nights in spring, summer and autumn. Further details of methods used for bat surveys are provided in Appendix A8.3 Bat Report.

8.4.5 Fisheries

A desk study was undertaken to review existing records of salmonid fisheries, ecological status and water quality in relevant watercourses using information from the Northern Ireland Environment Agency and other sources. Field surveys were then undertaken in the Study Area, including assessments of chemical status, physical habitat (e.g. substratum type, depth, flow velocity), aquatic invertebrates (the 'kick sampling' technique), habitat suitability for salmonids, and an electrofishing survey to assess juvenile fish stocks. Further details are provided in Technical Appendix A8.5: Fisheries Report.

8.4.6 Methodology for the Assessment of Effects

The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect. The process for the valuation and assessment of effects is taken from the CIEEM Guidelines, as outlined below.

8.4.6.1 Sensitivity of Receptors

The sensitivity of potentially affected receptors has been assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement. Based on the information collected during the desktop and walkover surveys, an ecological value is assigned to each feature based on its conservation status at different geographical scales (Table 8.2). For example, a site may be of national ecological value for a given species if it supports a significant proportion (e.g., 5%) of the total national population of that species.

Sensitivity of Receptor	Definition
International	International or European scale
National	Northern Ireland or the island of Ireland
Regional	Ulster, and/or the north-west coast of Ireland
County	County Londonderry
Local	Rigged Hill, Cam Forest and its immediate surroundings
Negligible	None, the feature is common and widespread

Table 8.2: Framework for Determining Sensitivity of Receptors

It is accepted that any development will have an effect on the receiving environment, but the significance of the effect will 27. depend on the value of the ecological features that will be affected. The following is outlined in the CIEEM guidelines1: "One of the key challenges in an Ecological Impact Assessment is to decide which ecological features (habitats, species, ecosystems and their functions / processes) are important and should be subject to detailed assessment. Such ecological features will be those that are considered to be important and potentially affected by the project. It is not necessary to carry out detailed

assessment of features that are sufficiently widespread, unthreatened and resilient to impacts from the development, and that will remain viable and sustainable."

For the purposes of this report, detailed assessments are only carried out for ecological features of local value or higher, or that are Northern Ireland Priority Habitats or Species. These features are termed 'important ecological features' and are listed in Section 8.5.6. Features of Negligible ecological value (e.g., species-poor grasslands) are not considered to be material in decision making, so they are not included in the impact assessment.

8.4.6.2 Magnitude of Effect

The magnitude of potential effects has been identified through consideration of the Development, the degree of change to 29 baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation. These terms are defined in the CIEEM guidelines¹, and are not reproduced here. The criteria used to describe the magnitude of an effect are presented in Table 8.3.

1	Table 8.3: Framework for Determining Magnitude of Effects						
	Magnitude of Effects	Definition					
	Imperceptible	An effect capable of measurement bu					
	Slight	An effect which causes noticeable cha					
	Moderate	An effect that alters the character of the existing and emerging trends					
	Profound	An effect which, by its character, mag					

8.4.6.3 Significance of Effect

Depending on the type of effect and the sensitivities of the important ecological feature, an effect may be assessed as 'significant'. The process used to identify significant effects for Ecological Impact Assessment is less rigidly defined that for other environmental disciplines, and is described as follows in the CIEEM guidelines: "A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project'. "For the purpose of EcIA, a 'significant negative effect' is an effect that undermines biodiversity conservation objectives for 'important ecological features', or for biodiversity in general". Where significant effects are identified, measures will be taken to avoid, minimise or compensate for effects.

8.4.7 Assessment Limitations

31 All surveys were carried out during the optimal seasons for relevant flora and fauna, so the assessment does not have any limitations or information gaps.

8.4.8 Embedded Mitigation

- Habitats and peat were identified as important ecological features at an early stage in the planning of the Development, and preliminary surveys were carried out prior to the development of the initial layout. The ecologist subsequently provided input for each iteration of the design, proposing modifications to the layout to minimise effects on these features. The design iterations and their rationale are set out in Chapter 4: Site Selection and Design. Where possible, the layout was developed to make use of existing access roads and hardstands of the Operational Rigged Hill Windfarm, in order to minimise the impact of the Development on habitats and peat.
- A range of hydrological mitigation measures have been proposed for the decommissioning / construction phase of the 33. Development, which are described in the outline Demolition / Construction Environmental Management Plan (DCEMP, Technical Appendix A3.1) and the Water Construction and Environmental Plan (WCEMP, Technical Appendix A7.2), it is proposed that the WCEMP forms part of the final DCEMP, but for ease of reference this has been treated as a separate Technical Appendix for the purposes of this ES. They include established and effective good practice methods, to which the Developer will be committed as part of a planning consent. There is sufficient confidence in the effectiveness of the measures

ut without noticeable consequences.

anges in the character of the environment

ne environment in a manner that is consistent with

nitude, duration or intensity alters a sensitive aspect of

⁹ Collins, J. (ed.) (2016). Bat Surveys For Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

¹⁰ Hundt, L. (ed.) (2012). Bat Surveys: Good Practice Guidelines document. (2nd edition). The Bat Conservation Trust, London.

¹¹ Scottish Natural Heritage (in association with Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust), 2019. Bats and onshore wind turbines: survey, assessment and mitigation. Available online at https://www.nature.scot/professional-advice/planning-and-development/renewable-energy-development.

for them to be treated as part of the Development for the purposes of this assessment, so they are considered to be embedded mitigation.

- ^{34.} The hydrological mitigation measures outlined in the DCEMP and WCEMP can be summarised as follows:
 - Buffer zones for watercourses, and restrictions on works within these zones;
 - Measures for the control of exposed sediments;
 - A system of interceptor drains and settlement ponds to control suspended sediments;
 - Procedures for the storage of cement (and related materials), for the pouring of concrete, and the cleaning of equipment;
 - Procedures for the storage of hydrocarbons, for the refuelling of vehicles, and for responses to any spills; and
 - Monitoring and maintenance of the implementation of these measures.
- ^{35.} The system of interceptor drains and settlement ponds will remain in place during the operation of the Development, and will be monitored and maintained as required.
- ^{36.} Although these hydrological measures are described as embedded mitigation throughout the ES, it is important to note that embedded mitigation cannot be considered during the Appropriate Assessment process. Therefore, in the Habitat Regulations Assessment in **Technical Appendix A8.2**, the measures outlined in the DCEMP and WCEMP are treated as traditional mitigation measures, and are not taken into account at the screening stage.

8.5 Baseline Description

8.5.1 Environmental Setting

- The Operational Rigged Hill Windfarm is situated on the summit of Rigged Hill (377 m AOD), and is part of a ridge between Temain Hill to the south of the Site (376 m AOD) and Boyd's Mountain to the north of the Site (329 m AOD). The Site includes the Operational Rigged Hill Windfarm and additional lands on the western slope of the hill. The surrounding landscape is characterised by conifer plantations, moorland and heathland, while the lower slopes are predominantly in agricultural use.
- The underlying bedrock geology is basalt, which is a poor aquifer. Superficial geology is predominantly glacial till, with peat on the crest of the hill. The Site is in the catchment of the Castle River, which is a tributary of the River Roe; these watercourses are part of the North Western International River Basin District. The Castle River is classified as having good overall status. Further details are provided in **Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat.**

8.5.2 Designated Sites

The Site is not within or adjacent to any sites that are designated for nature conservation. Details of Natura 2000 sites (Special Areas of Conservation (SACs) and SPAs) within 15 km of the centre of the Site are provided in Figure 8.1 and Table 8.4. Sites of national importance (ASSIs and NNRs) are presented in Figure 8.2 and Table 8.5. Potential pathways (e.g., hydrological connections) for indirect effects on each designated site are discussed in the tables.

Table 8.4: Designated Sites of European Importance (Natura 2000 sites) within 15 km of the Site

Site name	Distance	Qualifying Interests	Potential pathways for effects
River Roe & Tributaries	3.1 km north	 Annex I Habitats: Watercourses Old sessile oak woodlands Annex II Species: Otter (Lutra lutra) Atlantic salmon (Salmo salar) 	Indirect hydrological connection via the Castle River.
Carn / Glenshane Pass SAC	9.1 km south	Annex I Habitats: • Blanket bog	None
Binevenagh SAC	9.2 km north	 Annex I Habitats: Species-rich Nardus grasslands Calcareous scree 	None

Site name	Distance	Qualifying Interests	Potential pathways for effects
Lough Foyle SPA	11 km north-west	 Special Conservation Interests: Light-bellied brent goose (<i>Branta bernicla hrota</i>) (wintering) Whooper swan (<i>Cygnus cygnus</i>)(wintering) Bar-tailed godwit (<i>Limosa lapponica</i>) (wintering) 	Indirect hydrological connection via the Castle River and River Roe.

Site name	Distance	Reasons for designation	Potential pathways for effects
Coolnasillagh ASSI	2.7 km south- east	Purple moor-grass and rush pastures	None
Ballyrisk More ASSI	3.1 km north	Purple moor-grass and rush pastures	None
Castle River Valley NNR	3.4 km south	Purple moor-grass and rush pastures, lowland meadow	None
Gortcorbies ASSI	3.7 km north	Purple moor-grass and rush pastures	None
Smulgedon ASSI	3.9 km south	Purple moor-grass and rush pastures	None
River Roe and Tributaries ASSI	4.2 km north	River, oak woodland, otter, salmon	Indirect hydrological connection via the Castle River.
Brockagh Quarry ASSI	4.5 km south- east	Scarce blue-tailed damselfly	None
Ballymacallion ASSI	6 km south	Purple moor-grass and rush pastures, lowland meadow	None
Aghanloo Wood ASSI	6.7 km north- west	Mixed ash woodlands, wet woodlands	None
Errigal Glen ASSI	7.1 km south- east	Oak woodland	None
Bovevagh ASSI	8,3 km south- west	Geology: glacial deposits	None
Tircreven ASSI	9 km north	Geology: Jurassic rocks in a river valley	None
Altikeeragh ASSI, NNR	9 km north	Blanket bog	None
Binevenagh ASSI, NNR	9.2 km north	Inland rock, calcareous grassland, tertiary geology	None
Roe Estuary NNR	10.4 km north- west	Estuarine / coastal habitats and overwintering bird species	Indirect hydrological connection via the Castle River.
Lough Foyle ASSI	11.2 km north- west	Saline lagoons, coastal saltmarsh, multiple overwintering bird species	Indirect hydrological connection via the Castle River.
Altmover Glen ASSI	11.7 km south- west	Oak woodland	None
Loughermore Mountain ASSI	13 km west	Geology: exposures of Precambrian rock	None

40. Potential effects on water quality in the River Roe catchment are addressed in Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat. Based on this specialist report, potential effects on the 'River Roe and Tributaries' SAC are addressed in Appendix A8.2: Habitats Regulations Assessment.

- Although there are also distant hydrological connections to other designated sites in the Roe catchment (e.g. the Roe Estuary ASSI and the Lough Foyle SPA), any measures taken to avoid or minimise impacts on the 'River Roe and Tributaries' SAC would also avoid or minimise impacts on the other designated sites. Therefore, detailed assessment of other designated sites in the Roe catchment is considered unnecessary.
- Maps showing the locations of Sites of Local Nature Conservation Importance (SLNCIs) were obtained from Causeway Coast and Glens Borough Council, but no relevant sites were identified within the 5 km Study Area.

8.5.3 Desktop records of flora and fauna

- Prior records of flora and fauna in the vicinity of the Site were obtained from the Centre for Environmental Data and Recording 43 (hosted by the National Museum of Northern Ireland) and the National Biodiversity Network. The former are from government databases of rare and protected species, and the latter are additional records from a range of verified sources (e.g., BSBI tetrad data for Ireland). The Site is within the 10km grid-squares C71 and C72. All records were filtered for protected and priority species, and edited lists are provided in Sections 8.5.4 and 8.5.5.
- It is important to note that these records do not provide a definitive confirmation of the presence or absence of these species in the Site. Most records are from national distribution atlases that are based on representative sampling at a few randomised sites, so the true distribution of these species (and also species not included on this list) may be much higher than recorded. Conversely, the distribution of some species may have decreased since the latest record, and some may have become locally extinct. As such, the lists are provided for reference purposes only, and should be interpreted with care.

8.5.4 Habitats and Flora

A map of habitats within the Site (at the time of scoping) is provided in Figure 8.3, and descriptions of each habitat are provided below. Particular attention has been paid to habitats that would qualify as 'active peat', as outlined in Section 8.4.3. Detailed habitat and peat assessments at proposed turbine locations are presented in Technical Appendix A8.1.

8.5.4.1 Bog and Heath

8.5.4.1.1 Blanket Bog (E1.6.1)

- A relatively-large expanse of blanket bog is found on the crest of Rigged Hill in the east of the Site, which forms part of a larger peatland unit over the upland areas to the north, south and east of the Site. The habitat is dominated by ling heather Calluna vulgaris and hare's-tail cottongrass Eriophorum vaginatum, with frequent deergrass Trichophorum germanicum, occasional cross-leaved heath Erica tetralix and purple moor-grass Molinia caerulea, and rare bilberry Vaccinium myrtillus and royal fern Osmunda regalis. The bryophyte layer has frequent Rhytidiadelphus loreus and Hypnum cupressiforme, and occasional Polytrichum commune, Sphagnum capillifolijum and Sphagnum fallax. Under the NVC classification system for mires (JNCC 2001) it is considered most closely matched to M19a: Calluna vulgaris - Eriophorum vaginatum blanket mire: Erica tetralix sub-community, albeit a relatively species-poor form. Self-seeded lodgepole pine Pinus contorta and sitka spruce Picea sitchensis trees are frequent near the eastern boundary of the Site. The ling heather, hare's-tail cottongrass and deergrass are also very overgrown in the east of the Site, forming a dense layer at a height of approx. 30 - 50 centimetres (cm) above ground level. This vegetation structure is not typical of high-quality blanket bog, and is indicative of drainage.
- This is considered to be a low-quality example of blanket bog habitat, based on the low diversity of species, the low coverage of Sphagnum in the bryophyte layer, and the lack of flora diversity. There was clear evidence of degradation on the surface of the habitat, including an uneven topography caused by peat extraction, drainage channels of 0.5 m to 1 m in depth, and the flailing / stripping of vegetation to facilitate peat harvesting. The overgrowth of heather and cottongrass is indicative of excess nutrients in the soil, either from mineralisation of surface peat, or the drift of fertiliser from the adjacent conifer plantation. In combination, these forms of disturbance are likely to have stopped the peat formation process over the majority of this area, although some of the wetter areas on low-lying ground may still have the hydrological conditions for peat formation. However, it appears that the degradation of the peat is confined to the upper layer of the vegetation, and as the overall peatland is unfragmented and has relatively even topography, it may be possible to restore the habitat in the medium to long-term, so it has been classified as 'intact' blanket bog rather than dry modified bog (as described in Section 8.5.4.1.3).
- Blanket bog is listed on Annex I of the EC Habitats Directive, and is a Northern Ireland Priority Habitat. However, as the 48. habitat within the Site is degraded, it is not considered to be of international or national value, and would not warrant designation, so all such habitat within the Site is considered to be of County ecological value.

8.5.4.1.2 Wet modified bog (E1.7)

Some of the blanket bog along the sides of the access roads associated with the Operational Rigged Hill Windfarm has been cut away in the last 10 - 20 years through the exercise of Turbury rights, leaving a mosaic of wet modified bog in low-lying areas, and dry modified bog in the raised, drained areas. These activities are likely to have stopped the peat formation process over most of this area, although some of the wet, low-lying ground may still have the hydrological conditions and Sphagnum coverage suitable for peat formation.

Most of the habitat has abundant common cottongrass Eriophorum angustifolium, frequent deergrass and occasional purple moor-grass, ling heather, hare's-tail cottongrass, cross-leaved heath, and soft-rush Juncus effusus. The bryophyte layer is very dense, with dominant Polytrichum commune, abundant Sphagnum cuspidatum and S. capillifolium, and frequent S. papillosum.

50. These habitats may previously have been high-quality blanket bog, but they are now degraded. The modification of peatland often causes changes in hydrology, pH and nutrient levels, which in turn can alter vegetation communities. As a result, these habitats would not currently qualify as European Annex I habitat, although they are still considered to be NI Priority Habitat. In their current state they are considered to be of Local ecological value

8.5.4.1.3 Dry modified bog (E1.8)

- Dry modified bog is found along the edge of the cutover bog, at locations in which the vertical exposure of peat has caused 51 significant drainage. All remaining peat within the drained areas has become dry and mineralised, resulting in the loss of wetland species and excessive growth of heather, superficially resembling dry heath habitat. These areas are dominated by ling heather of approximately 50-70 cm height, with frequent cross-leaved heath and hare's-tail cottongrass, but little other vegetation. Hypnum jutlandicum is dominant in the bryophyte layer, with occasional heathland mosses such as Rhytidiadelphus loreus, Hylocomium splendens and Pleurozium schreberi.
- As noted above, this habitat has been highly modified and has lost the characteristic vegetation communities of blanket bog. It 52 would not qualify as a European Annex I habitat, although it is still considered to be NI Priority Habitat. As it has been drained for a long period of time it is unlikely that it could revert to blanket bog in the medium to long term, and as the climax community is dry dwarf shrub heath. On this basis, it is considered to be of Local ecological value.

8.5.4.1.4 Acid fen and flush (E2.1)

- This habitat is found on the transition between the acid grassland and wet heath habitats. It is at the lowest point on a large 53. plateau, and therefore receives a regular flow of sub-surface lateral seepage, causing the formation of acid flush habitat. Considering the large size of the areas, they may also be considered to be acid fens.
- The dominant species is sharp-flowered rush Juncus acutiflorus, mixed with a range of species of acid / wet grassland, including locally-abundant glaucous sedge Carex flacca, and frequent sweet vernal-grass, soft-rush, Yorkshire-fog, purple moor-grass, star sedge Carex echinata and carnation sedge Carex panicea. Occasional species include: jointed rush Juncus articulatus, meadow thistle Cirsium dissectum, marsh willowherb Epilobium palustre, marsh horsetail Equisetum palustre, tormentil Potentilla erecta, mat-grass Nardus stricta, compact rush Juncus conglomeratus and heath-rush Juncus squarrosus, with rare cuckooflower Cardamine pratensis. The bryophyte layer is patchy, with frequent Polytrichum commune, Pleurozium schreberi and Rhytidiadelphus squarrosus, and occasional Sphagnum papillosum, Sphagnum fallax and Sphagnum capillifolium. There are also large cushions of Hylocomium splendens, Rhytidiadelphus loreus and/or Rhytidiadelphus squarrosus in places.
- Acid flush is relatively widespread in peatland areas, often forming a mosaic with wet heath habitats. However, the habitat 55. within the Site covers a relatively large area, and is considered to be of Local ecological value. 'Upland Flushes, Fens and Swamps' are a NI Priority Habitat

8.5.4.1.5 Wet dwarf shrub heath (D2)

- This habitat is found on the upper western slopes of Rigged Hill, on areas with peat layers of approx. 0.2 0.5 m depth. At its upper extent it grades into blanket bog habitat, and at its lower extent (approx. 300 - 320 m AOD) it grades into acid grassland habitat.
- The dominant species is ling heather, with frequent species including deergrass and common cottongrass, and occasional 57. heath-rush, crowberry Empetrum nigrum subsp. nigrum, cross-leaved heath, and rare tormentil and heath bedstraw Galium

saxatile. In some places purple moor-grass is the dominant species, while sedges such as carnation sedge Carex panicea and green-ribbed sedge Carex binervis are frequent. The bryophyte layer has frequent Hypnum cupressiforme and Rhytidiadelphus loreus, occasional Rhytidiadelphus squarrosus, Sphagnum capillifolium, Thuidium tamariscinum, Pseudoscleropodium purum and Polytrichum juniperinum, and rare Racomitrium lanuginosum, Hylocomium splendens and Rhytidiadelphus triquetris.

Wet heath is listed on Annex I of the EC Habitats Directive (as 'northern Atlantic wet heaths with Erica tetralix'), and is an NI 58. Priority Habitat. However, it is common and widespread in surrounding upland areas, so it is considered to be of no more than Local ecological value.

8.5.4.2 Grassland

8.5.4.2.1 Acid grassland (B1)

- This habitat is found on the western slopes of Rigged Hill, typically between the 150 and 300 m AOD contours. At its upper extent it grades into wet dwarf shrub heath, and at its lower extent into improved grasslands. The sward is dominated by a combination of Yorkshire-fog Holcus lanatus and sweet vernal-grass Anthoxanthum odoratum, with locally-abundant wavy hair-grass Deschampsia flexuosa and mat-grass Nardus stricta. Soft-rush Juncus effusus is locally-abundant, particularly in low-lying areas with sub-surface water flows. Heathland species are occasional to locally-abundant, including deergrass, ling heather, cross-leaved heath and cottongrasses. The bryophyte layer is dominated by Rhytidiadelphus squarrosus, with occasional heathland species such as Rhytidiadelphus loreus, Dicranum scoparium, Hylocomium splendens and some small, isolated patches of Sphagnum capillifolium.
- This habitat is relatively common in the surrounding landscape and is considered to be of Negligible ecological value. 'Lowland dry acid grasslands' are an NI Priority Habitat, but as the acid grasslands within the Site are upland and generally wet in character, they would not meet the criteria of the NI Priority Habitat.

8.5.4.2.2 Improved grassland (B4)

- Improved grasslands are found on the lower slopes of the hill, and are primarily used for livestock grazing. The dominant species are Yorkshire-fog and sweet vernal-grass, with abundant perennial rye-grass Lolium perenne in the most intensivelymanaged areas. Other grasses include frequent creeping bent Agrostis stolonifera, common bent Agrostis capillaris, smooth meadow-grass Poa pratensis and rough meadow-grass Poa trivialis, and occasional annual meadow-grass Poa annua. Softrush is locally frequent. Forbs are locally-frequent, including patches of white clover Trifolium repens, creeping buttercup Ranunculus repens, creeping thistle Cirsium arvense, common mouse-ear Cerastium fontanum and nettle Urtica dioica. Rhytidiadelphus squarrosus is the dominant bryophyte throughout the sward.
- This habitat is very common in the surrounding landscape and is considered to be of negligible ecological value. It is not an NI 62. Priority Habitat.

8.5.4.3 Woodland, scrub and hedgerows

8.5.4.3.1 Scrub (A2)

This habitat is found in the valleys of several small streams in the west of the Site. All are dominated by dense gorse Ulex europaeus, with occasional willows Salix sp. in sheltered areas. The habitat is of little botanical value and is not an NI Priority Habitat, but it has secondary value as a habitat for badgers and other protected and priority fauna, so it is considered to be of Local ecological value.

8.5.4.3.2 Intact hedge (J2.1)

- There are a number of hedgerows in the improved agricultural land on the lower slopes of the hill near the Terrydoo Road. They are relatively species poor, typically dominated by gorse Ulex europaeus, blackthorn Prunus spinosa and hawthorn Crataegus monogyna, with relatively few other species. Most are cropped to a low height.
- The hedgerow of greatest relevant to the Development is at the site entrance on Terrydoo Road. It is dominated by blackthorn 65. and gorse, with abundant brambles Rubus fruticosus ag and nettles Urtica dioica, occasional hawthorn and dog-rose Rosa canina, and rare ash Fraxinus excelsior. It is tightly cropped to approx. 1 m in cross-sectional height and breadth, and has occasional gaps. Stock-proofing is provided by a metal fence topped with barbed-wire.
- Hedgerows are widespread in the farmland to the west of the Terrydoo Road. Some of the mature hedgerows are of Local ecological value, but most of the roadside hedgerows (including the feature at the site entrance on Terrydoo Road) are of

negligible ecological value. However, regardless of species richness and condition, all hedgerows are Northern Ireland Priority Habitats.

8.5.4.4 Open water 8.5.4.4.1 Running water (G2)

- A number of small streams arise in the Site and flow westwards downhill to join the Castle River. The watercourses were relatively fast flowing throughout the survey period, and did not dry out at any time. No aquatic vegetation or fauna was observed in the streams.
- All rivers are NI Priority Habitats, but the streams and drainage ditches found within the Site are considered to be of Negligible 68. value for habitats and flora. Nonetheless, all streams are part of the Castle River catchment, and have secondary value for fisheries, so all streams are considered to be important ecological features.

8.5.4.5 Rare or protected flora

A list of the protected and priority species obtained from desktop data sources is presented in Table 8.6. None of these species were recorded during field surveys.

Table 8.6: Desktop records or rare and protected plants

Latin Name	Common Name	Latest record	Approximate Location	Legal Status	Priority Species?
Coeloglossum viride	Frog Orchid	2004	Smulgedon, Gortnamoyagh Forest		Yes
Platanthera bifolia	Lesser Butterfly- Orchid	1988	Ballyrogan		Yes
Primula vulgaris	Primrose	1994	Three Taghmores Hill, Keady Mountain	Wildlife Order 1985	

8.5.4.6 Invasive species

observed within Cam Forest to the north of the Site, but it is more than 500 m outside the zone of influence for the Development.

8.5.4.7 Active peat

- The proposed location of Turbine 1 is on gently-sloping ground in an area of wet heath and cutover bog, partially overlapping with the main access track for the Operational Rigged Hill Windfarm. Some localised pockets of active peat were identified during the preliminary assessment, so a total of 30 randomly-located quadrats were taken in the footprint of the turbine foundation, hardstanding platform and access road. The results are presented in full in Table 1 of Technical Appendix A7.1, while a summary is provided below. Nine quadrats met the criteria for active peat, which is 30% of the total. All were on relatively shallow peat (0.4 - 0.6 m depth in all cases), and most were on wet modified bog to the east of the existing road. It is notable that the vegetation of all of these plots was relatively impoverished, typically with only three vascular plants and three bryophytes. This is a sign that the habitat is highly degraded. Overall, it is concluded that the majority of habitat at the proposed turbine location (including all associated infrastructure) is not active peat.
- The proposed location of Turbine 2 is on level ground in an area of modified blanket bog, surrounded by blanket bog on all 72. sides. The turbine location was selected to maximise overlap with an existing hardstand, and all additional landtake will be on highly-degraded habitat. The results are presented in full in Table 2 of Technical Appendix A7.1, but in summary, five quadrats were taken in the additional landtake. One quadrat met the criteria for active peat, but this was simply due to approximately 50% cover of *Eriophorum vaginatum*, a species that can be found in a range of peatland habitats. The other four quadrats had low cover of peat-forming species, evidence of significant drainage, and some atypical species, including Erica cinerea and a sapling of sitka spruce Picea sitchensis. These plots were typically dominated by Calluna vulgaris, Molinia caerulea and Hypnum jutlandicum. Peat depth ranged from 0.3 – 1.6 m. Overall, it is concluded that the majority of habitat at the proposed turbine location (including all associated infrastructure) is not active peat.
- The proposed location of Turbine 3 is on gently-sloping ground in an area of cutover bog, partially overlapping with the main 73 access track for the Operational Rigged Hill Windfarm. There are shallow drainage channels of approx. 0.2 - 0.3 m depth at

No invasive plant species were encountered in the Study Area. Some American skunk-cabbage Lysichiton americanus was

approximately 5 - 10 m spacing throughout this area, and there are signs that the surface vegetation may have been stripped in the past. These are signs of sub-surface chain-cutter harvesting of peat, although there is no evidence that this has taken place in recent years. Some localised pockets of active peat were identified during the preliminary assessment, so a total of 30 randomly-located quadrats were taken in the footprint of the turbine foundation, hardstanding platform and access road. The results are presented in full in Table 3 of Technical Appendix A7.1, while a summary is provided below. Ten quadrats met the criteria for active peat, which is 33% of the total. All were on relatively shallow peat (0.4 - 0.6 m depth in all cases), and a number were indicative of flushed conditions. Some were classified as active peat due only to the presence of Eriophorum vaginatum, with no other peat-forming species recorded. Overall, it is concluded that the majority of habitat at the proposed turbine location (including all associated infrastructure) is not active peat.

- The proposed locations of Turbines 4, 5, 6 and 7 are on gently-sloping or moderately-sloping ground on the lower plateau to 74. the west of the hill. Five quadrats were taken at each location, which are presented in full in Table 1 of Technical Appendix A7.1, and summarised below. Peat depth is consistently less than 0.5 m throughout this area (refer to Figure 7.4), and the habitat is considered to be transitional between wet heath and wet acid grassland, with some localised patches of acid flush in natural drainage features. The coverage of peat-forming species was low or absent, and most guadrats had moderate cover on plant species that are atypical of blanket bog, particularly grasses (Nardus stricta, Anthoxanthum odoratum, Deschampsia flexuosa) and rushes. One of the quadrats at Turbine 6 met the criteria for active peat due to the presence of Sphagnum mosses, but it was in a flushed area on a landowner's vehicle track, and thus is considered atypical of the broader surroundings. Overall, none of these proposed turbine locations support active peat.
- Where possible, the layout of the Development has been adapted to re-use existing access tracks and hardstand platforms of 75. the Operational Rigged Hill Windfarm. Access to Turbines 1, 2 and 3 will be via existing tracks and hardstands, and new infrastructure has been designed to avoid impacts on active peat, as outlined above. In most cases the existing access tracks can be re-used without major modification, except for the additional of drainage features on either side, as outlined in Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat. However, their extent is considered to be negligible in the context of the surrounding habitat.
- There are no existing access tracks that would serve the proposed locations for Turbines 4, 5, 6 and 7, so a new track will be constructed. It will cross an area of shallow peat in wet heath / acid grassland, which is very similar in character to the habitat described for Turbines 4 - 7 above, so it will not affect any active peat. All other aspects of the Development (including the control building, temporary construction compounds, and site entrance) will be on non-peatland habitats.

8.5.5 Protected / Priority Fauna 8.5.5.1 Badgers

- A large badger sett was recorded in the centre of the survey area. It will only be described in general terms in this document in 77. order to reduce the risk of persecution, but its exact location was indicated to a representative of the NIEA-NED during a meeting in March 2019. The closest entrance is located 40 m from the new access track up the hillside.
- It is a large sett complex with at least 19 entrances, and is considered to be a main sett with at least one annexe. However, 78. considering the spacing of entrances it is possible that there are up to three separate annexes around a central main sett. It is likely that the sett is permanently occupied, and that it is the primary breeding site for the local badger group. There were signs of activity at multiple entrances. Due to the presence of a breeding sett, the Site is considered to be of local importance for badgers.

8.5.5.2 Bats

- The Site is used by Leisler's bats on a regular basis during the mid-summer period. Activity levels of this species appear to follow certain temporal patterns - both for months of the year, and for times of the night - and appear to be strongly influenced by weather conditions. However, there does not appear to be a consistent spatial pattern in use of the Study Area, so they are assumed to forage relatively evenly over all areas. Common pipistrelle and soprano pipistrelle bats were rarely recorded on in the Study Area in significant numbers, and there did not appear to be a consistent temporal or spatial pattern in their activity. No other species were recorded in significant numbers.
- On this basis, it is concluded that the Site is used on a regular basis as a feeding area by Leisler's bats, and thus that it has at 80. least local value for this species. It is noted that all bat species receive strict protection under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (S.I. 1995/380, as amended), under which it is an offence to kill, injure or

disturb any bat species. It has been demonstrated that bats may be vulnerable to collision at some windfarm sites. Therefore, bats are considered to be an important ecological feature for this assessment.

8.5.5.3 Irish hare

Irish hares Lepus timidus subsp. hibernicus were observed on the roads within the windfarm on a number of occasions. This species is common and widespread in Northern Ireland and is currently listed as 'least concern' in the all-Ireland red data book for terrestrial mammals (Marnell et al. 2009). It is a Northern Ireland Priority Species, but does not receive legal protection. The population within the Site is considered to be very small, and of Negligible ecological value.

8.5.5.4 Other protected mammals

No other protected mammals were recorded using the Site during the surveys. Desktop records of other protected and priority 82 mammal species from the surrounding 10 km Study Area are presented in Table 8.7.

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Latin Name	Common Name	Latest record	Approximate Location	Legal Status	Priority Species?
Erinaceus europaeus	Hedgehog	1968	Springwell Forest, Coleraine		Yes
Lutra lutra	Otter	2002	Tributary of Castle River	HD, WO	Yes
Martes martes	Pine Marten	2015	Cam Forest	HD, WO	Yes
Meles meles	Badger	2002	Ballyrogan	WO	
Sciurus vulgaris	Red Squirrel	2002	Cam Forest	WO	Yes

* Codes used in the 'legal status' column are as follows: HR - species that are protected under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995; WO - species that are protected under the Wildlife (Northern Ireland) Order 1985

- The preferred habitat of hedgehogs is hedgerows and gardens, particularly in lowland farmland and suburban areas. The 83. gorse scrub in the west of the Site may provide suitable habitat for them, but they are unlikely to use the open peatland and heathland areas in the Site on a regular basis.
- Otters are a qualifying interest of the River Roe & Tributaries SAC, and have been recorded in the Castle River. Although the 84. small streams within the Site could potentially be used by otters, it is highly unlikely that they could provide a sufficient quantity of prey to sustain even a single individual. No potential otter holts were identified during field surveys. Therefore, the Site is highly unlikely to be used by otters on a regular basis.
- Red squirrels and pine martens are primarily associated with woodland / forest habitats. They have been recorded in the 85. adjacent Cam Forest, and may occasionally pass through the conifer trees around the Site. However, open peatland and heathland habitats are not preferred habitats of either species, so they are unlikely to use the Site on a regular basis.
- Therefore, at present, the Site is considered to be of Negligible ecological value for all of these species.

8.5.5.5 Reptiles and Amphibians

- Some common frogs were recorded in the heathland and grassland habitats, but no common lizards or smooth newts have 87 been recorded within the Site. No ponds or other permanent waterbodies were observed that could provide breeding habitat for newts or frogs. On this basis, newt surveys were scoped out of this assessment, as discussed in the Scoping document.
- Upland bogs and heaths are a preferred habitat for common lizards, and it is possible that some may be present in the Site at 88. low densities. However, considering that the Site was visited on multiple occasions throughout 2017 and 2018, and that more than 50 km was travelled during walkover surveys, it is notable that no lizards were recorded. On this basis, it is expected that, if present, lizards may occupy the Site at very low densities, and thus would not be likely to experience significant effects from the Development. Consequently, lizard surveys were scoped out of this assessment. However, some precautionary mitigation measures, were requested by the NIEA (Natural Environment Division), which are provided in Section 8.7.7.

8.5.5.6 Terrestrial Invertebrates

A search for the larval habitat of the marsh fritillary butterfly was undertaken during the habitat surveys. A small patch of devil's-bit scabious Succisa pratensis was found on a patch of cutaway blanket bog in the north-east of the Site, but the

surrounding vegetation was dominated by rank purple moor-grass and hummocks of Polytrichum commune moss, and thus was considered to be sub-optimal for marsh fritillary. No other devil's-bit scabious was recorded anywhere else in the Site. Consequently, marsh fritillary surveys were scoped out of this assessment.

8.5.5.7 Fisheries

The Development is located in the Castle River sub-catchment of the River Roe. Fisheries assessments were carried out on five streams that arise in the Site and flow downstream into the Castle River. All are shallow with moderate flows, and had a substratum comprising mainly of sand, gravel and cobble. The pH in all streams was slightly alkaline, with moderate conductivity, satisfactory dissolved oxygen levels and very low turbidity readings. All sites had low levels of suspended sediments. Based on aquatic invertebrate surveys, all three sites were classified as having high or good Water Framework Directive (WFD) based water body status, both for the numbers of taxa and average scores per taxon.

- A juvenile fish stock survey of the streams within the Site and the downstream reach of the Castle River was carried out in 90. August 2017. Juvenile salmon and trout were recorded all streams, generally within an abundance index of 'good' for salmon and 'moderate' for trout. Adult trout are known to spawn throughout the Castle River, with greater abundance in upstream areas, while adult salmon spawn in downstream reaches, although within 3 km of the Site.
- The sensitivity of the five streams within the Study Area ranged from low to medium, but was high in the Castle River, and very 91. high in the River Roe. Further details are provided in Technical Appendix A8.5: Fisheries Report.

8.5.6 Selection of Important Ecological Features

Summaries of the ecological valuation and legal / conservation status of habitats and fauna are outlined in Tables 8.8 and 8.9 92. respectively. For the purposes of this impact assessment, any features that are NI Priority Habitats/Species, or that are valued at local value or higher, are considered to be 'important ecological features'.

Table 8.8: Identification of key ecological receptors: designated sites and habitats

Site name	Total Area (ha)	Ecological Value	NI Priority Habitat	Important Ecological Feature?
Natura 2000 sites	tura 2000 sites International			Yes
ASSIs		National		Yes
SLNCIs		County / Local		No
Blanket bog (E1.6.1)	32.0	County	Yes	Yes
Wet modified bog (E1.7)	24.0	Local	Yes	Yes
Dry modified bog (E1.8)	6.9	Local	Yes	Yes
Acid fen and flush (E2.1)	11.6	Local	Yes	Yes
Wet dwarf shrub heath (D2)	110.6	Local	Yes	Yes
Running water (G1)	2.1 km	Local	Yes	Yes
Gorse scrub (A2)	12.8	Local		Yes
Intact hedge (J2.1)	6.5 km	Negligible	Yes	Yes
Acid grassland (B1) 178.5		Negligible		No
Improved grassland (B4)	proved grassland 84.1 4)			No
Total area	489.3ha			

Fable	8.9	Identification	of	key	ecological	recepto	rs:	flora	â

Site name	Ecological Value	Legal Status*	NI Priority Species	Important Ecological Feature?
Bats	County	WO	Yes (3 spp)	Yes
Badger	Local	WO		Yes
Fisheries (streams)	Medium sensitivity	FA	Yes	Yes
Fisheries (Castle River)	High sensitivity	FA	Yes	Yes
Irish hare	Negligible		Yes	No
Otter	Negligible	HR, WO	Yes	No
Red squirrel	Negligible	WO	Yes	No
Pine marten	Negligible	HR, WO	Yes	No
Hedgehog	Negligible		Yes	No
Other mammals	Negligible			No
Smooth newt	Negligible	WO		No
Common lizard	Negligible	WO	Yes	No
Common frog	Negligible			No
Marsh fritillary	Negligible	WO	Yes	No
Other invertebrates	Negligible			No
Rare and protected flora	Various	WO	Yes	No

* Codes used in the 'legal status' column are as follows: HR - species that are protected under the Conservation (Natural Habitats, etc.) 93. Regulations (Northern Ireland) 1995; WO - species that are protected under the Wildlife (Northern Ireland) Order 1985

8.5.7 Future baseline scenario

- A separate planning application has been submitted for a new access track for the Operational Rigged Hill Windfarm, which 94. has the same routing as the access track for this Development. A decision on the planning application had not been made at the time of writing, but, if approved, the new access track would be constructed prior to the commencement of this Development. This would represent a change from the baseline discussed above, but it would reduce the scale of impacts associated with this Development.
- 95. the baseline reported in this section.
 - 8.6 Assessment of Potential Effects
 - 8.6.1 Decommissioning and Construction Phase
 - 8.6.1.1 Designated sites
- 96. sites
- 97. There is a distant hydrological pathway between the Site and the 'River Roe and Tributaries' SAC / ASSI via approximately 8.5 km of the Castle River. If the initial decommissioning /construction phases of the Development caused the release of significant quantities of pollutants (e.g., suspended sediments or hydrocarbons) into the Castle River catchment, they could potentially be carried downstream into the SAC / ASSI. Atlantic salmon is one of the gualifying interests of the SAC; this species and its spawning sites are highly vulnerable to pollution of watercourses, particularly releases of suspended sediments. In practice, it is highly unlikely that sufficient quantities of material could reach the SAC to have a significant effect even without implementing mitigation measures, for the purposes of this assessment a worst-case scenario has been constructed, where it has been assumed that it could cause localised, slight negative effects on the SAC, and/or could

and fauna species

With this exception, there are not expected to be any changes to the condition of the habitats, flora and fauna of the Site from

The Site is not within or adjacent to any designated sites, so there is no risk of direct effects on any ecological designated

contribute to diffuse pollution in the river. Further details are provided in Appendix A8.2: Habitats Regulations Assessment. Mitigation is discussed in Section 8.7.1 and Chapter 7.

There is no risk of effects on any other designated sites.

8.6.1.2 Habitats

- Any construction works on undeveloped land will result in habitat loss, but the significance of ecological effects will vary in 99. relation to the value of the habitats that will be affected, and whether or not they are Important Ecological Features. In recognition of this, the layout of turbines and access roads was designed in order to avoid or minimise effects on habitats of ecological value (mitigation by design), particularly peatland areas. Habitat and peat surveys were carried out at an early stage in the planning of the Development, and the ecologist provided input for each revision of the layout, proposing modifications to minimise effects on important habitats.
- Based on the final layout, an approximate calculation of the direct effects on habitats from each component of the Development is listed in Table 8.10. A summary of the total effects on each habitat type is presented in Table 8.11, including an indication of the percentage loss of each habitat type within the Site Boundary (at the time of scoping). These figures are provided only for informative purposes; they have been calculated using GIS software and are approximate.
- The calculations in Table 8.10 only address the potential negative effects on habitats, and exclude the positive effects that will result from the measures outlined in the Draft Habitat Management Plan in Appendix 3.2. This will include some restoration of blanket bog at some redundant roads and hardstanding areas, blocking of artificial drainage ditches, and levelling of degraded blanket bog. These habitat improvements are not included in the table.

Table 8.10. Direct effects on habitats within the footprint of the Development

Component	Subdivision	Habitat type	Area affected (m ²)	Important Ecological Feature?
Τ1	Turbine and hardstand	Wet heath Existing track Wet modified bog	2,400 1,150 1,100	Y Y
	Roads: T1 to T2	Existing tracks	2,000	
T2	Turbine and hardstand	Wet modified bog Existing hardstand / track	3,400 1,200	Y
	Roads: T2 to T3, and connection to new access track	Existing tracks Wet heath Wet modified bog	8,000 600 100	Y Y
Т3	Turbine and hardstand	Wet heath Existing hardstand / track	3,900 750	Y
	Roads: new access track to T4	Wet heath Acid flush	450 250	Y Y
T4	Turbine and hardstand	Wet heath	4,700	Y
	Roads: T4 to T5	Wet heath	1,500	Y
Т5	Turbine and hardstand	Wet heath	4,700	Y
	Roads: T5 to T6	Wet heath	2,350	Y
Т6	Turbine and hardstand	Wet heath	4,700	Y
	Roads: T6 to T7	Wet heath	3,250	Y
T7	Turbine and hardstand	Wet heath	4,500	Y
Substation and energy storage area		Existing hardstand / compound	1,900	
Temporary Construction Compounds		Improved agricultural grassland Wet modified bog Acid grassland Existing hardstand	2,500 2,200 2,000 1,900	Y
New permanent accord Terrydoo Road	ess track, and site entrance at	Acid grassland Improved agricultural grassland	28,800 4,400	

Component	Subdivision	Habitat type	Area affected (m ²)	Important Ecological Feature?
		Wet heath	5,000	Y
		Acid flush	3,500	Y
		Intact hedgerow	300 m	Y
		Total	103,200	

Table 8.11. Cumulative effects on each habitat type, including an indication of the habitat loss within the

Habitat type	Total area affected (m ²)	Total habitat area (m²)	Percentage loss	Ecological Value
Wet heath	38,050	1,106,500	3.4%	Local
Existing road / surface	16,900	29,415	57.4%	Negligible
Wet modified bog	6,800	239,800	2.8%	Local
Acid grassland	30,800	1,785,000	1.7%	Negligible
Improved agricultural grassland	6,900	840,600	0.8%	Negligible
Acid flush	3,750	116,450	3.2%	Local
Intact hedge	300 m	6,500 m	4.6%	Negligible

- ¹⁰² In summary, there will be permanent, unavoidable effects on 0.7 ha of wet modified bog, 3.8 ha of wet heath, 0.4 ha of acid flush and 0.3 km of intact hedge, all of which are NI Priority Habitats. All other habitats within the Study Area are of Negligible ecological value, or will not be affected by the Development.
- 103. It is noted that the losses of wet modified bog, wet heath and acid flush would be 2.8%, 3.4%, 3.2% and 4.6% of the total extent of each habitat within the Site. On this basis, the magnitude of impact on all four habitats is considered to be imperceptible (capable of measurement, but without noticeable consequences) as outlined in Section 8.4.6.2 of this document. In accordance with Section 8.4.6.3, the loss of these habitats would not have a significant impact at a local context, and would be considered 'not significant' in terms of the EIA Regulations.
- It is also noted that 43.4 ha of degraded peatland habitat will be restored and protected as part of the Development, as outlined in Appendix 3.2: Draft Habitat Management Plan (HMP). These measures are summarised as follows:
 - Blocking man-made drainage channels;
 - Removal of redundant tracks and hardstand platforms for existing Operational Rigged Hill Windfarm Turbines 8 and 9, and restoring them to blanket bog;
 - Removing self-seeded conifers, and ground-smoothing using excavated stumps; and
 - Tracking over desiccated / overgrown areas to restore natural hydrology and reduce the dominance of ling heather.
- 105. Subject to the successful implementation of the final HMP, the restoration measures will have a positive ecological effect on the degraded blanket bog habitat. It will take some years for these management measures to achieve their effect, but in the medium term the Development will have a slight positive effect on the local conservation value of these habitats, which will be permanent. The area of restoration is significantly larger than the combined area of blanket bog, wet modified bog and wet heath that will directly affected during the initial decommissioning/construction work.
- are expected to increase the extent and condition of blanket bog, the Development will have a slight to moderate positive effect on NI Priority Habitats in the medium term.

8.6.1.3 Active peat

Active peat assessments for all aspects of the proposed development are described in Section 8.5.4.8. The proposed locations of Turbines 1, 2 and 3 will be on wet modified bog and wet heath habitats that have localised pockets of active peat, but in all cases the majority of the affected area is not active peat. The proposed locations for Turbines 4, 5, 6 and 7, including

Therefore, as the negative impacts on these habitats will be relatively small in extent, and the habitat management measures

the connecting access track, will be on shallow peat that is transitional between wet heath and acid grassland. No other aspects of the Development are on active peat.

- As discussed in the previous section, the proposed habitat management measures will involve the restoration of approx. 43.4 ha of degraded blanket bog, with the aim of restoring most of these areas to intact blanket bog. These measures will reduce the rate of water loss from the bog, and thus will create wetter conditions at the peat surface, providing favourable conditions for the re-establishment of active peat in areas that are currently inactive. As noted above, it will take some years for these management measures to achieve their effect, but in the short to medium term the development will have a slight positive effect on local status of active.
- Therefore, as the loss of active peat during the initial decommissioning/construction works will be negligible at all locations, 109. and the habitat management measures are expected to increase the extent of active peat in the Site, the Development will have a slight to moderate positive effect on active peat in the medium term.

8.6.1.4 Badgers

The badger sett complex is located 40 m from the access track at its closest point. The zones of influence for potential impacts on badger setts are outlined in the Northern Ireland Environment Agency guidance document Badgers and Development (NIEA 2011)¹². It is noted that groundworks within 25 m of sett entrances may cause direct damage to underground tunnels and chambers, while blasting or pile driving within 100 m of a sett may have indirect impacts on badgers that may occupy it.

The engineer has confirmed that no blasting or pile driving will be required for construction of the access track, and there will be no construction work within 25 m of the sett. Therefore, there is not considered to be a risk of direct or indirect impacts on the badger sett or its underground tunnels. However, it is likely that badgers will pass over the track during construction works, in which case there is a risk of disturbance, e.g. if a badger fell into an excavation. This could cause injury to one or more badgers, but would be highly unlikely to have a significant effect on their local conservation status.

8.6.1.5 Bats

Site clearance works will involve the removal of low-growing vegetation and soils in the footprint of all decommissioning /construction works. This will predominantly take place on heathland and grassland vegetation, which is of negligible value for feeding and commuting bats. A short section of low-quality hedgerow will be removed at the site entrance on the Terrydoo Road (it will be replaced in the short - medium term), but this is unlikely to sever or disturb any important commuting routes or feeding areas, as there is a similar hedgerow on the opposite site of the Terrydoo Road. No other trees, hedgerows or other linear habitats will be removed. Therefore, habitat loss during site clearance works will not cause any significant adverse effects on bats. No further hedgerows or other linear habitats will be removed, so there will be no severance or disturbance of commuting routes or feeding areas. Therefore, habitat loss during site clearance works will not cause any adverse effects on bats. Further details are provided in Appendix A8.3.

8.6.1.6 Fisheries

The potential for impacts on fisheries and aquatic habitats during the decommissioning/construction phases is mainly 112. associated with ground disturbance and the release of sediments into surface water features. There is also a potential impact from the accidental spillage of other hazardous substances (oil and fuel) used in the construction process, and the construction of stream crossings could obstruct fish movements. The Site is hydrologically connected to watercourses of significant fisheries interest, particularly the Castle River and River Roe, which have spawning areas for Atlantic salmon. The un-mitigated effects of suspended sediments may be of Moderate Adverse Magnitude and of Moderate to Large Adverse Significance depending on the sensitivity of individual watercourses. Further details are provided in Appendix A8.5.

8.6.2 Operational Phase

Effects that would last for the duration of the operational phase are considered to be permanent, but they would be reversible should the Development be decommissioned at any point.

8.6.2.1 Designated sites

there will be no negative effects on downstream watercourses or associated designated sites. Further details are provided in Appendix A8.2 and Chapter 7.

8.6.2.2 Habitats

115 There will be no significant groundworks during the operational phase of the Development, beyond the areas considered as part of decommissioning / construction activity, so there will be no further effects on habitats.

8.6.2.3 Badgers

There will be no further groundworks during the operation of the development, so there is no risk of direct or indirect impacts 116. on the badger sett. Vehicles will pass along the access track during daylight, but this is highly unlikely to pose a risk of collisions with badgers, as they are nocturnal animals. The new track will be roughly level with the surrounding ground, so badgers will freely be able to cross it, without any need for an underpass or other similar crossing point.

8.6.2.4 Bats

- 117 Leisler's bats were recorded in significant numbers (i.e., moderate or high activity) during automated detector surveys at the Site, and this species is considered to have a high collision risk from wind turbines (SNH 2019). The highest levels of bat activity were recorded in the mid-summer period (June, July and August), usually in the hours just after sunset and just before sunrise.
- 118. Based on the profile of bat activity collected in baseline surveys, there is considered to be a potentially significant risk of collision-related fatalities on Leisler's bats during the operation of the Development. It is impossible to predict bat fatalities based on pre-construction activity surveys, but if several Leisler's bats were killed by the proposed operational wind turbines. the Development would have a slight to moderate effect on this species, and may have a significant effect on its local population. It is noted that the duration of impacts would be temporary, as Leisler's bats only use the Site in significant numbers in mid-summer months, and are largely absent for the remainder of the year. Further details are provided in **Technical Appendix A8.3**.

8.6.2.5 Fisheries

The potential for any impacts will be significantly reduced during the operational phase. Nonetheless, un-mitigated impacts from surface water run-off has the potential to be of Moderate Adverse Magnitude and of Moderate Adverse to Moderate to Moderate/Large Adverse Significance depending of the sensitivity of individual watercourses. Further details are provided in Appendix A8.5.

8.6.3 Cumulative impacts

8.6.3.1 Plans

The regional development plan for the Site is the Northern Area Plan 2016. The only reference to wind energy developments relates to Areas of Significant Archaeological Interest, and no other aspects of the plan were identified that could lead to potential in-combination effects with the Development. Other plans relevant to renewable energy developments are discussed in Chapter 5 of the ES; no potential in-combination effects were identified in any of these plans.

8.6.3.2 Other developments

The Site is located in a rural setting surrounded by agricultural land, farm buildings and one-off houses. It is a settled area and is not subject to significant development pressure. The Northern Ireland planning portal was searched for other developments within the surrounding area, and a small number of live or recently-approved applications were found. Permission was granted in 2015 for a single wind turbine with a 58.5 m blade-tip height, located approx. 500 m south-west of the Site (planning reference: B/2014/0221/F); this site is referred to as '37 Temain Road' in Technical Appendix 2.3. At the time of writing, the turbine had not yet been constructed, and the permission had a five-year validity, so it is likely that the development will be constructed prior to 2020. It is noted that an Environmental Construction Method Statement was submitted as part of the application, which includes a range of pollution-prevention and site-management measures. A subsequent application for a new laneway along the access route for the new turbine was also approved in 2015 (planning reference: LA01/2015/0009/F).

No significant releases of sediment or any other pollutant are anticipated during the operation of the Development. As a result,

¹² Northern Ireland Environment Agency, 2011. Badgers and Development. Available online at https://www.daerani.gov.uk/publications/badgers-development

All other live or recently-approved planning applications in the surrounding area were for residential extensions and other small-scale projects, none of which would pose a risk of in-combination impacts

8.7 Mitigation and Residual Effects

Considering the high ecological value of some parts of the Site, and the complexity of the proposed habitat reinstatement and compensation measures, an Ecological Clerk of Works (ECoW) will be employed for the duration of the initial decommissioning/construction works. The role of the ECoW is to assist the contractor with the interpretation and implementation of the ecological mitigation measures outlined in Chapters 8 and 9 of the ES, the Draft Habitat Management Plan (Appendix A3.2), and other relevant documents. The contractor will liaise with the ECoW prior to the commencement of construction works so that all ecological mitigation measures can be incorporated into the programme. The ECoW will review the method statements of all contractors in order to ensure that they are consistent with the mitigation strategy. They will visit the Site on a weekly / fortnightly basis during construction works and will keep a written record of the mitigation measures that have been implemented.

8.7.1 Measures to protect watercourses and associated designated sites

- A range of hydrological mitigation developments have been proposed for the initial decommissioning / construction phases of the Development, which are described in the outline Demolition / Construction Environmental Management Plan (DCEMP, Technical Appendix A3.1) and the Water Construction and Environmental Plan (WCEMP, Technical Appendix A7.2) which will form part of the final DCEMP. These documents are considered to be embedded mitigation, as they will form an inherent part of the Development, but in the context of Appropriate Assessment they are considered to be traditional mitigation measures, so they are repeated below, and in Appendix A8.2.
- In summary, the hydrological mitigation measures for the decommissioning / construction phases of the Development, as 122. outlined in the DCEMP and WCEMP are:
 - Buffer zones for watercourses, and restrictions on works within these zones; ٠
 - Measures for the control of exposed sediments;
 - A system of interceptor drains and settlement ponds to control suspended sediments;
 - Procedures for the storage of cement (and related materials), for the pouring of concrete, and the cleaning of equipment;
 - Procedures for the storage of hydrocarbons, for the refuelling of vehicles, and for responses to any spills; and
 - Monitoring and maintenance of the implementation of these measures.

The system of interceptor drains and settlement ponds will remain in place during the operation of the Development, and will be monitored and maintained as required.

8.7.2 Fisheries

The hydrological mitigation measures outlined in Section 8.7.1 will also avoid or minimise impacts on fisheries and aquatic ecology in downstream watercourses. The mitigation measures will avoid direct damage to fish and the siltation of spawning / nursery habitats, and will minimise the risk that other construction-related pollutants are accidentally released into the river network. This will reduce the effects from Moderate Adverse Significance to Neutral. Further details are provided in Appendix A8.5.

Measures to protect sensitive habitats 8.7.3

The following measures will be employed during the initial decommissioning / construction phases:

- Prior to the commencement of construction works, the ECoW will brief the contractor and construction staff on the ecological sensitivities of the Site, including all ecological mitigation measures outlined in the ES and HMP;
- All construction work will take place within the appointed areas, and there will be no earthworks, material storage, etc. outside the development footprint; and
- The ECoW will accompany the contractor when marking out the boundaries of the construction site in order to protect adjacent sensitive habitats and features of value for fauna. Where appropriate, features may be micro-sited in order to avoid any such features.
- 126. All turbines will have a micro-siting flexibility of up to 50 m to account for local ground conditions. Turbines 3 7 are located in areas of relatively homogenous habitat, so micro-siting of these turbines would not change the significance of any ecological effects. However, Turbine 2 is surrounded on all sides by intact blanket bog (which is active peat), and it is possible that micro-

siting could increase the impact on this habitat. Turbine 1 is located on a transition between wet modified bog and wet heath, and if moved to the east, it could increase the effect on cutover bog. Therefore, the ECoW will review any proposed micrositing for Turbines 1 and 2 in order to ensure that there is no additional effect on sensitive habitats. Similarly, any micro-siting of turbines within the 50m / 20m exclusion zones around streams / drains will be reviewed by the ECoW.

8.7.4 Reinstatement of temporarily disturbed areas

- When constructing hardstand platforms, some of the excavated peat will be 'side cast' and used to form low ridges along the 127 sides of the road, including for the construction of interceptor drains as part of the surface water management system. All other peat will be used for the reinstatement of redundant access tracks, as outlined in the Draft HMP. When all groundworks are complete, both areas will consist of bare peat, which will be vulnerable to desiccation and erosion. Peat excavated from below the surface does not have a viable seedbank, so it is reliant on windblown seed for vegetation recolonisation, and it can take several years for the bare peat to revegetate fully. In order to reduce the period of peat exposure, some measures will be taken to seed these features with appropriate vegetation, as follows:
 - When commencing earthworks in undeveloped areas, the top 20 cm of surface peat and vegetation will be stripped and laid to one side, outside the footprint of the Development;
 - habitat management measures;
 - Deposited peat will be shaped, flattened and compacted as much as possible, in order to minimise the desiccation and erosion of peat; and
 - for re-vegetation in future years.
- 128. If vegetation fails to establish in the first two years, additional seed can be spread across the habitat, either collected from within the Site, or potentially purchased as seedstock from third parties (e.g. locally-sourced Sphagnum seed stock). Common cotton-grass and deergrass are the most effective pioneer species of hydrologically-intact peat, while heathers (ling, crossleaved heath, crowberry) and heath grasses (wavy hair-grass, sweet vernal-grass) may be more effective at colonising desiccated peat.
- 129. A range of habitat enhancement measures are described in detail in Appendix A3.2: Habitat Management Plan.

8.7.5 Measures to protect bats

In recognition of the high levels of Leisler's bat activity in the Study Area, the activity of all wind turbines will be curtailed during the periods of highest risk to bats. This will involve increasing the cut-in speed of the wind turbines in June, July and August, particularly during the post-sunset and pre-dawn periods. The curtailment parameters are based on site-specific data collected in 2017 and 2018, and account for 90% of the bat activity recorded during this period. Further details are provided in Technical Appendices A8.4: Bat Monitoring and Mitigation Strategy.

8.7.6 Precautionary measures for the protection of badgers during construction works

- 131 follows:
 - Chemicals and fuels will be stored in locked containers in the site compound;
 - a gentle slope at one end, or by propping planks in the trench overnight; and

8.7.7 Precautionary measures for the protection of lizards during construction works

- When consulted at the scoping stage of the project, the NIEA (Natural Environment Division) requested that some generic mitigation measures should be provided for common lizards during construction works. The risk of negative impacts on lizards is considered to be very low, but some precautionary measures are outlined below:
 - · The hardstands and access tracks of the existing windfarm may provide refuges for hibernating lizards during winter

• The underlying peat and other spoil can be then excavated, and 'side cast' to create roadside mounds, or used for other

When all the initial decommissioning/construction work is complete, the reserved 20 cm of surface peat and vegetation will be spread across the top of the deposited peat and pressed into the peat surface, in order to provide a seed-source

Some simple precautionary measures will be taken to avoid or minimise effects on any badgers that may forage in the Site, as

Any trenches deeper than 0.5 m will be constructed in a manner that allows trapped animals to escape, either by creating

Any open pipe systems (e.g. cable ducts) will be capped or blocked overnight in order to prevent badgers gaining access.

months. If the decommissioning of these features will take place during the hibernation period (usually October to March,

inclusive), the ECoW will inspect relevant areas beforehand, involving a search for hibernating lizards in loose gravel around the margins of the infrastructure; and

٠ When construction is complete, artificial refugia consisting of piles of logs, brash and/or large stones will be created beside each of the new hardstand platforms. This process will be overseen by the ECoW.

Monitoring 8.8

- As part of the Habitat Management Plan for the Development, vegetation sampling will be undertaken for at least nine years after the completion of habitat restoration works, as outlined in Appendix 3.2. Monitoring of water quality will also be carried out as part of the DCEMP and WCEMP, as outlined in Technical Appendices A3.1 and A7.2.
- In order to monitor the effectiveness of the bat mitigation proposals, post-construction activity surveys and carcass searches 134. will be carried out. This is discussed in detail in Technical Appendix A8.4: Bat Monitoring and Mitigation Strategy.

Potential indirect, in-combination effects with other wind farm developments 8.9

135. Only one development was identified that could potentially cause cumulative effects: the '37 Temain Road' single wind turbine located approx. 500 m south-west of the Site (refer to Section 8.6.3). An Environmental Construction Method Statement was submitted as part of the application, which includes a range of pollution-prevention and site-management measures. The Development will also incorporate pollution-prevention measures (refer to Section 8.7.1). On this basis, there is not considered to be a risk of cumulative effects. No other live or recently-approved planning applications were identified that could lead to incombination effects with the Development.

8.10 Summary of Effects

136. **Table 8.12** provides a summary of the effects detailed within this chapter.

Table 8 12: Summary of Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect				
Decommissioning / Cor	Decommissioning / Construction Phase							
Watercourses	Low risk of pollution during construction works	Slight effect in a worst- case scenario, but not significant	Pollution-prevention measures	No risk of effects				
River Roe and Tributaries SAC / ASSI	Low risk of pollution during construction works	Slight effect in a worst- case scenario, but not significant	Pollution-prevention measures	No risk of effects				
Fisheries	Low risk of pollution during construction works	Moderate to Large Adverse Significance depending on the sensitivity of individual watercourses	Pollution-prevention measures	No risk of effects				
Habitats (including active peat)	Permanent loss of small areas of habitat during construction	Imperceptible effect, not significant	Restoration of degraded blanket bog and wet heath habitat. Planting of a replacement hedgerow	Slight to moderate positive effect in the medium-term				
Badgers	No direct or indirect impacts during construction works. However, badgers may be trapped in trenches or open pipework	Slight, not significant	Providing means of escape in trenches, and blocking pipes overnight	No risk of effects				

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Lizards	None	None	Pre-construction surveys, and provision of refugia	Slight positive effect in the long-term
Operational Phase		•	•	
Bats	Collision with operational wind turbines	Possible moderate effect on Leisler's bats	Curtailment of turbines during periods of highest risk	Imperceptible effect, to be confirmed by operational monitoring
Fisheries	Low risk of pollution during construction works	Moderate to Large Adverse Significance depending on the sensitivity of individual watercourses	Pollution-prevention measures	No risk of effects

8.11 Statement of Significance

Subject to the successful implementation of the proposed mitigation measures, the Development will have neutral or slight-137. positive effects (i.e. a Biodiversity Net Gain) on all Important Ecological Features. Therefore, the Development will not cause any significant negative effects on designated sites, habitats, legally protected species, or any other features of ecological importance.

8	3.12 Glossary	У
	Abbreviation	Description
	ASSI	Area of Special Scientific Interest
	CEDaR	Centre for Environmental Data and Reporting
	CIEEM	Chartered Institute of Ecology and Environme
	EcIA	Ecological Impact Assessment
	ECoW	Ecological Clerk of Works
	GIS	Geographical Information Systems
	HMP	Habitat Management Plan
	IEF	Important Ecological Feature
	NI	Northern Ireland
	NNR	National Nature Reserve
	NVC	National Vegetation Classification System
	SAC	Special Area of Conservation
	SLNCI	Sites of Local Nature Conservation Importance
	SPA	Special Protection Area

tal Management

Ornithology 9

9.1 Introduction

This Chapter of the Environmental Statement (ES) evaluates the effects of the Development on the ornithology resource. This assessment was undertaken by Bird Surveyors Ltd (BSL). The assessment will consider the potential effects of the Development during the following development stages:

- Decommissioning of the Operational Rigged Hill Windfarm (Initial Phase of the Development);
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development: and
- Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development are likely to occur 2. partly in tandem. This represents a worst-case scenario for assessment purposes. Any effects arising as a result of the decommissioning of the Development is considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- This Chapter of the ES is supported by the following figures, in Volume 2 Figures, and Technical Appendices, in Volume 3 **Technical Appendices:**
 - A9.1: Ornithology Surveys 2014 2019; •
 - A9.2: Data Review;
 - A9.3: Collision Risk Modelling (CRM); and
 - A9.4: Operational Phase Bird Monitoring Plan.
- This Chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - Assessment of Potential Effects;
 - Mitigation and Residual Effects;
 - Cumulative Effect Assessment;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary.

9.2 Legislation, Policy and Guidance

The following guidance, legislation and information sources have been considered in carrying out this assessment:

- Environmental Impact Assessment Directive 85/337/EEC (as amended);
- EU Council Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive);
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of wild flora and fauna (the Habitats Directive);
- The Conservation (Natural Habitats, etc.) Regulations 1995 (as amended) which transposes the Habitats Directive into law in Northern Ireland (the Conservation Regulations);
- The Wildlife (Northern Ireland) Order 1985 (as amended) (the Wildlife Order);
- The Wildlife & Natural Environment (Northern Ireland) Act 2011;
- Planning Policy Statement 2 (PPS 2) Planning & Nature Conservation;
- Planning Policy Statement 18 (PPS 18); ٠
- JNCC (2012) UK Biodiversity Action Plan;
- Local Biodiversity Action Plans (www.biodiversityni.com);
- Balmer et al. (2013). Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland. British Trust for Ornithology:

- Colhoun & Cummins (2013). Birds of conservation concern in Ireland 2014 2019; CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal,
- 2nd edition
- DOE (2015). DOE Planning & Environment: Standing advice for planning officers and applicants seeking planning Permission for land which may impact on wild birds;
- Eaton et al., (2015). Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man:
- NIEA (2010). Wind Energy Development in Northern Ireland's Landscapes: Supplementary Planning Guidance to accompany Planning Policy Statement 18 'Renewable Energy'. NIEA Research and Development Series No 10/01, Belfast:
- Ruddock & Reid (2010). Review of windfarms and their impact on biodiversity: Guidance for developments in Northern Ireland. Report by the Natural Heritage Research Partnership, Quercus for the Northern Ireland Environment Agency, Northern Ireland, UK;
- Percival (2001; 2003) Birds and windfarms: a review of potential issues and impact assessment. Ecology Consulting 25pp Tosh et al. (2014). A review of the impacts of wind energy developments on biodiversity. Report prepared by the Natural Heritage Research Partnership (NHRP) between Quercus, Queen's University Belfast and the Northern Ireland Environment Agency (NIEA) for the Research and Development Series No. 14/02:
- SNH (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoiding action, Scottish Natural Heritage:
- SNH (2005). Survey methods for use in assessing the impacts of onshore windfarm on bird communities. Scottish Natural Heritage;
- SNH (2006). Assessing significance of impacts from onshore windfarms on birds' out-with designated areas. July 2006. Scottish Natural Heritage;
- SNH (2009). Guidance on methods for monitoring bird populations at onshore wind farms. Guidance Note, January 2009. Scottish Natural Heritage;
- SNH (2010a). Survey methods for use in assessing the impacts of onshore windfarms on bird communities. November 2005 (revised December 2010), Scottish Natural Heritage;
- SNH (2010b). Use of avoidance rates in the SNH wind farm collision risk model. Scottish Natural Heritage: SNH (2011). Guidance on assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage; SNH (2012a). Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage; SNH (2012b). Instruction Notice No. 099 - Dealing with development management casework where these is less raptor

- activity than expected. Scottish Natural Heritage;
- SNH (2013a). Recommended bird survey methods to inform impact assessment of onshore windfarms. Scottish Natural Heritage:
- SNH (2013b). Assessing connectivity with Special Protection Areas (SPAs). July 2013. Scottish Natural Heritage: SNH (2014a). Assessing the impact of small-scale wind energy proposals on the natural heritage. Version 2 June 2014.
- Scottish Natural Heritage:
- SNH (2014b). Flight speeds and biometrics for collision risk modelling. October 2014. Scottish Natural Heritage: SNH (2014c). Recommended bird survey methods to inform impact assessment of onshore wind farms. May 2014.
- Scottish Natural Heritage;
- SNH (2014d). Guidance on repowering wind farms: bird survey requirements. November 2014. Scottish Natural Heritage; SNH (2015a). Good practice during wind farm construction. Scottish Natural Heritage. Version 3;
- SNH (2015b). Spatial planning for onshore wind turbines natural heritage considerations. Scottish Natural Heritage; SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage;
- SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage:
- SNH (2018) Avoidance rate information & guidance note: Use of avoidance rates in the SNH wind farm collision risk model. Scottish Natural Heritage, Edinburgh, UK;
- SNH (2018). Assessing the cumulative impact of inshore wind farms on birds. Scottish Natural Heritage; and SNH (2018). Assessing significance of impacts from onshore windfarms on birds out-with designated areas. Scottish
- Natural Heritage.

6.

9.3 Assessment Methodology and Significance Criteria

9.3.1 Scoping Responses and Consultations

This Chapter has been informed by appropriate consultation undertaken during the Environmental Impact Assessment (EIA) process undertaken prior to planning application stage. In addition, a Scoping exercise was completed in advance of surveys and in consultation with NIEA. Relevant EIA Scoping responses and/or data were received from:

- Northern Ireland Environment Agency (NIEA within DAERA);
- Royal Society for Protection of Birds (RSPB); and
- Forest Service Northern Ireland (DAERA).
- 7. Key matters in the Scoping Opinion from consultees are reviewed here. The Scoping Opinion is provided in **Technical Appendix A2.2**.
- 8. Consultation was received from the organisations shown in **Table 9.1**.

Table 9.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
NIEA (Natural Heritage – Ornithology)	Meeting 04/03/2014	Review of survey scope and timings	Scope of survey works agreed
Ornithology) NIEA (Natural Heritage – Ornithology)	Meeting 09/04/2015	 Review of year 1 surveys (2014 – 2015) Habituation noted in the Operational Rigged Hill Windfarm site; particularly for snipe More details requested on wintering hen harrier roosts Agreement that no CRM required for golden plover on basis of established evidence of negligible likely impact Mitigation options discussed; pending calculations of displacement, disturbance, collision 	Meeting note prepared and agreedFurther details of this and the inter- annual variability presented and analysed in Chapter 9; Technical Appendix A9.1) and illustrated in Figures.Further details presented in Chapter 9; Technical Appendix A9.1; Confidential FiguresDetails of detections, flight paths and review of literature prepared in Chapter 9; Technical Appendix A9.1; Figures as informativesDetails of displacement and effects outlined in Chapter 9; Technical Appendix A9.1. Negligible effects predicted compared to baseline (Operational Rigged Hill Windfarm). Habitat management
			plan details restoration and management which will benefit snipe, passerines, kestrel and hen harrier
		CRMs required for peregrine, and any other species at risk of collision; request for further	barrier Details of collision risk presented for peregrine falcon, hen harrier, merlin, curlew, buzzard, kestrel
		and raven activity and CRM.	Technical Appendix A9.3 and



Type and Date

Summary of

Response

Consultee

Consultation	Response to Consultee
	illustrated in associated Figures. Buzzard, kestrel, raven CRM caveated as discussed. Agreed that these were secondary species in relation monitoring protocols but that further information remained desirable
nonitoring programme	Details of operational monitoring programme presented in Chapter 9
nat construction in son acceptable in ect to pre- surveys, on-going ng and avoidance of m, curlew by 800 m	Details of construction phasing and disturbance avoidance measures presented in Chapter 9
at no additional red	Additional surveys undertaken by SPR to maintain updated programme of works and findings to inform Chapter. Results of additional surveys 2015 – 2019 presented in Chapter 9 and Technical Appendix A9.1; A9.3
vey scope of works to date data	Completion of additional scope of surveys as discussed for 2016- 2017; further works undertaken over and above agreed scope of works in 2018 – 2019 which are presented in Technical Appendix A9.1; A9.3 & Chapter 9
arising from owering over and le (Operational indfarm)	Review of data and analysis undertaken comparing baseline (Operational Rigged Hill Windfarm) and proposed repowering to inform Chapter 9 and Technical Appendix A9.1; A9.3
arising to designated ortant species er Roe & Tributaries	Review of designated sites completed in Technical Appendix A9.1 ; review of sensitivities of species including those outlined by NIEA and analysis presented in Chapter 9; Technical Appendix A9.1; Technical Appendix A9.3
cts arising due to loss preeding, foraging	Potential effects on breeding, wintering and foraging habitats all reviewed and considered in Chapter 9

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Consultee	Type and Date	Summary of Consultation Response	Response to Consultee	Cons	sultee	Type and Date	Summary of Consultation Response	Response to Consultee
			habituation. Raven actually observed flying through rotor swept area at this locality				and potential connectivity to SAC / ASSI at River Roe Identifies hen harrier and merlin in	reviewed in Chapter 9 Details of red grouse, hen harr
		Requested further details on merlin and whether these are scoped in / out.	These were classed as a key sensitivity hence why not scoped out – these did not successfully nest at the location they were identified. Also move between				the forest and red grouse in the site	and merlin distribution and abundance presented in Technical Appendix A9.1 ; associated Figures and review in Chapter 9 .
			locations between years. Ground nesting not an option since deep heather areas heavily covered in self-seeded conifers and mostly	NIEA Herit	A (Natural tage)	Meeting 18/12/2018	Additional survey information acknowledged	Details of additional survey wo provided in Chapter 9; Techni Appendix A9.1; A9.3
			landownership control at this site. This species has nested right behind the turbines historically (M. Ruddock personal observation). Reviewed in Technical Appendix A9.1; Chapter 9 in context of final layout / design / track. No significant collision risk and all				Recognition of apparent habituation observed by some species and that the baseline was an Operational Rigged Hill Windfarm	Details of findings and inter-and changes presented in Chapter Technical Appendix A9.1; A9 species mapping and figures presented to show abundance distribution as well as habituati tolerance / avoidance of Operational Rigged Hill Windfa
			flights low level, displacement risk considered with final layout and design. Not scoped out initially as dependent on final layout / design. Nest baskets to be installed on lower lying areas away from turbines for kestrel, but these will also would be suitable for long- eared owl or merlin.				Avoidance of hen harrier by a minimum of 500 m and following best practice guidance and site- specific metrics. Discussed viewshed of turbines from nest locations given proximity of recent nesting sites selected by hen harriers	Set-back distances for hen har (merlin and all other species) presented in Chapter 9 ; Confidential Figures . Avoidar by windfarm design in line with best practice guidance and research and hen harriers hav selected to move closer to windfarm over duration of
		Requirement to include an HMP with particular emphasis on maintenance of snipe habitats within the windfarm footprint	HMP (Technical Appendix A3.2) for proposed wader / bird management interlinked with the wider habitat management and proposed restoration / management of a cumulative 76 ha which includes blanket bog restoration, removal of re-seeded					monitoring. Zones of theoretical visibility (ZTV) constructed for operational and proposed turb (Figure 6.11) shows that both of turbines are theoretically vision from both adjacent nest sites. However clearly the actual vision is dependent on screening from trees etc which is currently
			(including scrapes), and creation of linear foraging features for hen harrier etc. HMP considered in context of ornithology based on layout and displacement / collision models and results which are presented in Technical Appendix A9.1; A9.3 and Chapter 9					(temporarily) present at the northern site but not at the ea site. Hen harrier nests further as recorded during initial monitoring years are well awa and screened from turbines. H harrier nesting locations within afforested habitats are dynam and dependent on the availab
DAERA – Forest Service	Scoping Opinion 06/10/2017	Identifies nearby Cam Forest under FS management and also access track through the forest	Details of designated sites and relevant habitat are presented in Technical Appendix A9.1 and					compartments (typically 3-12 of age) and such nest sites a selected here site are typical

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
		Requirements for CRM and displacement modelling to be undertaken for both operational	unsuitable for nesting outside of the age range and the species would be expected to move to other forest parcels of suitable age structure over time. There is an extensive range of suitable age structured forest available locally and clear-felling / re-planting remains on-going (see also Forest Service Scoping Opinion) Details of CRM and displacement modelling all undertaken for both Operational Rigged Hill Windfarm
		Undertaken for both operational and proposed windfarm Details of historical data and/or collision fatalities if available for the site	Operational Rigged Hill Windfarm (baseline) and the Development and results compared and analysed in Chapter 9 No historical information available from original application stage, but detailed baseline surveys conducted 2014 – 2019 (Section 9.4) and SPR conducts on-going mortality reporting and recording strategy at all operational sites
			strategy at all operational sites (Section 9.5.6). A monitoring programme is proposed to ensure relevant post-construction data are collected (in Technical Appendix A9.4).
	8/11/17	undertaken	undertaken since the Scoping Opinion during 2018-2019
		Comments over location of vantage points within the development site	Response and details of rationale provided in methodology section Technical Appendix A9.1
		Review of assessment requirement and mitigation (including agricultural / habitat management; time restrictions on construction	Displacement and disturbance review undertaken to consider mitigation; HMP proposed to reinstate and restore extensive areas of habitat which will benefit bird species; details of construction management strategy provided in Chapter 9
		Advocates "no loss of biodiversity"	There are negligible effects predicted from baseline (Operational Rigged Hill Windfarm) to Development; in some incidences risk is reduced as a result of the Development. Details

ases,

9.3.3 Elements Scoped Out of Assessment

- Further consideration and assessment is required based on a final layout, prior to determining if any ornithological effects can be scoped out of the assessment. It is anticipated that direct effects on curlew territories can be scoped out, due to the distance between the recorded curlew location and the Development.
- 12. It is noted that there is strong evidence of habituation of some species within the Operational Rigged Hill Windfarm, in particular numerous active (and successful) snipe territories were recorded within the Operational Rigged Hill Windfarm therefore indicating habituation to operational turbines. The baseline findings indicate habituation to the operational turbines but that this, and other species, may still be vulnerable to decommissioning/construction activities. During one survey year an active nest was observed remotely approximately 25 m from a turbine base and chicks were later observed walking around the turbine base and tracks.
- Red grouse territories recorded within the Operational Rigged Hill Windfarm and at one territory a covey of four birds was recorded in the autumn counts, so grouse are breeding successfully. The baseline findings indicate habituation to the operational turbines but that this, and other species, may still be vulnerable to decommissioning/construction activities.
- There were a small number of greylag goose and whooper swan flights recorded within the vantage point surveys over the Survey Area and 500 m buffer, although these passed either outside the turbine envelope(s) and/or were above potential collision risk height. There are known wintering swan sites approximately 8 - 15 km away but there were no connectivity or movement corridors identified for these species near the Site Boundary (or the Lough Foyle SPA) and thus low weighting is given to effects on these species.
- Some (non-breeding) golden plover flights were recorded, which could be subject to collision risk. However published literature indicates that this species shows considerable avoidance and lack of effect due to windfarms (Fielding & Haworth, 2010¹; Douglas et al., 2011²) although some recent studies indicate breeding season effects (Sansom et al., 2016³). Thus significant effects may be considered unlikely based on published literature, as such they will be considered in this Chapter, but no collision risk model is proposed to be undertaken for this species, as agreed with NIEA (Table 9.1).
- It is noted that NIEA in the Scoping Opinion "disagreed with the intention to scope out some ecological impacts". It is noted that in relation to ornithology, NIEA agreed that a number of additional factors could be scoped out subject to presentation of data and appropriate windfarm design and mitigation, particularly in relation to construction (Table 9.1) and the requisite information to inform NIEA is made available here, Chapter 9, and also in Technical Appendices A9.1; A9.2; A9.3. Thus whilst the Chapter has scoped out a number of non-significant effects, as agreed with NIEA, all of the target species and findings are reviewed and the evidence, including for those effects which were scoped out, is presented to provide an evidence base to NIEA and other consultees.

9.3.4 Study Area / Survey Area

- The ornithological Survey Area was digitally mapped in ArcGIS 10.5 and defined as the Site Boundary (as defined at scoping) buffered by 500 m (hereafter 500 m Survey Area) respectively for breeding and wintering bird surveys and vantage point surveys (Figure 9.1). This buffer was selected as recent research has shown the majority of wind turbine effects are prevalent up to 500 m (Pearce-Higgins et al., 2009⁴, Ruddock & Reid, 2010⁵; Figure 9.1; Figure 9.2).
- An 800 m buffer of the Site Boundary (hereafter 800 m Survey Area) defined the search area for curlew during breeding season surveys; as displacement effects on this species are considered high up to 800 m (Pearce-Higgins et al., 2009; Figure 9.1). The wider priority species Survey Area was defined as the 2 km buffer of the Site Boundary (hereafter 2 km Survey Area) to search for hen harrier and merlin nest locations and/or breeding territories or wintering locations of species considered

vulnerable and/or priority species within Northern Ireland (Table 9.1). A wider search area up to 5 km (hereafter 5 km Survey Area) was utilised during priority searches for hen harrier and for wintering swans and geese (Figure 9.3).

9.3.5 Design Parameters

For the purposes of this Chapter the details of the Development are included in Chapter 3: Development Description. 19

9.3.6 Baseline Survey Methodology

- The knowledge of the spatial and temporal occurrence of bird species within and surrounding the Site (see Technical 20 Appendix A9.1) is essential to inform the likely effects of the Development.
- Where available national documents have been utilised and in the absence of some national best practice guidance, Scottish 21. Natural Heritage (SNH) guidance has been reviewed and incorporated where necessary and an extensive review of relevant and published literature and peer-reviewed science which are referenced in text where relevant (see also Technical Appendix A9.1). A range of expert guidance documents have thus been utilised throughout the Scoping, design and preparation of this Chapter. This Chapter is further supported by, and should be read in conjunction with **Technical Appendix** A9.1 and the associated figures in Volume 2 Figures.
- The survey programme and assessment methods have been designed and reviewed throughout following best practice 22. information (see also Technical Appendix A9.1) including regional and nationally recognised best practice guidance and published literature (Section 9.2). The methods utilised have four main aims:
 - To provide baseline data on all extant ornithological features to establish the risk posed to birds due to the Development;
 - vear:
 - To identify locations of priority target species territories to establish risk posed due to Development; and
 - To identify mitigation options and future monitoring needs, where required, upon assessment of disturbance and/or displacement and/or collision risk due to the Development
- The objectives were to: 23
 - · Establish the sensitivities and designated site features within the landscape, in particular to establish and identify any species-specific risks and identify key ornithological receptors
 - Establish the distribution and abundance of nearest known priority species using desk-based studies;
 - and wintering season from walkover and vantage point surveys within the 500 m Survey Area;
 - Higgins et al., 2009);
 - Establish the breeding distribution and abundance of snipe Gallinago gallinago within the 500 m Survey Area:
 - Establish the breeding distribution and abundance of red grouse Lagopus lagopus within 500 m Survey Area;
 - field surveys during both the breeding and wintering season within 2 km and 5 km (swans / hen harrier); and
 - Establish the distribution and abundance of suitable displacement habitats or mitigation options and provide recommendations for management, if necessary.
- which likely significant effects are anticipated and assessed. The ZoI for individual ornithological receptors refers to the area within which potential effects are anticipated (500 m / 800 m / 2 km / 5 km Survey Areas) and were assigned following best available guidance (SNH 2016) and published literature. The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ornithological Receptors. Following a comprehensive desk study, initial site visits and consultation, a list of "Target species" likely to occur in the Zol of the Development was derived (Technical Appendix A9.1; Table 9.1). The survey work carried out on the Site was specifically designed to survey for these identified target species in accordance with SNH guidance (2005; 2013; superseded by SNH, 2017). The target species list (see Technical Appendix A9.1) was derived from:
 - SNH (2018). Assessing the cumulative impact of onshore windfarms on birds. Scottish Natural Heritage;

To quantify the risk of collision with turbines to extant bird species flying through the Development area throughout the

Establish the spatial distribution and relative abundance of all bird species from primary field surveys during the breeding

Establish the breeding distribution and abundance of curlew Numenius arguata within the 800 m Survey Area (see Pearce

Establish the distribution and abundance of priority species (specifically waders, raptors, swans and geese) from primary

The key ornithological receptors are defined as species occurring within the Zone of Influence (ZoI) of the Development upon

¹ Fielding, A.H. & Haworth, P.F. (2010). Golden eagles and wind farms. A report created under an SNH Call-of-Contract arrangement 56 pp. ² Douglas, D. J. T., Bellamy, P. E. & Pearce-Higgins, J. W. (2011). Changes in the abundance and distribution of upland breeding birds at an operational windfarm Bird Study 58: 37-43.

³ Sansom, A., Pearce-Higgins, J.W. & Douglas, D.J.T. (2016). Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. IBIS 158: 541-555

⁴ Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. (2009a). The distribution of breeding birds around upland wind farms. Journal of Applied Ecology 46: 1323-1331.

⁵ Ruddock, M. & Reid, N. (2010) Review of windfarms and their impact on biodiversity: Guidance for developments in Northern Ireland. Report by the Natural Heritage Research Partnership, Quercus for the Northern Ireland Environment Agency, Northern Ireland, UK.

- SNH (2018). Assessing significance of impacts from onshore windfarms on birds outwith designated areas. Scottish Natural Heritage;
- Designated feature species of Special Protection Areas (SPA) within the zone of likely significant effects; ٠
- Annex I of the Birds Directive;
- Species protected under Schedule 1 of the Northern Ireland Wildlife Order 1985 as amended by the Wildlife and Natural Environment (WANE) Act 2011:
- Red and Amber listed birds of Conservation Concern (Colhoun & Cummins, 2013; Eaton et al., 2014); and
- Published and peer-reviewed scientific literature which identifies species or assemblage specific sensitivities or effects (e.g. Pearce-Higgins et al., 2009; 2012).
- Following analysis of the collated bird survey data, it was possible to refine the list of target species to identify key 25. ornithological receptors and associated sensitivities (see Table 9.7) and exclude species which were not recorded during the extensive surveys and those for which pathways for a potential significant effect could not be identified.
- The survey scope of works has been designed utilising best practice guidance and scoping of the proposed survey works have been discussed and findings reviewed with NIEA ornithologists (Table 9.1). The following field surveys which have been undertaken between 2014 and 2019:
 - Breeding vantage point observation (March 2014 August 2014) & (March 2018 August 2018); ٠
 - Wintering vantage point observation (September 2014 March 2015) & (September 2018 March 2019);
 - Spring migration vantage point observation (January 2014 April 2014) & (January 2018 April 2018);
 - Autumn migration vantage point observation (September 2014 November 2014) & (September 2018 November 2018);
 - Breeding walkover surveys (Brown & Shepherd⁶ + passerines) (March 2014 August 2014 & March 2018 August 2018): includina:
 - Prey species surveys (April 2014 July 2014) & (April 2018 July 2018);
 - Woodland point counts (April 2014 July 2014) & (April 2018 July 2018);
 - Wintering walkover surveys (September 2014 February 2015);
 - Breeding priority species surveys (March 2014 August 2014); including
 - Snipe surveys (May 2014) & (May 2018);
 - Red grouse surveys (April 2014; August 2014) & (April 2018; August 2018);
 - Wintering priority species surveys (September 2014 February 2015) & (September 2018 February 2019);
 - Supplementary breeding / wintering priority species surveys (March 2015 August 2015; March 2016 April 2017).
- The surveys were undertaken by experienced field ornithologists, under licence from NIEA (where necessary). Full details of 27. the survey methods, survey effort, and weather conditions are presented in Technical Appendix A9.1; see also Table 9.2 of Technical Appendix A9.1 for a summary of survey effort and programme, which is not replicated further here.

9.3.7 Methodology for the Assessment of Effects

- The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.
- The assessment follows the requirements set out in the EIA Regulations and standardised guidance (CIEEM, 2018; Chapter 29. 2) to focus on potentially significant effects.
- The assessment (Section 9.5) considers the potential effects arising from the footprint of Development due to turbines, turbine blades, nacelles, towers and/or ancillary windfarm infrastructure (e.g. sub-station, Energy Storage Unit, power-lines, meteorological masts) for the decommissioning/construction and operational phases, are assessed in consideration of direct loss of breeding, wintering and/or foraging habitat; direct mortality due to collision; and/or displacement of birds as a result of increased disturbance and/or decreased suitability of breeding, wintering and/or foraging habitats.
- The assessment (Section 9.5) considers that disturbance can take varying formats and occur over short or long temporal periods. The effects may be transient (e.g. short-term alteration in behaviour) or permanent (e.g. total displacement from the

breeding or wintering locations) and that disturbance effects may be lower depending on the tolerance and/or experience/habituation of individuals or species (Ruddock & Whitfield, 2007⁷; Whitfield et al., 2008⁸).

- The assessment (Section 9.5) considers that effects are likely to occur in phases; during the initial 32. decommissioning/construction phases (which will occur simultaneously with the former) and during the operational phase. The decommissioning/construction phases will occur over a short temporal period (approximately eight months) whilst the operational phase will occur over the operational life-time of the Development, which is assumed to be permanent. Cumulative effects can also occur temporally or spatially in combination with other nearby proposals.
- Assessment of potential effects considered the Survey Areas (500 m, 800 m and 2 km; Figure 9.1) which have been defined 33. on the basis of the Indicative Development Area, rather than the Development footprint. These buffers allow an assessment of wider species connectivity in the area and to establish whether beyond the initial decommissioning/construction and operational phases, footprint effects are likely within a wider Zol. However further assessment is undertaken of the turbine 500 m buffers and the infrastructure footprints for both the Operational Rigged Hill Windfarm and the Development.
- To establish effects of the Development, additional mapping and modelling analyses were undertaken of the baseline ornithology data (Technical Appendix A9.1) which includes comparative data between the existing Operational Rigged Hill Windfarm infrastructure and turbines (baseline) compared to the proposed Development infrastructure and turbines. Additional analyses were completed using the baseline data to review:
 - Potential effects types;
 - Potential effects on breeding birds and within 500 m of turbines and infrastructure footprint;
 - Potential effects on wintering birds within 500 m of turbines and infrastructure footprint;
 - Potential effects of collision on birds within 500 m of turbines:

 - Potential effects by species; and
 - Potential effects on designated sites and/or site features.
- Following the results from each survey and assessment of the baseline and sensitivity of the ornithological receptor (Table 35. 9.2), the direct and/or indirect effects of the Development are analysed. This process considers the necessary mitigation measures and residual effects.
- The assessment considers each of the potential effects of windfarms (SNH, 2018; Section 9.3.2) and for each of these risks, the detailed knowledge of bird distribution and flight activity within and surrounding the Site has been utilised to predict the potential effects of the Development on birds. Effects are assessed with regard to the decommissioning / construction phases, the operational phase and cumulatively in consideration with other projects. Utilising the results from each survey and assessment of the baseline (Technical Appendix A9.1), the effects of the Development will be analysed in isolation and in combination (with cumulative developments) and considered based on:
 - Type (positive; neutral; negative);
 - Extent (see Section 9.3.7.1);
 - Magnitude (see Table 9.3);
 - Duration (see Section 9.3.7.2);
 - Reversibility (temporary, permanent, reversible, irreversible);
 - Timing (hourly, daily, weekly, monthly, seasonally, annually); and
 - Frequency (once, rarely, occasionally, frequently, constantly).
- Effects will be reported according to EIA Regulations as either significant or not significant in the context of the sensitivity of 37 the species, the conservation status of bird species (Colhoun & Cummins, 2013; Eaton et al., 2015) and population status and trends of each potentially affected species. If necessary, upon assessment of the effects of the Development, this process

Collision risk modelling (CRM) - specifically for peregrine falcon; hen harrier; buzzard, kestrel and raven;

⁷ Ruddock, M. & Whitfield, D. (2007). A review of disturbance distances in selected bird species. A report from Natural Research (Projects) Ltd

⁸ Whitfield, D.P., Ruddock, M. & Bullman, R. (2008). Expert opinion as a tool for quantifying bird tolerance to human disturbance. Biological

⁶ Brown, A.F. & Shepherd, K.B. (1993). A Method for Censusing Upland Breeding Waders. Bird Study 40: 189-195.

to Scottish Natural Heritage. 181pp

Conservation 141: 2708-2717.

considers the necessary mitigation and / or enhancement measures together with any residual effects, as well as cumulative effects.

9.3.7.1 Geographical Extent

The geographical extent of the receptors and effects are defined based on population status and trends of each species 38. and/or assemblage utilising the following terms:

- Local level (on site or neighbouring site);
- District level (Causeway Coast and Glens); ٠
- Regional level (Northern Ireland); •
- National level (UK); and ٠
- ٠ International.

9.3.7.2 Duration of Effect

- The duration of the effect is defined during the assessment based on: 39.
 - Short-term (decommissioning / construction phases); and •
 - Permanent but reversible (operational phase).

9.3.7.3 Sensitivity of Receptors

The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the 40. sensitivity of potentially affected receptors, is be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

41. The framework for determining the sensitivity of receptors is detailed in **Table 9.2**.

Table 9.2: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance. In an ornithological context (Percival, 2003) this includes: Species that form the cited interest of an SPA and other statutory protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance. In an ornithological context (Percival, 2003) this includes: Species that contribute to the integrity of an SPA but which are not cited as species for which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, white-tailed eagle, curlew, red necked phalarope, roseate tern and chough. Species present in nationally important numbers (>1% of the UK population)
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance. In an ornithological context (Percival, 2003) this includes: Species on Annex 1 of the EU Birds Directive. Species present in regionally important numbers (>1% regional (Northern Ireland) population). Other species on the regional and/or national red list of Birds of Conservation Concern (Colhoun & Cummins, 2013; Eaton et al., 2015)
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance. In an ornithological context (Percival, 2003) this includes:

Sensitivity of Receptor	Definition				
	Any other species of conservation inte amber list of Birds of Conservation Co				
Negligible	The receptor is resistant to change and In an ornithological context (Percival, 2 Any other species of conservation inte green list of Birds of Conservation Cor				

9.3.7.4 Magnitude of Effect

- The magnitude of potential effects will be identified through consideration of the Development, the degree of change to 42. baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.
- The criteria for assessing the magnitude of an effect are presented in Table 9.3. 43.

Magnitude of Effects	Definition				
High	A fundamental change to the baseline condition of the asset, leading to total loss or major alteration of character. In an ornithological context (Percival, 2003) this includes: Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed. <i>Guide: 20-80% of population/ habitat lost</i>				
Medium	A material, partial loss or alteration of character. In an ornithological context (Percival, 2003) this includes: Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed. <i>Guide: 5-20% of population/ habitat lost</i>				
Low	A slight, detectable, alteration of the baseline condition of the asset. In an ornithological context (Percival, 2003) this includes: Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns. <i>Guide: 1-5% of population/ habitat lost</i>				
Negligible	A barely distinguishable change from baseline conditions. In an ornithological context (Percival, 2003) this includes: Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. <i>Guide: < 1% population/ habitat lost</i>				

9.3.7.5 Significance of Effect

44. The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 9.4 summarises guideline criteria for assessing the significance of effects.

erest, including species on regional and/or national ncern (Colhoun & Cummins, 2013; Eaton et al., 2015)

- d is of little environmental value.
- 2003) this includes:
- erest, including species on regional and/or national ncern (Colhoun & Cummins, 2013; Eaton et al., 2015)

Table 9.4: Framework for Assessment of the Significance of Effects

Magnitude of	Sensitivity of Receptor							
Effect	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			

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA 45. Regulations, and are shaded in light green in the above table.

9.3.8 Collision Risk Modelling

- Field data on target species (peregrine, hen harrier) were recorded from four vantage points (Figure 9.1; excludes the migration vantage point, MIGVP) during the breeding season (March 2014 – August 2014 & March 2018 – August 2018; Technical Appendix A9.1) and wintering season (September 2014 – March 2014 & September 2018 – March 2019).
- Collision risk modelling is a two-stage process (Band et al., 2007⁹) whereby Stage 1 estimates the number of birds that fly through the rotor swept area (RSA) and Stage 2 predicts the proportion of these birds that could theoretically be hit by the rotor blade (Technical Appendix A9.3). The combination of these two stages produces an estimate of collision fatalities in the presumed absence of avoidance behaviour. The model is then adjusted for i) turbine efficiency and ii) avoidance behaviour (set separately at rates of 95%, 98% and 99% successful avoidance) to calculate minimum and maximum likely collision risk (Technical Appendix A9.3).
- For the purposes of the models the area of the both the Operational Rigged Hill Windfarm and Development infrastructure is initially taken to be the envelope as defined by the turbine locations and the associated turbine plus 500 m buffer for which field data were collected. This equates to an area of 2,281,586 m²; for the Operational Rigged Hill Windfarm, and 3,288,415 m² for the proposed Development. These 500 m buffers are utilised to encompass rotor blade length and to minimise spatial error in flight recording accuracy due to the effects of parallax.
- The area visible from each vantage point (hereafter viewshed) was calculated and ground-truthed (i.e. confirmed during field work) to establish the physical visibility of the viewshed including landscape features (e.g. woodland, spoil heaps etc) that are not accounted for in the computer modelling programme. These viewshed areas were truncated at 2 km as the efficacy of detection rates decline beyond this distance; although varies with size; species; colouration and habitat (Madders & Whitfield, 2006). The VPs are considered to have effectively covered the area of the proposed Development turbines to ground level, when truncated at 2 km, and all airspace out to 2 km and beyond was visible.
- For the purposes of the modelling process; the bird breeding season is defined as the period March to August inclusive and the non-breeding season as September to February inclusive. Biometric data for each species was derived from Snow & Perrins (1998)¹⁰ and/or published literature review by BTO (2019)¹¹. It is assumed in CRM that birds are available to collide with turbines for 365 days per year based on the average monthly day length and activity at the site (Technical Appendix A9.3; Table A9.1), although for some species may not present in the area during the wintering period (Technical Appendix A9.1) and adjustments for seasonal occurrence were made accordingly. Bird flight speeds were derived from Provan & Whitfield (2006)¹² and SNH (2014)¹³.
- The models were constructed for both the existing and the proposed turbines in order to compare the effects between the Operational Rigged Hill Windfarm and the Development. Turbine parameters were entered into the CRM; including the

number of turbines (n); hub height (m), rotor diameter (m), rotation period (sec); maximum chord i.e. blade width (m); rotor depth (m); pitch (°) and operation period (%).

- revolution) respectively.
- Details of the proposed Development turbines are based on a candidate machine assuming worst case parameters (the lowest likely tower height and greatest rotor diameter). The likely candidate turbines have an estimated hub height of (6.5 – 13.7 rpm) are often variable in turbines; where a range is available average values were utilised in the CRM for pitch (44.5°) and the maximum rotation period at 13.7 rpm (4.38 seconds for single revolution) respectively.
- 52 al., (2007) usually considered wind turbine operational time as 75% or greater and in the absence of site-specific wind data the nominal figure of 75% has been utilised.
- Each species is considered separately between years of survey 2014 2015 and 2018 2019 and comparison between 53. Operational Rigged Hill Windfarm collision risk estimates and the proposed Development collision risk estimates made. Only those flights which passed through the respective, existing and proposed windfarm (500 m buffer) areas are incorporated to the collision risk modelling (Figures 9.56 & 9.57; Technical Appendix A9.3).

9.3.9 Assessment Limitations

There were no significant limitations to the surveys, baseline data or constraints on the assessment. An extensive range of 54 surveys were undertaken during 2014 - 2019 which covered all parts of the Site, Survey Areas and associated buffers including existing and proposed turbine buffers (Figure 9.7).

9.4 Baseline Description

- 55 semi-improved, rushy grazed pastures (Figure 9.1) and much of the Development comprises existing infrastructure (Figure 3.3).
- There are occasional trees or shrubs, particularly blackthorn Prunus spinosa or hawthorn Crataegus monogyna and a maze of 56 mixed scrub, including bramble Rubus fruticosus and gorse Ulex europaeus around inaccessible stream features (Figure 9.2). From an ornithological perspective, habitats are readily distinguishable in the orthophotography (Figure 9.2) with clear evidence of significant agricultural improvement of land along the western parts of the Study Area (Figure 9.1). Some parts of Study Area are bounded by either post and/or wire fencing, hedgerows, scrub or stone walls (Figure 9.2).
- The Operational Rigged Hill Windfarm is located in the east of the Site and contains ten 500 kW turbines. There is mixed 57. grazing and agricultural activity mostly sheep grazing and some cattle grazing primarily within the western areas and at various levels around the Site, and occasional human activity in the windfarm and along the existing access track associated with operational and maintenance activities.
- A range of semi-natural and improved habitats were present within the Site Boundary of Rigged Hill Windfarm, arranged in three guite discrete altitudinal bands which run in a north-south orientation to mirror the approximate orientation of Rigged Hill. The upland plateau of Rigged Hill itself, occupying the eastern-most part of the Site Boundary and including the area where all ten existing turbines and their associated access roads where located, was dominated by modified blanket bog; that is, blanket bog in which the hydrology had been altered through the digging of drainage ditches. This is described and effects on it are assessed in Chapter 8: Ecology and Fisheries.
- Numerous ditches had been cut into the peat, primarily along an east-west orientation to facilitate drainage to the west, where the ground sloped away from the plateau. Such ditches were especially prominent in the southern half of the site. Blanket bog habitat shows clearly on aerial photographs of the site as areas of purple-brown vegetation (Figures 9.1 & 9.2), these colours indicating the dominance of Heather within this habitat. Peat within the area of blanket bog had a noticeably uneven topography which, together with an often deep covering of heather Calluna vulgaris and deep drainage ditches. Occasional carpets of the mosses Sphagnum capillifolium and S. papillosum, as well as tussocks of hare's-tail cottongrass Eriophorum

• The operational turbines have a maximum hub height of 39 m with a rotor diameter of 37 m (radius 18.5 m from the centre of the hub). Whilst pitch $(0.02 - 20^{\circ})$ and rotation period (30 rpm) are often variable in turbines; where a range is available average values were utilised in the CRM for pitch (10°) and the maximum rotation period at 30 rpm (2 seconds for single

75 m with a rotor diameter of 120 m (radius 60 m from the centre of the hub). Whilst pitch $(0.0 - 89^{\circ})$ and rotation period

Wind turbines were assumed to be operative for 75% of the time due to speed, inclement weather and maintenance. Band et

The Survey Area (Figure 9.1) comprises the Operational Rigged Hill Windfarm and infrastructure and a variety of improved or

⁹ Band, W., Madders, M. & Whitfield, D. P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In de Lucas, M., Hanss, G. and Ferrer, M. (eds). Birds and wind farms: Risk assessment and mitigation. pp Quercus.

^o Snow, D.W. & Perrins, C.M. (1998). The Birds of the Western Palaearctic. Volume I Non-Passerines. Oxford University Press. ¹¹ BTO (2019). <u>https://www.bto.org/understanding-birds/birdfacts</u>

¹² Provan, S. & Whitfield, D.P. (2006). Avian flight speeds and biometrics for use in collision risk modelling. Report to Scottish Natural Heritage from Natural Research (Projects) Ltd.

¹³ SNH (2014b). Flight speeds and biometrics for collision risk modelling. October 2014. Scottish Natural Heritage;

vaginatum, indicated that some parts of the bog were still sufficiently wetted to permit the continued growth of these peatforming plant species although significant numbers of self-seeded, colonising sitka spruce Picea sitchensis are evident across the bog and particularly in the eastern and southern parts of the Operational Rigged Hill Windfarm.

- To the immediate west of the plateau, the ground slopes westwards and here the blanket bog which dominated on the plateau 60 fragmented into a mosaic habitat with areas of acid grassland and marshy grassland which together dominated the central portion of the Site Boundary. Areas of acid grassland were dominated by grasses tolerant of acid soils such as purple moorgrass Molinia caerulea, mat-grass Nardus stricta, wavy hair-grass Deschampsia flexuosa, common bent Agrostis capillaris and sweet vernal-grass Anthoxanthum odoratum. Such grassland was relatively species-poor with the sward being dominated by grasses and relatively few sedges or forbs including tormentil Potentilla erecta, heath bedstraw Galium saxatile and greenribbed sedge Carex binervis. The bog-moss Sphagnum russowii was noted in some areas of acid grassland in the southern part of the Site Boundary.
- Areas of marshy grassland were dominated by occasional stands of soft rush Juncus effusus and sharp-flowered rush J. 61. acutiflorus, the former generally associated with areas of localised flushing where an abundance of the mosses Sphagnum palustre and S. fallax were also noted; the latter generally supported a greater diversity of plant species within the sward including marsh bedstraw Galium palustre, marsh willowherb Epilobium palustre, heath spotted orchid Dactylorhiza ericetorum, lesser spearwort Ranunculus flammula, devils-bit scabious Succisa pratensis and sedges including glaucous Carex flacca, common C. nigra and carnation Carex panicea.
- Both acid marshy grassland habitats were bisected by a number of groundwater dependent terrestrial ecosystems (flushes), 62. these areas often indicated by an abundance of mosses and sedges. Several small streams also cut through the grassland habitats, their banks often steep due to the rapid flow rate of water, the banks also often marked by patches of developing aorse scrub. The western limit of the Site Boundary stretched downslope sufficiently to include enclosed agricultural fields of improved grassland; this nutrient-rich, species-poor habitat shows clearly orthophotographs as fields of bright green. Several farm houses and associated outbuildings, as well as private dwellings and their access lanes, punctuate this area of more improved agricultural land (Figure 9.2) as well as an extensive range of hedgerow, tree and fence bounded fields.
- The eastern and north-eastern parts of the 500 m Survey Area were dominated by mature coniferous plantation, composed 63. primarily of Sitka Spruce Picea sitchensis various coupes of mature plantation was harvested and which were clear-felled throughout the survey periods (2014 - 2019). The north-western portion of the 500 m Survey Area consisted of a mosaic of acid grassland and marshy grassland, grading into improved agricultural fields as the gradient of the land became less steep towards the Terrydoo Road. Improved grassland also dominated the western and south-western parts of the 500 m Survey Area with occasional farm buildings, private dwellings, mature hedgerows and mature tree-lines sub-dividing the otherwise highly modified, improved pastoral lowland landscape. The southern portion of the 500 m Survey Area consisted primarily of a mosaic of marshy grassland and acid grassland, with blanket bog becoming increasingly prevalent up-slope (to the southeast).
- The western, north-western and south-western portions of the 800 m Survey Area consisted of improved agricultural fields 64. which were bisected and punctuated by occasional mature hedgerows and tree-lines, farm buildings and private dwellings in close proximity to Terrydoo Road. Moving eastward along the northern and southern parts of the 800 m Survey Area, improved agricultural fields transition into a mosaic of acid grassland and marshy grassland owing to increased altitude and increasingly steep topography.
- Along the southern boundary of the Site these grassland habitats transition into blanket bog on the plateau of the hill; along the northern boundary this transition is prevented by the presence of coniferous plantation forest; a break within this part of the forest supports a mosaic of modified blanket bog and marshy grassland habitat. The eastern part of the 800 m Survey Area consists of coniferous plantation forest of varying age classes and which extends considerably into the 2 km Survey Area.
- Whilst further improved agricultural habitat dominates the 2 km Survey Area to the west, to the south grass / heather moorland 66. and bog mosaic extends over an elevated peak at Craiggore and towards the summit of Donald's Hill and associated crags. A range of active and dormant quarries are located to the north and to the south of the 2 km Survey area. The Ulster Way, a public right of way (PRoW), bisects the Operational Rigged Hill Windfarm and extends towards Temain Hill and Donald's Hill (Figure 9.1) and is frequently utilised by recreational walkers including with dogs and other users.

- The Site is not part of a designated site or site complex, but is located south-east of the Lough Foyle Special Protection Area 67. (SPA) which is designated for various waterbirds. A wider review of the designations and protected species is reviewed in Technical Appendix A9.1. The following designations have been considered relevant.
- The Site is not located within any nationally or internationally designated sites for ornithological features. The Site is located approximately 10 km to the south-east of the Lough Foyle SPA, designated in 1999 for whooper swan, light-bellied brent geese and bar-tailed godwit and the wintering waterbird assemblage. This SPA was designated five years after the approval of the Operational Rigged Hill Windfarm in 1994. Lough Foyle is also designated as an ASSI and a RAMSAR site and adjacent to Roe Estuary NNR (Figure 9.4). A variety of adjacent windfarms and single turbines have been approved nearby since, and post-designation and closer to the SPA than the Development.
- Within 5 km, the Coolnasillagh ASSI mentions curlew and snipe and the Ballyrisk More ASSI designated for species rich 69. grassland mentions willow warbler and meadow pipit in the citation document. Gortcobies ASSI Castle River Valley ASSI, Smulgedon ASSI and Brockagh Quarry ASSI only generally mentions the suitability of the site for birds, but does not list any specific species. There are several other designated sites between 5 km and 10 km some of which cite ornithology features (see Table A9.2). Additionally, baseline surveys and assessment considered any flight path connectivity between designated sites.
- Full baseline results are presented in **Technical Appendix A9.1**; however, the key findings are as follows: 70.
 - Desktop reviews were undertaken of published distributional data from a variety of published and specific requested data and designated sites in the area;
 - During vantage point surveys conducted during up to 17 target species recorded which varied between years and some seasonal variation also recorded between breeding and wintering seasons. A similar range of target species were recorded during spring migration and autumn migration;
 - Most frequently detected species from all vantage point surveys were raven, lesser black-backed gull, buzzard, kestrel and snipe although the detection frequency varied by vantage point type, seasonally and between years;
 - additionally, buzzard, raven and kestrel flights were mapped and reviewed in collision risk modelling. There were three whooper swan flights and 1 greylag goose flight recorded within the 500 m Survey Area during vantage point observations;
 - There were up to 60 species recorded during breeding walkover surveys which varied between years and a smaller number, up to 57 species, recorded during winter walkover surveys;
 - peregrine were all recorded breeding within 2 km Survey Area. A maximum of one curlew territory occurred within the breeding hen harrier and merlin locations were identified beyond the 2 km Survey Area to the north and south respectively. Peregrine falcons were recorded within the 2 km Survey Area and successfully bred in one of the survey noted in the 500 m Survey Area during vantage point surveys. Long-eared owl, merlin, sparrowhawk, buzzard, hen harrier, raven and kestrel territories were recorded within the 500 m Survey Area;
 - distribution and abundance of these varied between years of survey;
 - were recorded within 1 km of the Operational Rigged Hill Windfarm and also appeared habituated;
 - 2 km Survey Area;
 - known to occur more than 10 km away; and
 - Regularly occupied hen harrier winter roost areas were identified within the 2 km Survey Area and the maximum roost

The locations, flight paths and heights were recorded for target 1 species and utilised to inform collision risk modelling;

Priority species breeding locations confirmed that curlew, buzzard, sparrowhawk, kestrel, raven, red grouse, snipe and 2 km Survey Area to the south of the Operational Rigged Hill Windfarm but was beyond 1 km from both the existing and proposed turbines. Nearest breeding hen harrier and merlin were recorded in the 500 m Survey Area. Other successful years but failed to breed in most survey years with single adult / immature birds were recorded. Some flight activity was

There were a number of red grouse and snipe recorded breeding in the Site and associated 500 m Survey Area, and the

There was considerable evidence of habituation to the Operational Rigged Hill Windfarm including target species, red grouse and snipe however the distribution and abundance of these varied between years. Two pairs of nesting hen harrier

Wintering priority species were recorded widely within the 2 km Survey Area (including gulls, buzzard, kestrel, golden plover, heron, peregrine, snipe, hen harrier, red grouse and raven). Gulls and buzzards were typically associated with the lowland agricultural habitats and there were no wintering swan or geese roosting or foraging areas recorded within the

Greylag geese (maximum flock 25) were recorded flying in the 2 km Survey Area over winter and whooper swans and greylag geese were not recorded roosting in either the 2 km or 5 km Survey Area. Traditional whooper swan roosts are

count was three birds and was used regularly each year over the winter survey period. Hen harriers were also recorded

roosting in the vicinity of nest sites. Several other suitable areas of roosting habitat occurred within the 2 km Survey Area but no hen harriers were observed, although another two roosts were identified approximately 2 - 4 km away and were recorded to have a maximum of one to two roosting harriers.

9.5 Assessment of Potential Effects

Following surveys and baseline findings (Technical Appendix A9.1) the assessment of potential effects considers the key 71 ornithological receptors as outlined in Table 9.5.

Table 9.5: Summar	y of key	ornithological	receptors and	sensitivity	y criteria and status
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Species	Sensitivity	Population potentially affected	ик	NI	DISTRICT	LOCAL	Status	Season
Hen harrier	High	1-2 pairs within 1 km – 3 km; winter roost within 2 km	575 pairs	46 pairs	-	3 – 4 pairs within 5 km	Annex 1; red-listed; vulnerable to windfarm effects	Breeding / Wintering
Merlin	High	1 pair within 500 m – 2 km	1,162 pairs	32 pairs	-	2 pairs within 5 km	Annex 1; red-listed	Breeding / Wintering
Peregrine	Medium	1 pair within 2 km	1,769 pairs	83 pairs	-	2 pairs within 5 km	Annex 1; green- listed	Breeding / Wintering
Buzzard	Low- Negligible	6-10 pairs within 2 km	57,000 - 79,000 pairs	1,000 - 2,000 pairs	-	-	Green-listed	Breeding / Wintering
Kestrel	Low	1-3 pairs within 2 km	46,000 pairs	1,000 pairs	-	-	Amber-listed	Breeding / Wintering
Sparrowhawk	Low	3-5 pairs within 2 km	35,000 pairs	2,000 pairs	-	-	Amber-listed	Breeding / Wintering
Raven	Low- Negligible	1-3 pairs within 2 km; winter roost within 500 m – 1 km	7,400 pairs	400 pairs	-	-	Green-listed	Breeding / Wintering
Golden plover	Medium	Passage / over-wintering flocks	420,000 birds	20,000 birds	-	-	Annex 1; red-listed	Wintering
Curlew	High	1 pair within 2 km	68,000 pairs	526 pairs	-	2 pairs within 5 km	Red-listed; ecological sensitivity	Breeding
Snipe	Low	10-17 territories within 500 m	80,000 pairs / 1,100,000 birds	1123 pairs / 100,000 birds	-	13-28 ¹⁴ territories within 4 km	Amber-listed, ecological sensitivity	Breeding / Wintering
Red grouse	Medium	3-8 territories within 500 m	230,000 pairs	220 pairs	-	3-17 ¹⁵ territories within 3 km	Red-listed	Breeding / Wintering
Whooper swan	Medium	Maximum 17 (flying) birds within 500 m / no roosting	15,000 birds	4,000 birds	-	-	Annex 1; amber- listed	Wintering

¹⁴ Comprehensive surveys not undertaken beyond 500 m so this is a minimum estimate provided to show some local context ¹⁵ Comprehensive surveys not undertaken beyond 500 m so this is a minimum estimate provided to show some local context

Species	Sensitivity	Population potentially affected	UK	NI	DISTRICT	LOCAL	Status	Season
Greylag geese	Low	Maximum 25 (flying) birds within 500 m	230,000 birds	10,000 birds	-	-	Amber-listed	Wintering
Meadow pipit	Medium	18-21 territories within 500 m	2,000,000 pairs	100,000 pairs	-	312 - 397 territories	Red-listed	Breeding / Wintering
Skylark	Medium	2-10 territories within 500 m	1,500,000 pairs	100,000 pairs	-	63 - 194 territories	Red-listed	Breeding / Wintering
Small passerines	Medium	Small numbers recorded in footprint	-	-	-	-	Red-listed	Breeding / Wintering
Small passerines	Low	Small numbers recorded in footprint	-	-	-	-	Amber-listed	Breeding / Wintering
Small passerines	Negligible	Small numbers recorded in footprint	-	-	-	-	Green-listed	Breeding / Wintering

9.5.1 Embedded Mitigation

- The baseline ornithological survey data (Technical Appendix A9.1) was utilised to inform design iterations of the 72. Development where possible to implement set-back (avoidance) distances of turbines and infrastructure from ornithological receptors. In the first instance the Development has sought to avoid significant effects by sensitive design of the windfarm layout.
- It is noted that, at the out-set and as discussed in consultation with NIEA (Table 9.1), several target species recorded 73. breeding in the Site are noted to show considerable habituation in relation to tracks, infrastructure and the existing turbines.
- 74. It was necessary in this process to consider various sensitivities and also weighting in relation to other disciplines including landscape and visual assessment and wider ecology, particularly in relation to habitats and also the habituation observed in some species within the Operational Rigged Hill Windfarm (particularly snipe, red grouse and hen harrier) but also recognising that species abundance and/or distribution changes between years and total avoidance of all locations identified in a multiyear survey is impractical.
- However, weighting was given to areas which were utilised between years and/or comprised relatively intact habitats. 75. Ornithological information was utilised to inform part of the Development design; the Outline Decommissioning and Construction Environmental Management Plan (DCEMP; Technical Appendix A3.1) and the Draft Habitat Management Plan (Technical Appendix A3.2); which whilst targeted at habitat remediation and restoration will have considerable benefits to birds on the Site, in particular snipe. Management measures for snipe, passerines and hen harriers are identified separately (Section 9.6) and contained within the Draft Habitat Management Plan (Technical Appendix A3.2).

9.5.2 Potential Effect Types

Decommissioning/construction and operational activity presents three main risks to birds (Desholm, 2006¹⁶; SNH, 2017); 76. namely 1) direct mortality due to collision; (2) direct loss of breeding, wintering and/or foraging habitat, due to the footprint of

¹⁶ Desholm, M. (2006). Wind farm related mortality among avian migrants – a remote sensing study and model analysis. National Environmental Research Institute. 132 pp.

decommissioning/construction; and 3) displacement of birds as a result of increased disturbance and/or loss of suitable habitat and barrier effects due to the avoidance of turbine arrays.

- Displacement can occur in two ways i) displacement from breeding and/or wintering locations, and/or ii) displacement from 77 foraging areas. These potential effects are not mutually exclusive and may interact with one another to increase or decrease the severity of the effect. For example, reduced occurrence of species caused by habitat loss may decrease collision risk (Pearce-Higgins et al., 2009). Similarly, the absence of avoidance response of specific species or individual birds may increase collision risk (Drewitt & Langston, 2006¹⁷; McGuinness et al., 2015¹⁸).
- The decommissioning/construction phases will occur over a short temporal period (weeks months) whilst the operational 78 phase will occur over several years. Effects are most likely to arise where spatial and/or temporal interactions occur between nesting, foraging, wintering or roosting habitats and windfarm developments. The key considerations for birds and windfarms are direct mortality; direct or indirect effects of disturbance; loss or fragmentation of breeding, wintering or foraging habitats as well as barrier effects.

9.5.2.1 Direct Mortality Effects

- The mortality effects of windfarms on birds can be variable and may be affected by: season: topography: turbine metrics such as height, design and age; windfarm spatial arrangement; weather conditions; repowering; specific species' vulnerability or morphology; species' abundance and distribution; and the value or attractiveness of surrounding habitats.
- Poorly sited developments can result in extensive mortality e.g. Smóla (Norway). Site specific mortality may be elevated and 80. may be additive or compensatory to other types of mortality such as persecution (e.g. shooting or poisoning), predation or other types of collisions (e.g. vehicles, towers, buildings, power-lines). However, population effects or dynamics may occur for poorly manoeuvrable, rare, long-lived, low productivity species and may have wider effects than at the site of the collision e.g. migrants.
- The potential effects of repowering on mortality rates appears variable, since repowering (i.e. increasing the capacity) of older 81 turbines may change the collision risk for birds (Stewart et al., 2007¹⁹; Drewitt & Langston, 2008²⁰) but there may be no discrete relationship with turbine height and power output (MW) (Pearce-Higgins et al., 2009; 2012).
- Collision risk and/or collisions are therefore a complex interaction between multiple species characteristics and occurrence, 82. environmental, and wind turbine / windfarm factors (see Wilson et al., 2015²¹). Windfarms may operate in combination with other mortality factors to exacerbate population declines, such as climate change effects, which may change over time given the increasing numbers of turbines nationally and globally in line with important renewable energy policy.

9.5.2.2 Potential Direct & Indirect Displacement Effects

Displacement from breeding, wintering or foraging areas can occur as both as a result of both direct and indirect effects at windfarms. This can occur through direct loss, perturbation or changes to habitats i.e. loss of nesting, foraging or roosting habitat or indirectly through behavioural avoidance due to disturbance (Langston & Pullan, 2003²²) and/or modification of the utility and quality of habitats (Arroyo et al., 2009²³). Indirect effects may also be due to behavioural avoidance by individual

birds of turbines at or a wider 'barrier effect' at windfarm(s) level (de Lucas et al., 2004²⁴). This spatial avoidance may subsequently lead to localised population changes on abundance and/or distribution.

- Displacement may not occur or its effects are negligible (Madders & Whitfield, 2006²⁵; Devereux et al., 2008²⁶; Douglas et al., 84 2011²⁷); it may have negative impacts (Pearce-Higgins et al., 2009); or effects may be complex interactions between sitespecific and species-specific metrics (Drewitt & Langston, 2006; Pearce-Higgins et al., 2009; 2012; Garvin et al., 2011²⁸).
- The direct habitat loss due to the footprint of decommissioning/construction is a relatively small area of land with a wider behavioural effect likely at a greater distance through avoidance. Displacement is a spatial response i.e. avoidance of infrastructure by a specified distance (Whitfield et al., 2008) although this can be variable between species and individuals. Displacement exhibits considerable intra-specific variation and, where it occurs, may extend from 25m to 1,000 m but that some species may not be affected (Douglas et al., 2011). Effects on some species may extend to a greater distance (see Ruddock & Whitfield, 2007; Whitfield et al., 2008).
- Pearce-Higgins et al., (2009) found that there was no relationship with displacement and turbine size or power whilst Stewart et al., (2005) found that there does not seem to be an inter-relationship with abundance and turbine number. In this study only a weak relationship with power output was observed where lower (power) rated turbines had greater effects on bird abundance than higher rated turbines and that bird abundance was significantly affected by the life-span of the windfarm operation.
- 87 Some research indicates that some species may be affected (i.e. reduced occurrence and/or breeding density) up to 800 m away from turbines, tracks and/or windfarm infrastructure (Pearce-Higgins et al., 2009) with effects declining post-construction (Pearce-Higgins et al., 2012). There remains very little information on the long-term behavioural response of birds to windfarms (Stewart et al., 2007), although evidence is increasingly available (see Wilson et al., 2015; Fielding & Haworth, 2013: Sansom et al., 2016).
- 88 Six species in particular (golden plover, meadow pipit, skylark, snipe, curlew and wheatear) may avoid windfarms between 100 m and 800 m and may be reduced in breeding density up to 500 m away from turbines (Pearce-Higgins et al., 2009). Red grouse are not significantly affected (Pearce-Higgins et al., 2009; Douglas et al., 2011; Pearce-Higgins et al., 2012) and foraging activity by buzzards and hen harriers was considered to be reduced within the windfarm (Pearce-Higgins et al., 2009). In supporting information, Pearce-Higgins et al., (2012), found continued apparent negative impacts on waders, but reiterated few impacts on red grouse and some species actually increased post- construction.
- Displacement may affect breeding success in raptors (Bright et al., 2008²⁹; Carrete et al., 2009³⁰; Dahl et al., 2012³¹) although 89 several studies show no detectable effects (see Wilson et al., 2015). There is mixed evidence of habituation, with some reviews (Stewart et al., 2005) suggesting that effects will persist throughout the operational period. Others suggest this may vary between species (Marques et al., 2014) but few studies have demonstrated this empirically (see Madsen & Boertmann, 2008³²). Further research on habituation responses is desirable.

²⁴ de Lucas, M., Janss, G. E. & Ferrer, M. (2004). The effects of a wind farm on birds in a migration point: The Strait of Gibraltar. Biodiversity &

¹⁷ Drewitt, A. L. & Langston, R. H. W. (2006). Assessing the impacts of wind farms on birds *Ibis* 148: 29-42.

¹⁸ McGuinness, S., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). Bird sensitivity mapping for wind energy developments and associated infrastructure in the Republic of Ireland. BirdWatch Ireland, Kilcoole

¹⁹ Stewart, G.B., Pullin, A.S. & Coles, C.F. (2007). Poor evidence-base for assessment of windfarm impacts on birds. Environmental Conservation 34: 1-11.

²⁰ Drewitt, A. L. & Langston, R. H. W. (2008). Collision effects of wind-power generators and other obstacles on birds. Annals of the New York Academy of Sciences 1134: 233-266.

²¹ Wilson, M, Fernández-Bellon, D., Irwin, S. & O'Halloran, J. (2015). The interactions between Hen Harriers and wind turbines. Windharrier. Final project report, prepared by School of Biological, Earth & Environmental Sciences, University College Cork, Ireland. PP95. ²² Langston, R., & Pullan, J. (2003). Windfarms and birds: an analysis of the effects of wind farms on birds, and guidance on environmental

assessment criteria and site selection issues. ²³ Arroyo, B., Amar, A., Leckie, F., Buchanan, G. M., Wilson, J. & Redpath, S. (2009). Hunting habitat selection by hen Harriers on moorland:

Implications for conservation management. Biological Conservation 142: 586-596.

Conservation 13: 395-407.

²⁵ Madders, M. & Whitfield, D. P. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis* 148: 43-56. ²⁶ Devereux, C. L., Denny, M. J. H. & Whittingham, M. J. (2008). Minimal effects of wind turbines on the distribution of wintering farmland birds. Journal of Applied Ecology 45: 1689-1694.

²⁷ Douglas, D. J. T., Bellamy, P. E. & Pearce-Higgins, J. W. (2011). Changes in the abundance and distribution of upland breeding birds at an operational windfarm Bird Study 58: 37-43.

²⁸ Garvin, J. C., Jennelle, C. S., Drake, D. & Grodsky, S. M. (2011). Response of raptors to a windfarm. Journal of Applied Ecology 48: 199-209

²⁹ Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R., Gardner, S. & Pearce-Higgins, J. W. (2008a). Map of bird sensitivities to wind farms in Scotland: A tool to aid planning and conservation. Biological Conservation 141: 2342-2356 ³⁰ Carrete, M., Sánchez-Zapata, J.A., Benítez, J.R., Lobón, M., Montoya, F., Donázar, J.A., (2012). Mortality at wind-farms is positively related to large-scale distribution and aggregation in griffon vultures. Biological Conservation 145: 102-108.

³¹ Dahl, E. L., Bevanger, K., Nygård, T., Røskaft, E. & Stokke, B. G. (2012). Reduced breeding success in white-tailed eagles at Smøla windfarm, western Norway, is caused by mortality and displacement. Biological Conservation 145: 79-85. ³² Madsen, J. & Boertmann, D. (2008). Animal behavioural adaptation to changing landscapes: spring-staging geese habituate to wind farms. Landscape Ecology 23: 1007-1011.

9.5.2.3 Potential Direct & Indirect Disturbance & Construction Effects

- Several studies attribute much of the perturbation caused by wind energy developments to the construction phase (Garvin et al., 2011; Pearce-Higgins et al., 2012; Stevens et al., 2013³³; see Chapter 3) although some species (particularly seabirds, waders and raptors) may be impacted in the long-term (Nygard et al., 2010³⁴) with potential population effects. Other studies show that there are no detectable population level impacts (Devereaux et al., 2008; Pearce-Higgins et al., 2009; Fielding & Haworth, 2010; Douglas et al., 2011) particularly during operational phase although some species may be vulnerable to longer-term effects than others (Pearce-Higgins et al., 2012).
- Disturbance is a key factor which can affect bird behaviour, physiology and spatial distribution (Ruddock & Whitfield, 2007; Tarjuelo et al., 2015³⁵). The distance at which a species responds (e.g. by flushing) is often thought to indicate the sensitivity of the species to disturbance (Fernandez-Juricic et al., 2003³⁶). Spatial buffers and/or temporal cessation of works are usually prescribed to protect birds from disturbance (Rodgers & Schwikert, 2003).
- For larger species the flushing distances and consequently set-back distances are usually greater to protect them from human disturbance (Arroyo et al., 2006; Martinez-Abrain et al., 2010³⁷) but can be variable between species and individuals (Ruddock & Whitfield, 2007). Typically, smaller species will be affected by activities within 25 - 100 m indirectly (Ruddock & Whitfield, 2007) and/or directly by any associated footprint of actual land-take or removal of vegetation during decommissioning / construction activities. Pearce-Higgins et al. (2012) indicates that most breeding bird populations recover post-construction excluding large waders specifically snipe and curlew.
- An important consideration when assessing the potential effects of the decommissioning/construction phases of the 93. Development is the spatial extent of activities at any one time. All planned activities (Chapter 3) would not take place simultaneously over the whole Site. Rather they would be more restricted to smaller areas of activity at any particular time. Since suitable habitat typically exists nearby the effects of short-term displacement will be minimised as birds are able to move away from the source of the disturbance during decommissioning/construction activity. Additionally, some impacts are known to decline after these phases and therefore only temporary for some species (Pearce-Higgins et al., 2012).

9.5.2.4 Potential Ancillary Effects

- Other windfarm infrastructure such roads and powerlines may cause other effects for birds (Drewitt & Langston, 2008). This includes the facilitation of access to previously inaccessible areas via windfarm roads and tracks which may be used by recreational personnel and vehicles such as scramblers or motorbikes or turf extraction (see Ruddock et al., 2016³⁸) and access management is key to reducing any likely disturbance.
- Roads may increase fragmentation of habitats but may attract some species, e.g., novel linear features which harriers may utilise for foraging (M. Ruddock, personal observation) or snipe for feeding (M. Ruddock, personal observation). Power-lines and any associated vegetation clearance may create fragmentation or barriers to movement (avoidance) and/or collision risks. Overhead power-lines and associated infrastructure (i.e. pylons or poles) may also act as perching locations for some species including nest predators such as corvids but can also cause electrocution.
- The main predicted effects during the operational phase on birds are from disturbance during maintenance operations, the avoidance and barrier effect of the turbines (i.e. causing displacement of flight activity) and direct mortality through collision. Therefore, all species recorded have been considered further in this Chapter for potential decommissioning/construction and/or operational effects.

human activity on physiological and behavioural responses of an endangered steppe bird. Behavioural Ecology 26: 828-838 ³⁶ Fernández-Juricic, E., Jimenez, M.D., Lucas, E. (2002). Factors affecting intra- and inter-specific variations in the difference between alert and flight distances in forested habitats. Canadian Journal of Zoology 80: 1212-1220.

9.5.3 Potential effects on breeding birds within 500 m of turbines and infrastructure footprint Both the Operational Rigged Hill Windfarm (baseline) and the proposed Development layout i.e. footprint of turbines (including rotor swept area) and access roads were mapped in ArcGIS 10.5 and buffered by 25 m (hereafter turbine and infrastructure buffer). This footprint was super-imposed upon the aggregated breeding bird locations to establish which species were coincident with the decommissioning / construction areas and might therefore be directly impacted during works. This analysis was also undertaken on the extant priority species locations to identify territories at risk of displacement. Published literature

9.48).

- There were three species recorded within the Operational Rigged Hill Windfarm existing turbine and infrastructure buffer in 98 2014 (Technical Appendix 9.1, Figures 9.41 - 9.44) namely meadow pipit (15 territory), skylark (4 territories) and snipe (1 territory). Skylarks and are red-listed in the UK (Eaton et al., 2015) and meadow pipits are red listed in Ireland (Colhoun & Cummins, 2013). This was different in the proposed turbine and infrastructure buffer in 2014 (Technical Appendix 9.1; Figures 9.41 – 9.44) with 14 species recorded in the turbine and infrastructure buffer namely blue tit (1 territory), chaffinch (1 territory), dunnock (1 territory), house sparrow (1 territory), magpie (1 territory), meadow pipit (33 territories), robin (1 territory), raven (non-breeding detection), rook (1 territory), skylark (14 territories), stonechat (1 territory), starling (1 territory), wren (2 territories) and willow warbler (1 territory). Skylarks, house sparrow and starling are red-listed in the UK (Eaton et al., 2015) and meadow pipits are red listed in Ireland (Colhoun & Cummins, 2013).
- There is a difference in the predicted displacement or disturbance and numbers territories between the existing and proposed 99 turbine and infrastructure buffer, and therefore greater effects could arise due to the Development. The difference largely arises due to the main access track which extends into lowland pasture and has a footprint across moorland areas. There was a difference of 18 meadow pipit and 10 skylark territories between existing and proposed turbine and infrastructure buffers. The 18 meadow pipit territories comprise 4.5% of the 397 territories recorded locally within the 500 m Survey Area (Technical Appendix A9.1). Ten skylark territories comprise 5.2% of the 194 territories recorded locally within the 500 m Survey Area (Technical Appendix A9.1). Red-listed species (Colhoun & Cummins, 2013 or Eaton et al., 2015) detected in the wider 500 m turbine buffers for both existing and proposed Development turbines include cuckoo, grasshopper warbler, linnet, lesser redpoll, mistle thrush, merlin, meadow pipit, red grouse, skylark and song thrush.
- There were two species recorded within the existing turbine and infrastructure buffer in 2018 (Technical Appendix 9.1, Figures 9.45 - 9.48) namely meadow pipit (5 territories), and robin (1 territory). Meadow pipits are red listed in Ireland (Colhoun & Cummins, 2013). This was different to the proposed turbine and infrastructure buffer in 2018 (Technical Appendix 9.1; Figures 9.45 – 9.48) with 13 species recorded in the footprint and 25m buffer namely blackbird (1 territory), golden plover (non-breeding detection), jackdaw (1 territory), lesser black-backed gull (non-breeding detection), linnet (1 territory), meadow pipit (26 territories), pied wagtail (1 territory), robin (1 territory), skylark (2 territories), stonechat (1 territory), swallow (1 territory), wren (4 territories) and willow warbler (1 territory).
- 101. turbine and infrastructure buffers, and therefore greater effects could arise due to the Development. The difference largely arises due to the main access track which extends into lowland pasture and has a footprint across moorland areas. There was a difference of 21 meadow pipit territories between existing and proposed predictions. The 21 meadow pipit territories comprise 6.7% of the 312 territories recorded locally within the 500 m Survey Area (Technical Appendix A9.1). There was a difference of two territory estimates of skylark between existing and proposed turbine and infrastructure buffer which comprises 3.2% of the 63 territories recorded locally within the 500 m Survey Area (Technical Appendix A9.1). There appeared to be a lower number of skylarks locally in the 2018 surveys compared to 2014 surveys.
- The footprint of the initial decommissioning/construction activities therefore could only directly affect a smaller sub-set of species and individuals, notably potential displacement or reduction in density of meadow pipits (18 - 19 territories) and smaller numbers of other passerine species (Technical Appendix A9.1; see Pearce-Higgins et al., 2009) which may be variable between years (Table 9.6).

was reviewed to establish which of the species recorded within 500 m would be vulnerable to displacement (Figures 9.41 -

There is a difference in the predicted displacement or disturbance and numbers territories between the existing and proposed

³³ Stevens, T. K., Hale, A. M., Karsten, K. B. & Bennett, V. J. (2013). An analysis of displacement from wind turbines in a wintering grassland bird community. Biodiversity and Conservation 22: 1755-1767.

³⁴ Nygård, T., Bevanger, K., Dahl, L., Flagstad, Ø., Follestad, A., Hoel, P. L., May, R. & Reltan, O. (2010). A study of White-tailed Eagle Haliaeetus albicilla movements and mortality at a wind farm in Norway. BOU Proceedings - Climate Change and Birds 1-4. ³⁵ Tarjuelo, R., Barja, I., Morales, M.B., Traba, J., Benítez-López, A., Casas, F., Arroyo, B., Delgado, P., & Mougeot, F. (2015). Effects of

³⁷ Martínez-Abraín, A., Oro, D., Jiménez, J., Stewart, G., Pullin, A. (2010): A systematic review of the effects of recreational activities on nesting birds of prey. Basic and Applied Ecology 11: 312-319.

³⁸ Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harriers in Ireland. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

Table 9.6 Predicted displacement of species (Pearce-Higgins et al., 2009) from within the 500 m buffer of existing and proposed Development infrastructure for data 2014 – 2019.³⁹

Year / Site	Species	Average % reduction (range)	Number (n) within 500 m	Average remaining (n)	Maximum remaining (n)	Minimum remaining (n)	Ave. loss (n)	Min loss (n)	Max. loss (n)
2014 Existing	Snipe	47.5 (8.1- 67.7)	12	6.3	11.0	3.9	5.7	1.0	8.1
2014 Existing	Meadow pipit	14.7 (2.7- 25.1)	162	138.2	157.6	121.3	23.8	4.4	40.7
2014 Proposed	Snipe	47.5 (8.1- 67.7)	14 (2 ⁴⁰)	7.4	12.9	4.5	6.7	1.1	9.5
2014 Proposed	Meadow pipit	14.7 (2.7- 25.1)	217	185.1	211.1	162.5	31.9	5.9	54.5
2015 Existing	Snipe	47.5 (8.1- 67.7)	7	3.7	6.4	2.3	3.3	0.6	4.7
2015 Proposed	Snipe	47.5 (8.1- 67.7)	11 (2)	5.8	10.1	3.6	5.2	0.9	7.4
2016 Existing	Snipe	47.5 (8.1- 67.7)	9	4.7	8.3	2.9	4.3	0.7	6.1
2016 Proposed	Snipe	47.5 (8.1- 67.7)	10 (0)	5.3	9.2	3.2	4.8	0.8	6.8
2018 Existing	Snipe	47.5 (8.1- 67.7)	8	4.2	7.4	2.6	3.8	0.6	5.4
2018 Existing	Meadow pipit	14.7 (2.7- 25.1)	119	101.5	115.8	89.1	17.5	3.2	29.9
2018 Proposed	Snipe	47.5 (8.1- 67.7)	13 (2)	6.8	11.9	4.2	6.2	1.1	8.8
2018 Proposed	Meadow pipit	14.7 (2.7- 25.1)	163	139.0	158.6	122.1	24.0	4.4	40.9

^{103.} For several of these species there is a negligible difference in the number of territories recorded between the existing and proposed infrastructure and therefore no significant effects are predicted. Differences, where they do occur, relate to a very small number of territory locations (typically 1-2 of relatively common species). Modelling displacement within 500 m for meadow pipit (Pearce-Higgins et al., 2009) reveals that within years there was low-medium magnitude of difference between the maximum predicted displacement for existing (baseline) turbines compared to proposed turbines (2014: 40.7 to 54.5 territories = 13.8 territories difference; 2018: 29.9 to 40.9 territories = 11 territories difference). Only two species were detected that could be modelled and others, e.g. wheatear and curlew, were excluded since no displacement could occur.

- The majority of key target breeding species (Technical Appendix A9.1; Table 9.1) which occurred within the vicinity and wider hinterland of the Development are avoided by appropriate buffers (Figure 9.49 - 9.53) with some priority raptor species occurring within 500 m of either the existing or the proposed turbines and infrastructure including long-eared owl, sparrowhawk and merlin, whilst buzzard, kestrel and hen harrier were recorded within 750 m of the existing and/or proposed access tracks. Buzzard and sparrowhawk are recorded closer to the existing access track infrastructure than the proposed Development access track infrastructure in all years of survey with both species recorded and also immediately adjacent to the tracks in the forested areas adjacent to the Site (Figures 9.49 - 9.53).
- The raptor species recorded nesting in the forest are present due to the availability of suitable habitat (i.e. mature conifers for kestrel, buzzard and sparrowhawk and second rotation forest). These species locations are therefore highly vulnerable to change and movement due to the temporal and spatial trends in conifer harvesting e.g. hen harrier were located beyond 2 km but moved closer to the turbines during monitoring years and selected habitat in close proximity to the Operational Rigged Hill Windfarm. There are no potential significant displacement or disturbance impacts predicted to arise to breeding raptor species subject to specific mitigation measures (Section 9.6).
- Snipe and red grouse territories do occur within the existing Site, and were recorded to fledge young within the Operational Rigged Hill Windfarm during surveys (M. Ruddock, personal observation). Snipe occurred between 24 m and 3.6 km away from existing turbines and between 35 m and 3.3 km from proposed Development turbine locations. For all snipe recorded in most years of survey, the proposed Development turbines are located, on average, closer (circa 110 m) to snipe territories than the existing turbines (Table 9.7). For snipe which occurred within the 500 m turbine buffers, the distances these were located away from turbines is similar on average, for the proposed turbines (240.1 m) to existing turbines (242.7 m, Table 9.6) i.e. set-back (avoidance) distances is largely unchanged for snipe within 500 m of the proposed turbines.

Table 9.7 Distances (m) of snipe recorded in each year of survey to nearest existing and proposed turbines.

Year	Existing turbines (all SN)	Existing turbines (SN within 500 m)	Proposed turbines (all SN)	Proposed turbines (SN within 500 m)
2014	862.0	238.4 (12)	780.1	187.6 (12)
2015	914.2	364.0 (7)	730.5	273.0 (9)
2016	937.3	199.8 (9)	861.9	238.6 (10)
2018	995.4	168.6 (8)	897.7	260.8 (11)
Average	927.2	242.7	817.6	240.1

- 107. Modelling of displacement (Pearce-Higgins et al., 2009) for snipe (Table 9.6) reveals that there is a difference in the predictions for displacement in all years of survey between the existing and proposed 500 m buffers (including access tracks) although these change between years with a range of between seven and 12 snipe territories in the existing turbine buffers and 10 to 14 snipe territories in the proposed turbine buffer of which two were recorded in the track section of buffer only (Table 9.6). The difference in maximum displacement predictions between existing and proposed varied between years (2014; 1.4 pairs; 2015: 2.7 pairs; 2016: 0.7 pairs; 2018: 3.4 pairs). Therefore, there are potential displacement (effectively 1 to 4 pairs) or disturbance risks or effects that may arise due to the Development to snipe when compared to the baseline comprising the existing turbines and infrastructure. Snipe are known to be habituated in the area but effects can be minimised subject to avoidance of disturbance factors during construction, and the implementation of habitat management (Section 9.7; Technical Appendix A3.2).
- There are no curlew territories located within 500 m therefore applying Pearce-Higgins et al., (2009) predictions indicate that no curlew will be displaced or reduced in density (Pearce-Higgins et al., 2009). Furthermore, the existing turbines (1.5 km) and/or proposed turbines (1.4 km) are all located more than 1 km from the nearest curlew territories. Therefore, it is confirmed that no density reduction or displacement could occur (Pearce-Higgins et al., 2009; Whitfield et al., 2010). There are therefore no potential significant displacement or disturbance risks, or effects predicted to arise to breeding curlew and the Development footprint lies outwith the 800 m or 1 km buffers for avoidance of any disturbance and/or displacement effects.
- Most vulnerable to displacement or disturbance are the ground-nesting species, e.g., meadow pipit, skylark, red grouse, snipe, stonechat, wren (Figures 9.41 - 9.44) but the distribution and abundance of these species varies between years (see also

³⁹ Footnote to Table 9.6; n = number of territories; the displacement calculations are utilised to establish the average, minimum and maximum displacement values which provide an average, maximum and minimum remaining number of territories

⁴⁰ Numbers in parentheses for snipe indicates the number of snipe from total numbers which are located within 500 m of the access track only and beyond the 500 m turbine buffer since Pearce-Higgins et al., 2009 indicates displacement effects on snipe due to tracks as well as turbine

Figures 9.45 – 9.48). Other species including blue tit, chaffinch, dunnock, house sparrow, magpie, rook, starling and willow warbler are less vulnerable to direct impacts since they are more liable to be nesting in buildings, man-made structures and/or trees and/or hedgerows or scrub and often along vegetated edges associated with the existing tracks and infrastructure (Figure 9.41 – 9.48).

These latter locations can readily be protected from direct impacts during the decommissioning/construction phases by the protection of key breeding habitats and temporal restrictions on construction periods within the vicinity of such nests (Section **9.6**). Several of the species territories recorded are associated with the lower altitude improved agricultural habitat mosaics near the site entrance and existing hedgerows along roads, field margins and around buildings, all of which will be retained and/or reinstated (Section 9.6; Technical Appendix A3.2). Most small passerines were recorded in grass / moorland pasture which contains meadow pipit and skylark and unusually some common tree nesting species (such as chaffinch) were recorded out on the moorland areas, within areas of invasive, self-seeded conifers within the Site with an apparent reduced occurrence (displacement) of priority species such as meadow pipit and skylark, particularly over time during surveys as self-seeded conifers have expanded and matured during the survey period (see Figure 9.46).

9.5.4 Potential effects on wintering birds within 500 m of turbines and infrastructure footprint

The same analysis was completed on aggregated wintering bird species locations as outlined in Section 9.5.3 above and mapped for wintering bird survey data (Figures 9.54 & 9.55).

- 112. During the winter few species are constrained to spatial locations and as such are much less vulnerable to displacement or disturbance than during the nesting season as they can readily move to alternative habitats. Red-listed species (Colhoun & Cummins, 2013 or Eaton et al., 2015) detected in the wider 500 m turbine buffers include grasshopper warbler, golden plover, hen harrier, lesser redpoll, meadow pipit, mistle thrush, skylark, song thrush, starling and woodcock.
- 113. There were five wintering species recorded within the existing turbine and infrastructure buffer in 2014 (Figure 9.49) namely meadow pipit (2 locations), red grouse (1 location), raven (2 location), snipe (4 location) and wheatear (1 location). Meadow pipit and red grouse are red-listed in Ireland (Colhoun & Cummins, 2013). There was a wider presence of species within the 500 m turbine buffer (Technical Appendix A9.1), but no additional species were located within the track buffer.
- There were 12 wintering species recorded within the proposed turbine and infrastructure buffer in 2014 (Figure 9.49) namely blue tit (1 location), dunnock (1 location), golden plover (1 location), hooded crow (2 locations), magpie (1 location), meadow pipit (5 locations), robin (4 locations), red grouse (1 location), raven (2 locations), rook (2 locations), snipe (6 locations) and wren (4 locations). Golden plover, meadow pipit and red grouse are red-listed in Ireland (Colhoun & Cummins, 2013). There was a wider presence of species within the 500 m turbine buffer (Technical Appendix A9.1), but no additional species were located within the track buffer.
- There was some variation between survey years with five species recorded within the existing turbine and infrastructure buffer in 2018 (Figure 9.55 meadow pipit (4 locations), red grouse (1 location), raven (1 location), stonechat (1 location) and snipe (2 locations). There were two red-listed species recorded red grouse and meadow pipit (Colhoun & Cummins, 2013).
- Within the proposed turbine and infrastructure buffer in 2018 there were 16 species recorded with chaffinch (1 location), dunnock (1 location), golden plover (2 locations), hooded crow (1 location), herring gull (1 location), jackdaw (1 location), kestrel (1 location), meadow pipit (14 locations), red grouse (1 location), raven (6 locations), rook (4 locations), skylark (2 locations), stonechat (1 location), swallow (1 location), snipe (6 locations) and wren (1 location). There were four red-listed species recorded golden plover, herring gull, red grouse and meadow pipit (Colhoun & Cummins, 2013) and herring gull and skylark red-listed in the UK (Eaton et al., 2015).
- The two wader species recorded during the winter namely golden plover and snipe recorded within the 500 m Survey Area (Technical Appendix A9.1) and turbine and infrastructure buffer (Figures 9.52; 9.54 & 9.55). Small numbers of golden plover were located mostly in flight near the Site, including in and around existing turbines, but were also recorded roosting briefly on the ground in the Survey Areas immediately adjacent to, and within the Operational Rigged Hill Windfarm infrastructure, including at the edge and in the middle of existing windfarm tracks (M. Ruddock, personal observation) whilst the snipe were often located along existing ditches and drainage channels, and edges of existing windfarm tracks and hard-standing areas (Figures 9.52). Research indicates a variable response of (breeding) golden plover (Sansom et al., 2016; Douglas et al., 2011).

The footprint of decommissioning/construction therefore will only theoretically directly affect a sub-set of species and individuals. The locations can readily be protected from direct impacts during the decommissioning / construction phases by the protection of key habitats. Several of the species territories recorded are associated with the lower altitude improved agricultural habitat mosaics adjacent to the proposed site entrance and existing hedgerows along roads, field margins and around buildings all of which will be retained and/or reinstated (see Technical Appendix A3.2) and few are within the remaining proposed Development footprint per se, whilst those in open habitats can readily relocate to alternative adjacent areas during the winter.

9.5.5 Potential effects of collision on birds within 500 m of turbines

- There was a maximum of 14 target species detected flying within the 500 m Survey Area during the breeding season, 119 buzzard, common gull, greater black-backed gull, heron, hen harrier, kestrel, lesser black-backed gull, merlin, peregrine, red grouse, raven, sparrowhawk, snipe and whooper swan although the detection rates and occurrence varied between years (Technical Appendix A9.1). There were nine of the detected species recorded breeding within 500 m - 2 km of turbines and may therefore have a pathway to collision risk - buzzard, hen harrier, kestrel, merlin, peregrine, raven, red grouse, sparrowhawk and snipe and therefore regular flights of the other species recorded are less likely.
- 120 Most frequently occurring species in all years of study were raven, buzzard, kestrel, lesser black-backed gull and snipe (Technical Appendix A9.1). The gulls and ravens were frequently recorded to be present on the Site and wider agricultural landscape including scavenging on available carrion and/or associated with agricultural activities such as ploughing or slurry spreading. There were some raptor species nesting and territorial activity recorded within the 500 m turbine buffers although nest locations will physically be unaffected by the Development as most are associated with the coniferous forest plantation adjacent to the windfarm (Section 9.6.1; Figure 9.20 - 9.26; 9.39). Two Target 1 species were recorded within potential collision height bands, peregrine and hen harrier.
- 121 although there were additional species detected over-winter including golden plover, mallard and greylag goose. There were a maximum of 17 target species detected flying within the 500 m Survey Area during the wintering season buzzard, common gull, greater black-backed gull, greylag goose, golden plover, heron, hen harrier, kestrel, lesser black-backed gull, mallard, merlin, peregrine, red grouse, raven, sparrowhawk, snipe and whooper swan although the detection rates and occurrence varied between years (Technical Appendix A9.1).
- Small numbers of greylag geese and whooper swans were recorded to occasionally pass over or near the Site area during 122. wintering / migration periods however flights passed either beyond the 500 m Survey Areas from either existing or proposed turbines or above potential collision risk height and therefore no collision is predicted. There were no foraging or roosting sites for swans or geese identified within 5 km and therefore the risk of large aggregations for winter roosting or traditional commuting or migratory corridors means that collisions are unlikely.
- 123. these locations, which varied between years, will be unaffected by the existing and/or proposed turbines and associated infrastructure. The harrier and raven wintering locations were utilised throughout the winter although are mostly beyond the Development footprint and beyond the 500 m Survey Area. Hen harrier roosts were within moorland / grassland habitat and in similar areas each year. Raven winter roost sites were identified at several locations in the Cam Forest adjacent to the Operational Rigged Hill Windfarm and were spatially variable between different days and years and some roost sites were lost during clear-felling between years.
- The key risk species for collision are therefore identified as the peregrine falcon and hen harrier, however, this risk varies 124. spatially as well as temporally, i.e., between years and seasons (Section 9.6.4; Technical Appendix A9.1; A9.3). In consultation with NIEA (Table 9.1), it was agreed to review the spatial occurrence (see Figures 9.14 – 9.16 & 9.33 – 9.35) and collision risk for buzzard, kestrel and raven although it was confirmed that detailed height band and flight duration information is not recorded for these secondary species (Technical Appendix A9.1; Table 9.1). It was also agreed with NIEA (Table 9.1) and confirmed during Scoping that collision risk for golden plover could be scoped out of assessment given the species manoeuvrability and published research on this species (Section 9.3.3).

During the winter the occurrence of most species were similar (Technical Appendix A9.1), notably curlew and common gull,

Hen harrier and raven roost sites were recorded within the 2 km, Survey Area, and beyond (Technical Appendix A9.1) and

9.5.6 Collision risk modelling (CRM)

The following section sets out collision models and assessment findings for each bird receptor and concludes that the Development presents no significant risk of collision to ornithological receptors. There has been one documented collision (kestrel found in 2018) recorded at the Rigged Hill windfarm as part an on-going monitoring, recording and reporting protocol operated by ScottishPower Renewables since 2010 (see also Technical Appendix A9.4). When considering the operational phase of the Development in terms of collision risk, an illustrative 30-year period has been used when considering the magnitude of collision estimates.

9.5.6.1 Peregrine falcon

- There was an active peregrine nest site within 2 km Survey Area, although this was not successful in recent years of survey 126 (Technical Appendix A9.1). This is a traditional nesting site which is intermittently successful in fledging young (M. Ruddock, personal observation). This territory and another territory to the north appears to be the origin of all the peregrine flights observed during vantage points with more observations in later summer after young fledglings began travelling further afield during 2014 - 2015 surveys. Peregrine flights only occasionally passed through the respective 500 m turbine buffers (Technical Appendix A9.3; Table A9.2; A9.3) and there was some variation in potential collision risk heights at the existing and proposed turbines given the different turbine metrics.
- 127. The collision risk predicted in 2014-2015 at the Operational Rigged Hill Windfarm turbine envelope equates to up to 0.06 peregrines (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.04% (i.e. 0.06 divided by 166 – 2 x 83 pairs – peregrines) from the Northern Ireland adult population (Wilson et al., 2018)⁴¹. With the recommended avoidance for peregrines as 98% (Provan & Whitfield, 2006), this declines to a negligible 0.001 peregrines (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 15.8 years, but with 98% avoidance one bird every 790.6 years (Technical Appendix A9.3).
- The collision risk predicted in 2014-2015 for the proposed Development turbine envelope equates to up to 0.8 peregrines 128 (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.48% (i.e. 0.8 divided by 166 - 2 x 83 pairs - peregrines) from the Northern Ireland adult population (Wilson et al., 2018). With the recommended avoidance, for peregrines as 98% (Provan & Whitfield, 2006) this declines to a negligible 0.02 peregrines (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 1.2 years, but with 98% avoidance one bird every 61.5 years (Technical Appendix A9.3).
- There was some variation between survey years and activity was lower during the 2018 2019 surveys. With no avoidance the activity during this period equates to predicted mortality of approximately one bird every 2.9 years, but with 98% avoidance one bird every 148.9 years for existing turbines (Technical Appendix A9.3) and approximately one bird every 1.3 years, but with 98% avoidance one bird every 67.1 years for the proposed turbines. Average collision risk as predicted by Band et al., (2007) models is actually lower for peregrine falcons in the proposed Development (9.9%) compared to the Operational Rigged Hill Windfarm (10%).
- There have been no collisions recorded of this species at the Operational Rigged Hill Windfarm and in conclusion, as shown 130. above, the Development presents no significant risk to peregrine falcons from collision throughout the operational phase.

9.5.6.2 Hen harrier

Hen harriers that were recorded were typically foraging and flying at low-level and occurred intermittently throughout all years of survey. The majority of activity was beyond the respective 500 m turbine buffers and in the wider territorial areas identified with core foraging and display areas observed away from the direction of the windfarm for both pairs (Technical Appendix A9.3; Figures 9.56, 9.57 and 9.58). Whilst breeding and roosting sites were recorded within the 500 m Survey Area and within 2 km (Technical Appendix A9.1) there were also some apparent regular activity and spatial patterns (along scrub corridors, hedgerows, linear features, drains, rivers, tracks, stone walls, watercourses; see Madders, 2003⁴²) observed for hen harriers utilising the existing and/or proposed windfarm sites at Rigged Hill and the wider Site Boundary.

- There was regular usage of nesting and roosting areas although this varied between years and season (Technical Appendix A9.1) and nesting habitat is ephemeral (i.e. young stage pre-thicket forest plantation) and thus nesting locations in this area are dependent on the year-to-year dynamics of forest harvesting and re-planting programmes. There is no associated risk of displacement or direct impacts on hen harriers at the observed set-back distances (>500 m) and some flights occurred at potential collision height, hence collision risk modelling is conducted accordingly.
- The collision risk predicted in 2014-2015 at the Operational Rigged Hill Windfarm turbine envelope equates to up to 0.11 hen 133 harrier (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.12% (i.e. 0.11 divided by 92 - 2 x 46 pairs - hen harrier) from the Northern Ireland adult population (Wotton et al., 2018⁴³). With the recommended avoidance, for hen harrier as 99% (Provan & Whitfield, 2006; Whitfield & Madders, 2006; SNH 2014; 2017) this declines to a negligible 0.001 hen harrier (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 9.3 years, but with 99% avoidance one bird every 930.4 years (Technical Appendix A9.3).
- The collision risk predicted in 2014-2015 in the proposed Development turbine envelope equates to up to 0.33 hen harriers (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.36% (i.e. 0.33 divided by 92 - 2x46 pairs - hen harrier) from the Northern Ireland adult population (Wotton et al., 2018). With the recommended avoidance, for hen harrier as 99% (Provan & Whitfield, 2006; Whitfield & Madders, 2006; SNH 2014; 2017) this declines to a negligible 0.003 hen harriers (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 3.0 years, but with 99% avoidance one bird every 302.9 years (Technical Appendix A9.3).
- There was some variation between survey years and activity was higher during the 2018 2019 surveys. With no avoidance the activity during this period equates to predicted mortality of approximately one bird every 4.2 years, but with 99% avoidance one bird every 422.9 years for existing turbines (Technical Appendix A9.3) and approximately one bird every 2.6 years, but with 99% avoidance one bird every 261.7 years for the proposed turbines.
- Average collision risk as predicted by Band et al. (2007) models is marginally higher for hen harrier in the proposed Development turbine envelope (11.8%) compared to the Operational Rigged Hill Windfarm turbine envelope (11.5%). However, the overall collision estimates are lower for the proposed Development than the Operational Rigged Hill Windfarm in the site-based models (Technical Appendix A9.3) and there is therefore no significant risk to hen harriers from collision. Pearce-Higgins et al. (2009) indicates that hen harrier occurrence in/around windfarms may be altered (displaced) by an average of 52.5% (range -1.2% to 74.2%), therefore indicating that there may be a reduced level of activity (i.e. behavioural avoidance), further reducing collision risk by up to 74%.
- There have been no collisions recorded of this species at the Operational Rigged Hill Windfarm and in conclusion, as shown above, the Development presents no significant risk to hen harrier from collision throughout the operational phase.

9.5.6.3 CRM for other species

- 138. CRM was required for golden plover but also that kestrel, raven and buzzard activity was of interest and NIEA requested that further details be presented and/or a collision risk model undertaken. It was noted that this was caveated recognising that these were secondary species during recording (Technical Appendix A9.1).
- vantage point observations for recording purposes (**Table 9.1**). Flight trajectories, duration and heights are recorded in a hierarchical method in order that high risk species e.g. Annex 1; red-listed or species vulnerable to collision are the focus of the observer. Thus, species like hen harrier and swans are prioritised and observer efforts focussed on these, in particular to avoid long recording periods of more common or less vulnerable species like ravens, or buzzards they are typically treated as secondary species (see both SNH, 2005 & 2013).
- It is noted that, as per SNH guidance and general best practice guidance, detailed field monitoring of secondary species can 140. detract and/or distract from the monitoring of primary species and would always caution against observers trying to record too many species. However, as a matter of course observers at Bird Surveyors Ltd record the height band range of all detected

Key issues discussed with NIEA Natural Heritage (Table 9.1) in relation to collision risk modelling was the agreement that no

As detailed in the methods section of the technical report (Technical Appendix A9.1) certain species are prioritised during

⁴¹ Wilson, M.W., Balmer, D.E., Drewitt, A., Francis, I., Jones, K., King, A., Raw, D., Rollie, C.J., Ruddock, M., Smith, G.D., Stevenson, A., Stirling-Aird, P.K., Wernham, C.V. and Noble, D.G. (2018). The breeding population of Peregrine Falcon Falco peregrinus in the UK, Isle of Man and Channel Islands in 2014. Bird Study 65: 1-19.

⁴² Madders, M. (2003). Hen Harrier Circus cyaneus foraging activity in relation to habitat and prey. Bird Study 50: 55-60.

⁴³ Wotton, S., Bladwell, S., Morris, N., Raw, D., Ruddock, M., Stevenson, A., Stirling-Aird, P. & Eaton, M. (2018) Status of the Hen Harrier Circus cyaneus in the UK and Isle of Man in 2016. Bird Study 65: 145-160

species and flight trajectory for the secondary species, particularly raptors (see Technical Appendix A9.1) and/or record additional information on maps and recording forms. This information was additionally digitised as requested by NIEA and has been presented (Technical Appendix A9.1; Figures 9.14 - 9.16 & 9.33 - 9.35).

- Therefore, whilst the requested information for collision risk models for buzzard, kestrel, and raven would be atypical, some further information on flight intervals (five minute intervals, recorded to the nearest minute), flying height (sub-sampled) and flight routes are provided for buzzard, kestrel and raven (Technical Appendix A9.1; Figures 9.14 – 9.16 & 9.33 – 9.35). Height bands are selected identical to the risk bands as per turbine metrics (<15; 15-25 m; 25-50 m; 50-75 m, 75-100 m; 100-125 m; 125-140 m; >140 m) with the bands 15 - 75 m used to define the risk window (rotor floor and ceiling respectively) for existing turbines and 15 – 140 m used to define the risk window (rotor floor and ceiling respectively) for proposed turbines.
- 142. The species priority list utilised in this study are based on composite measures of legislative protection e.g. Annex 1 EU protected species, conservation status (Colhoun & Cummins, 2013; Eaton et al., 2015), vulnerability to collision (e.g. swans with poor manoeuvrability) or displacement and propensity to consume observer observation effort (e.g. buzzards or ravens). Whilst this system does not diminish the importance of each individual species, the methods recognise that observers can realistically only record specific information during each observation. This hierarchical recording methodology is recognised best practice for wind farm vantage point observations (SNH, 2005; 2013; 2017) specifically to minimise observer errors or detections.
- Nevertheless, information presented here was extracted from original recording forms for three of these species concurs that there were 43 (2014-2015) and 26 (2018-2019) detections of buzzards, 17 (2014-2015) and 28 (2018-2019) detections of kestrel and 206 (2014-2015) and 183 (2018-2019) detections of raven. It is also noted that all of the red grouse, snipe, merlin and sparrowhawk detected were either flying <15m a.g.l. or were heard calling only from the ground (Technical Appendix A9.1). Therefore there is no associated collision risk for red grouse, snipe, merlin or sparrowhawk and no further collision risk modelling was conducted on these species. Whooper swans and greylag goose flights were either outside the wind turbine envelope(s) and/or above potential collision risk height.

9.5.6.4 Buzzard

- The majority of the buzzard activity was centred on the nearest breeding territories at Terrydoo Walker, Little Derry and Freugh; Technical Appendix A9.1; Figure 9.14 & 9.33) and occasional flights are made into the area by the pairs located to the west and east in the forest (Figure 9.14 & 9.33). Some individuals may use the edge of the Rigged Hill plateau to obtain lift for foraging, displaying and commuting, but the majority of all buzzard flight activity is in the wider 500 m Survey Area rather than through or over the core Site and existing or proposed turbine locations (Technical Appendix A9.1) which minimises extant risk.
- Buzzard flights occurred both inside and outside the potential collision risk height (Technical Appendix 9.3; Table 9.21 & 9.22). Since methods utilised here for CRM do not direct the use of timed flights by using the five minute interval to the nearest minute it must be noted that this method would considerably over-estimate collisions and therefore whilst further collision risk modelling is undertaken (Technical Appendix A9.3) these are only indicative and may be at least 5-fold over-estimated since recording was at five minute intervals.
- The collision risk predicted in 2014-2015 at the Operational Rigged Hill Windfarm turbine envelope equates to up to 3.2 buzzard (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.08% (i.e. 3.2 divided by 4,000 – 2 x 2,000 pairs – buzzard) from the Northern Ireland adult population (Musgrove et al., 2013⁴⁴) or 0.002% of the UK population (79,000 pairs / 158,000 birds). With the recommended avoidance for buzzard as 98% (Provan & Whitfield, 2006; SNH 2014; 2017), this declines to a negligible 0.06 buzzard (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.3 years, but with 98% avoidance one bird every 15.6 years (Technical Appendix A9.3).
- The collision risk predicted in 2014-2015 at the proposed Development turbine envelope equates to up to 7.6 buzzard (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.19% (i.e. 7.6 divided by 4,000 - 2 x 2,000 pairs – buzzard) from the Northern Ireland adult population (Musgrove et al., 2013) or 0.005% of the UK population (79,000 pairs / 158,000 birds). With the recommended avoidance for buzzard as 98% (Provan & Whitfield, 2006; SNH 2014;

2017), this declines to a negligible 0.2 buzzard (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.1 years, but with 98% avoidance one bird every 6.6 years (Technical Appendix A9.3).

- There was some variation between survey years and activity was higher during 2018 2019 surveys. With no avoidance the activity equates to predicted mortality of approximately one bird every 0.4 years, but with 98% avoidance one bird every 19.5 years for existing turbines (Technical Appendix A9.3) and approximately one bird every 0.1 years, but with 98% avoidance one bird every 6.5 years for existing turbines. Average collision risk as predicted by Band et al., (2007) models is lower for buzzards in the proposed Development (11.2%) compared to the Operational Rigged Hill Windfarm (11.7%).
- Buzzards are not considered particularly vulnerable to collision (Whitfield & Madders, 2006) and no specific avoidance 149. measures have been established for them. In Wales, they will breed in close proximity to windfarms although some collisions have occurred (K. Duffy, personal communication & M. Ruddock, personal observation) and equally buzzards have been recorded to display in the vicinity of windfarms and even perch on nacelles when blades are not turning without observations of mortality (M. Ruddock, personal observation).
- Pearce-Higgins et al., (2009) indicates that buzzard occurrence in/around windfarms may be altered (displaced) by an average of 41.4% (range 16.0% to 57.8%), therefore indicating that there may be a reduced level of activity (i.e. avoidance), and further reducing collision risk by up to 57%. In addition, the flights utilised here were all the flights recorded within the survey buffers (not only turbine buffers and thus further over-estimate collision risk estimates. Only a proportion of the buzzard flights utilised in collision risk estimate in 2014-2015 were recorded inside the existing (25%) and proposed (37%) turbine 500 m buffers and a higher proportion in 2018-2019 inside the existing (8%) and proposed (31%) turbine 500 m buffers. Thus, a further reduction in risk is likely of approximately 63-92% from the estimates provided in Technical Appendix A9.3.
- 151. A study by Musgrove et al. (2013) estimated that the UK population of buzzards was 57,000 79,000 pairs (with 1,000 -2,000 estimated for Northern Ireland). On the basis of the above any collision rates within the proposed Development turbine envelope would confirm that a negligible proportion of the buzzards may be affected from the UK population. Some buzzards nested within 1 km of the proposed Development turbines, and others were recorded within 2 km of the proposed turbines, therefore actual risks for this species of displacement and/or collision are considered low, but will continue to be monitored as part of the monitoring protocol outlined here (Section 9.7; Technical Appendix A9.4).
- Any collision risk estimate for this secondary species does not take into account the spatial preferences and/or usage of the 152. site which shows that activity is primarily away from the proposed area of the turbines (Figures 9.14 & 9.33), and located around areas of identified breeding territories (Technical Appendix A9.1) and also it appears that this species is exhibiting avoidance of the existing turbines (Figure 9.14 & 9.33) therefore collision rates are likely to be considerably lower than any predicted rate and over-estimated by the use of the five minute interval timings and inclusion of all flights in the indicative collision risk models (Technical Appendix A9.3).
- There have been no collisions recorded of this species at the Operational Rigged Hill Windfarm and in conclusion, as shown 153. above, the Development presents no significant risk to buzzard from collision throughout the operational phase.

9.5.6.5 Kestrel

- 154. Kestrels occurred within the 500 m Survey Area for 17 five-minute intervals during the vantage point surveys in 2014-2015 and there were more detections in 2018-2019 (n = 28). These birds occurred predominantly over southern and eastern parts of the 500 m Survey Area and around operational turbines (Technical Appendix A9.1; Figures 9.15 & 9.34). The activity centres largely correspond to the proximity of nearest known territories at Craiggore and latterly just beyond the 500 m Survey Area to the north-east. The site is occasionally used for foraging, and most activity was in the vicinity of VP2, VP3 and VP4 (Figure 9.1) and birds appear to be using the areas of the 500 m Survey Area based on proximity to the nearest nest sites (Figures 9.20 – 9.25 & 9.39), and they were frequently recorded to fly within the area of the existing windfarm (Figures 9.15 & 9.34).
- Kestrel flights occurred both inside and outside the potential collision risk height (Technical Appendix 9.3; Table 9.22 & 9.23) within a range of height bands and were recorded between 64-94% within collision risk height for the existing turbines and 64-94% at proposed turbines. Therefore circa 6-36% of flights were at no risk of collision. Since methods utilised here for CRM do not use timed flights by the five-minute interval to the nearest minute, it must be noted that this method would considerably over-estimate collisions and therefore whilst further collision risk modelling is undertaken (Technical Appendix A9.3) these are only indicative and may be at least 5-fold over-estimated since recording was at five minute intervals.

⁴⁴ Musgrove et al., (2013). Population estimates of birds in Great Britain and the United Kingdom. British Birds 106: 64–100

- The collision risk predicted in 2014-2015 at the Operational Rigged Hill Windfarm turbine envelope equates to up to 1.7 kestrel (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.09% (i.e. 1.7 divided by 2,000 - 2 x 1,000 pairs - kestrel) from the Northern Ireland adult population (Musgrove et al., 2013) or 0.002% of the UK population (46,000 pairs / 92,000 birds). With the recommended avoidance for kestrel as 95% (Provan & Whitfield, 2006; SNH 2014; 2017), this declines to a negligible 0.09 kestrel (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.6 years, but with 95% avoidance one bird every 11.6 years (Technical Appendix A9.3).
- The collision risk predicted in 2014-2015 at the proposed Development turbine envelope equates to up to 3.1 kestrel (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 0.16% (i.e. 3.1 divided by 2,000 - 2 x 1,000 pairs - kestrel) from the Northern Ireland adult population (Musgrove et al., 2013) or 0.003% of the UK population (46,000 pairs / 92,000 birds). With the recommended avoidance for kestrel as 95% (Provan & Whitfield, 2006; SNH 2014; 2017), this declines to a negligible 0.15 kestrel (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.3 years, but with 95% avoidance one bird every 6.5 years (Technical Appendix A9.3).
- There was some variation between survey years and activity was lower during 2018 2019 surveys. With no avoidance the activity equates to predicted mortality of approximately one bird every 0.5 years, but with 95% avoidance one bird every 10.3 years for the existing turbine envelope (Technical Appendix A9.3) and approximately one bird every 0.3 years, but with 95% avoidance one bird every 5.8 years for the existing turbine envelope. Average collision risk as predicted by Band et al., (2007) models is higher for kestrels in the proposed Development envelope (10.9%) compared to the Operational Rigged Hill Windfarm (9.6%). Only a proportion of the kestrel flights utilised in collision risk estimate in 2014-2015 were recorded inside the operational (82%) and proposed (88%) turbine 500 m buffers and a smaller proportion in 2018-2019 inside the existing (57%) and proposed (71%) turbine 500 m buffers. Thus, a further reduction in risk is likely of approximately 12 - 43% from the estimates provided in Technical Appendix A9.3.
- 159. A study by Musgrove et al., (2013) estimated that the UK population of kestrels were estimated at 46,000 pairs in the UK (1,000 for Northern Ireland). On the basis of the above any collision rates at the proposed Development would suggest that a negligible proportion of kestrels may be affected from the UK population. No kestrels nested within 1 km of the proposed turbines and indeed the majority were recorded more than 2 km away, therefore actual risks for this species of displacement and/or collision are considered low, but will continue to be monitored as part of the monitoring protocol outlined here (Section 9.6; Technical Appendix A9.4).
- Kestrels are considered vulnerable to collision (Whitfield & Madders, 2006⁴⁵) and collision risk modelling using the five-minute intervals to the nearest minute as duration, over-estimates the amount of time spent in the windfarm area. Therefore, whilst further collision risk modelling has been undertaken it must be noted to be heavily caveated (see Table 9.1); any effects can be monitored via the operational monitoring programme (Section 9.6; Technical Appendix A9.4). Any associated collision risk estimate also does not take into account the spatial preferences and/or usage of the Site which shows that activity is primarily around the area of the existing and proposed turbines (Technical Appendix A9.1; Figure 9.15 & 9.34) and activity may be linked to the proximity of the nearest nesting sites and elevated activity in 2018, due to the pair nesting within the 500 m Survey Area.
- There has been one collision recorded of this species at the Operational Rigged Hill Windfarm and in conclusion, as shown above, the Development presents no significant risk to kestrel from collision throughout the operational phase, however since the collision occurred in the year when nesting was recorded in closer proximity than previous years, flight activity and risk may therefore be associated with nesting proximity and can be managed via the installation of alternative nest sites away from turbine areas (Section 9.6).

9.5.6.6 Raven

Information on raven flight trajectories and data is available here (Technical Appendix A9.1; Figures 9.16 and 9.35). It appears from mapping of flight-lines that avoidance and lower rates of usage around the existing turbines is evident (see Figures 9.16 & 9.35). It is noted that ravens were frequently detected during vantage point observations (206 sightings in 2014-2015 and 183 sightings in 2018-2019) and that observer's concurred that these were associated with movements to / from the vicinity of known territories within 1 - 2 km and a winter roost site located within the Cam Forest approximately 500 m to 1 km away.

- The flights that did occur through the Site were across a range of altitudes both inside and outside the potential collision risk zone for existing and proposed turbines and also in some instances associated with carrion available in some parts of the Site and wider Survey Areas. This species was also frequently recorded perching on fence-posts, derelict and recently installed met masts and nearby radio masts during vantage point surveys (Technical Appendix A9.1) and the species seems readily habituated to the existing infrastructure there. In accordance with existing management practices, stock welfare will be checked on a frequent basis and any fallen stock removed from the site to dissuade any scavengers (e.g. ravens).
- Raven flights occurred both inside and outside the potential collision risk height (Technical Appendix 9.3; Table 9.22 & 9.23) 164. within a range of height bands and were recorded between 39-68% within collision risk height for existing turbines and 41-79% at proposed turbines. Therefore circa 21-61% of flights were at no risk of collision. Since methods utilised here for CRM do not direct the use of timed flights, by using the five minute interval to the nearest minute it must be noted that this method would considerably over-estimate collisions, and therefore whilst further collision risk modelling is undertaken (Technical Appendix A9.3) these provide only indications and may be at least 5-fold over-estimated since recording was at five minute intervals.
- The collision risk predicted in 2014-2015 at the Operational Rigged Hill Windfarm turbine envelope equates to up to 23.9 165 raven (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 2.9% (i.e. 23.9 divided by 800 - 2 x 400 pairs - raven) from the Northern Ireland adult population (Musgrove et al., 2013) or 0.16% of the UK population (7,400 pairs / 14,800 birds). With the recommended avoidance for raven as 98% (Provan & Whitfield, 2006; SNH 2014; 2017), this declines to a negligible 0.5 raven (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.04 years, but with 95% avoidance one bird every 2.1 years (Technical Appendix A9.3).
- The collision risk predicted in 2014-2015 at the proposed Development turbine envelope equates to up to 38.4 (Technical Appendix A9.3) in the absence of avoidance. This represents approximately 4.8% (i.e. 38.4 divided by 800 – 2 x 400 pairs – raven) from the Northern Ireland adult population (Musgrove et al., 2013) or 0.3% of the UK population (7,400 pairs / 14,800 birds). With the recommended avoidance for raven as 98% (Provan & Whitfield, 2006; SNH 2014; 2017), this declines to a negligible 0.8 raven (Technical Appendix A9.3). With no avoidance this equates to approximately one bird every 0.03 years, but with 98% avoidance one bird every 1.3 years (Technical Appendix A9.3).
- There was some variation between survey years and activity was higher during 2018 2019 surveys. With no avoidance the activity equates to predicted mortality of approximately one bird every 0.07 years, but with 98% avoidance one bird every 3.4 years for existing turbines (Technical Appendix A9.3) and approximately one bird every 0.05 years, but with 98% avoidance one bird every 2.4 years for proposed turbines. Average collision risk as predicted by Band et al., (2007) models is lower for ravens in the proposed Development (10.9%) compared to the Operational Rigged Hill Windfarm (12.4%). Only a proportion of the raven flights utilised in collision risk estimate in 2014-2015 were recorded inside the existing (45%) and proposed (67%) turbine 500 m buffers and a smaller proportion in 2018-2019 inside the existing (63%) and proposed (77%) turbine 500 m buffers. Thus, a further reduction in risk is likely of approximately 23 - 55% from the estimates provided in Technical Appendix A9.3.
- A study by Musgrove et al., (2013) estimated that the UK population of ravens at 7,400 pairs in the UK (400 for Northern Ireland). On the basis of the above any collision rates at the proposed Development would suggest that negligible proportion of ravens may be affected from the UK population. No ravens nested within 500 m of the proposed turbines and indeed the majority were recorded more than 1 km of the proposed turbines, therefore actual risks for this species of displacement and/or collision are considered medium to low, but will continue to be monitored as part of the operational monitoring protocol outlined in Section 9.6; and Technical Appendix A9.4.
- Any collision risk estimate does not take into account the spatial preferences and/or usage of the Site which shows that activity is widespread in the 500 m Survey Area including the existing and proposed area of the turbines (Figures 9.16 & 9.35), and located around areas of identified breeding territories and roost sites (Technical Appendix A9.1) and also it appears that this species is exhibiting avoidance of the existing turbines (Figure 9.16 & 9.35) therefore collision rates are likely to be considerably lower than any predicted rate and over-estimated by the use of the five minute interval timings and inclusion of all flights in the indicative collision risk models (Technical Appendix A9.3).

⁴⁵ Whitfield, D. P. & Madders, M. (2006). A review of the impacts of wind farms on Hen Harriers Circus cyaneus. NRIN Natural Research Ltd.

- Similar to the hen harrier, the raven roost and nest sites utilised within the adjacent conifer plantations are vulnerable to change and movement over time depending on the cycles of felling and re-planting since roosts and nests are located in mature woodland.
- There have been no collisions recorded of this species at the Operational Rigged Hill Windfarm and in conclusion, as shown above, the Development presents no significant risk to raven from collision throughout the operational phase.

9.5.7 Potential Effects by Species

Through the extensive suite of surveys and field data aggregated for the proposed Development (Technical Appendix A9.1) 172. desktop reviews (Technical Appendix A9.2) and collision risk modelling (Technical Appendix A9.3) there are a number of primary and secondary ornithological receptors identified. These include waders (snipe, curlew, golden plover) and red grouse; raptors (hen harrier, merlin, peregrine, buzzard, kestrel, sparrowhawk and the allied corvid: raven); waterbirds & wildfowl (whooper swan and greylag goose) and small passerines (within the footprint of the proposed Development) and for which the potential effects are reviewed and summarised here.

9.5.7.1 Waders

173. For waders three primary ornithological receptors were identified during surveys: golden plover, curlew and snipe. Waders (Pearce-Higgins et al., 2009; 2012) may be sensitive to displacement to windfarm development, based on published information, ground-nesting breeding strategy and conservation status.

9.5.7.2 Golden plover

- Golden plover are present during the migration season and during winter. This species presently utilises the Operational 174. Rigged Hill Windfarm for roosting and flights are also recorded. Golden plover are not recorded breeding in the area although BTO Atlas data (2007 - 2011) indicates possible breeding in 10 km square IC72 (Technical Appendix A9.1; A9.2). On the basis that none were recorded breeding within 2 km Survey Area therefore no breeding season displacement effects are likely to occur (Sansom et al., 2016).
- 175. Research indicates a relative tolerance for disturbance and landscape changes for golden plover (Pearce-Higgins et al., 2007) including to windfarms (Fielding & Haworth, 2010). Douglas et al., (2011) found no evidence of changes in abundance or distribution of golden plover (and red grouse) and an increase of breeding golden plover from seven to 13 pairs within three years. Whilst (breeding) golden plover were considered to be displaced at 200 m by Pearce-Higgins et al., (2009) there was no long-term operational impacts shown elsewhere (Fielding & Haworth, 2013).
- Golden plover were recorded migrating through the 500 m Survey Area in September / October / November and February / March and stopping for brief periods on the mountain and also towards Donald's Hill. The majority of these all subsequently departed and none were recorded to over-winter within the Operational Rigged Hill Windfarm. Published information, notably Douglas et al., (2011) which found an increase in (breeding) golden plover at some windfarm sites, and analysis here suggests a neutral effect with low magnitude, potentially beneficial (Douglas et al., 2011) effect. The beneficial effect would only occur if suitable breeding habitat exists and is retained nearby. Currently the Site itself is of marginal suitability for breeding golden plover, and therefore the proposed Development is considered more likely to have a negligible effect on golden plover.
- Research on golden plover (breeding and wintering) indicates they appear to be tolerant of turbines (Fielding & Haworth, 2010; Douglas et al., 2011) and are recorded to routinely fly and breed within and through active windfarm locations. A negligible effect is therefore predicted for this species, monitoring of this species will also in any event be undertaken as outlined in Section 9.6 and Technical A9.4.
- There are no significant effects predicted for golden plover since the species shows ready habituation to the existing turbines and tracks. Golden plover are classed as medium sensitivity by virtue of their occurrence on Annex 1 and as a red-listed species of conservation concern (Table A9.1). On the basis of observed habituation, wintering / migratory season presence only, and relatively low sensitivity to disturbance as indicated in the literature the potential effects on golden plover are classified as having a negligible magnitude of change and hence they have been scoped out on the basis of there being no potential for significant effects in agreement with NIEA (Table 9.1).

9.5.7.3 Curlew

- Whilst waders may be considered particularly vulnerable to displacement during decommissioning/construction activity including the curlew (and snipe) (Pearce-Higgins et al., 2009; 2012), the response of bird species is variable including curlew (Whitfield et al., 2010⁴⁶; Thomas, 1999; P. Whitfield, personal communication) and golden plover (Fielding & Haworth, 2010; Douglas et al., 2011) and any negative effects appear to decline post-construction (Pearce-Higgins et al., 2012). Whitfield et al., (2010) in a long-term study found no evidence of a reduction in breeding success or immediate or gradual displacement of curlew. Individual curlew response varied between sites and there was no evidence of displacement even at 200 m and at some sites curlew actually moved closer to turbines during the post-construction period and routinely nested within 'tens of metres' from turbine bases.
- found evidence of displacement at the "large scale" (up to 800 m), it also found no significant evidence of displacement at the "fine scale" (up to 500 m). Thus, there is conflicting evidence whether curlew actually are displaced. Pearce-Higgins et al. (2012) re-enforces the likely potential impact on large waders (notably snipe and curlew), but indicates that other factors including whether displacement is considered a population "loss", long-term results and the effects mitigation and habitat management are not fully known.
- The one territory that was observed was beyond 1 km, and one pair, which comprises 0.19% of the regional population 181. (average 526; range 252-783; Colhoun et al., 2015) although Musgrove et al., (2013) defines a higher regional population of circa 2,000 pairs (which equates to 0.05%) and 0.001% of the national population (circa 68,000 pairs; Musgrove et al., 2013).
- Any likely effects are avoided given the set-back distances of turbines from curlew (Section 9.7). Pearce-Higgins et al., (2012) effectively prescribes a 620 m - 800 m buffer around turbines for curlew, and all curlew territories are beyond this greater distance (>1.1 km), therefore it is predicted these territories will be retained on the basis of this published information. Based on Pearce-Higgins et al., (2009) there is no predicted loss or displacement of curlew at Rigged Hill since they do not occur within 500 m, nor 800 m nor 1 km zones outlined in that study.
- Curlew are classified as high sensitivity on the basis of the national declines in Ireland (Colhoun et al., 2015⁴⁷), its red-listed status nationally (Colhoun & Cummins, 2013) and published sensitivity to windfarm development (e.g. Pearce-Higgins et al., 2009; 2012). However, the spatial set-back (>1 km) at Rigged Hill from identified territories avoids risk of disturbance and displacement, and therefore there is negligible magnitude of change. There was no documented risk of collision in the present study (Section 9.6.4.4; Technical Appendix 9.3) and therefore the proposed Development is considered to reduce any potential effect to curlew locally, since the overall numbers of turbines are reduced (see also Technical Appendix A2.1).
- identified curlew territories and therefore no curlew territories will be affected by the Development (Technical Appendix A9.1; Section 9.6.4). Therefore, no significant effects are predicted either from displacement, or from collision since there is no predicted collision risk.

9.5.7.4 Snipe

- As above; waders, including snipe, may be vulnerable to displacement during windfarm development (Pearce-Higgins et al., 2009; 2012). Whilst it is recognised that the response of bird species is variable to windfarm development (Whitfield et al., 2010; Thomas, 1999; Fielding & Haworth, 2010; Douglas et al., 2011) and negative effects appears to decline postconstruction (Pearce-Higgins et al., 2012) snipe, are considered the most potentially affected species at this location.
- 186. 2009). Breeding snipe may be sensitive to displacement to windfarm development, based on published information, groundnesting breeding strategy and conservation status. Snipe are defined as low sensitivity (Table 9.2) since numbers recorded here (maximum of 14 territories in the windfarm area) comprise <1.5% of the regional population (1.2% of 1,123 pairs;

It is recognised that curlew may be vulnerable to displacement by windfarms though the study by Pearce-Higgins et al., (2009)

Based on Pearce-Higgins et al., (2009) the proposed Development turbines are more than adequately set-back (>800 m) from

Snipe may be reduced in density within 500 m of turbines although the effects decline beyond 400 m (Pearce-Higgins et al.,

⁴⁷ Colhoun, K., Mawhinney, K. & Peach, W. (2015). Population estimates and changes in abundance of breeding waders in Northern Ireland

⁴⁶ Whitfield, D.P., Green, M. & Fielding, A.H. (2010). Are breeding Eurasian curlew displaced by wind energy developments? *Natural* Research Projects Ltd, Banchory, Scotland,

up to 2013. Bird Study 62

Colhoun et al., 2015) and considerably less than the UK estimate of 80,000 pairs (0.02%) and since the species is amberlisted regionally (Colhoun & Cummins, 2013) rather than red-listed.

- The numbers of snipe territories recorded in the locality (10-17 territories) comprise approximately 0.9% 1.5% of the regional population (1,123 average; range 527-1782; Colhoun et al., 2015) although Musgrove et al., (2013) defines a higher regional population of circa 4,000 pairs (which equates to 0.3% - 0.4%) and 0.01% - 0.02% of the national population (circa 80,000 pairs; Musgrove et al., 2013).
- With between 10 and 14 snipe territories recorded within 500 m boundaries of the existing and/or proposed windfarms 188 (Section 9.6.1; Table 9.6) there is a difference of between 0.7 and 3.4 territories (i.e. 1 – 4 snipe territories; 2014:1.4 (8.2%); 2015: 2.7 (22.5%); 2016: 0.7 (7%); 2018: 3.4 (20%)) during survey years when comparing the numbers recorded within the Operational Rigged Hill Windfarm area and the area of the proposed Development (Section 9.6.1). Therefore, the difference between theoretical displacements ranges between 7% and 22.5% (average 14%) of the local population (within 500 m Survey Area) between the Operational Rigged Hill Windfarm and the proposed Development. This equates to a high to medium magnitude of change of displacement effect for this species.
- However, there is considerable evidence of habituation of snipe within the Operational Rigged Hill Windfarm and abundance 189 and spatial distribution of snipe varied between years (Technical Appendix A9.1). There is also negligible difference between the average distances between years for snipe within 500 m turbine buffers (Table 9.7) and although differential displacement may occur habituation should be readily facilitated compared to the baseline (Operational Rigged Hill Windfarm) given the negligible difference in average distances of territories.
- In the absence of long-term monitoring or ornithology survey data for the development phase of the Operational Rigged Hill Windfarm, it is not possible to know the original baseline of the snipe population, nor the attenuation time before the species occurred / recolonised during the post-construction period. It is evident though that snipe are utilising the existing site, and would likely continue to do so. There were relatively high numbers of snipe located during winter walkover, winter vantage point surveys and during wintering priority species searches within the 500 m turbine envelope, but these can readily displace to other nearby habitats.
- The various displacement modelling carried out for snipe (Section 9.6.1; Pearce-Higgins et al., 2009), identifies that whilst theoretically displacement may occur for this species, this occurs at different levels in relation to the Operational Rigged Hill Windfarm and at the proposed Development during the operational phase. Therefore theoretically, based on this study, the magnitude of change between baseline (Operational Rigged Hill Windfarm) and the Development is high to medium based on the size of the population which has the potential to be displaced at a local level (up to 22.5%; see **Table 9.3**) in some years. Since the average set-back distances are similar between the Operational Rigged Hill Windfarm and the Development (Section 9.6.1), a <u>negligible effect</u> on displacement distance (Table 9.7) is predicted for the proposed Development during the Operational phase, and given the larger spacing between fewer, larger turbines this also allows ready management of lands within the windfarm to mitigate for territorial displacement effect as habituation of this species, even within these distances has clearly been demonstrated within the existing Operational Rigged Hill Windfarm (Table 9.6).
- Based on published literature of sensitivity during the phases associated with construction and decommissioning there is a high - medium magnitude of change effect with one (6%) to four (24%) difference in territories within 400 m (i.e. disturbance zone) between Operational Rigged Hill Windfarm and the Development for a temporary time period (i.e. until construction is completed) in the absence of any mitigation via avoidance (Section 9.7). Since snipe are defined as low sensitivity species and given the predicted high to medium magnitude of change for disturbance and/or displacement during the decommissioning/construction phases this results in a potential moderate to minor significant effect predicted for snipe.
- The Draft Habitat Management Plan (Technical Appendix A3.2) proposes restoration of habitats and extensive removal of self-seeded conifers, habitat management is proposed across more than 76 ha and includes extensive areas suited to snipe management. The habitat management will have positive implications for snipe (Section 9.6), which are known habituate at this locality, with numbers and distribution varying between years within 400-500 m of existing turbines within the windfarm area
- Habitat management / restoration will also help enable a rapid recovery post-construction for snipe and will further mitigate 194. against displacement effects for in excess of four snipe territories.

Utilising minimum bounding geometry (MGB) to plot territorial boundaries for snipe locations between years within the 500 m Survey Area snipe were recorded to occur in densities of approximately 8 - 20 ha / pair (see Chart 9.1 below), whilst in the existing turbine 500 m buffer this was 4 - 15 ha / pair and in the proposed turbine 500 m buffer this was 6 - 15 ha / pair. The 76 ha habitat management area proposed should thus facilitate more than four territories. With a maximum of four territories predicted to be displaced, the habitat management areas are more than adequately sized to mitigate any potential displacement effects predicted for the decommissioning/construction phases.



9.5.7.5 Red grouse

- There were several red grouse territories recorded here currently and historically (Technical Appendix A9.1), although habitat within the site is poor for nesting in some parts, in other areas excellent areas of deep heather occur in spatially explicit areas (Figure 9.2). A small number of red grouse territories occur around the site and within the Operational Rigged Hill Windfarm footprint although the number and distribution of these changes between years. This species therefore shows considerable habituation in relation to the Operational Rigged Hill Windfarm with territories, including successfully fledging young, occurring in close proximity to the existing turbines and tracks (Technical Appendix A9.1).
- Red grouse have been recorded to fledge a number of young in some years (maximum covey of four birds recorded) thus birds appear productive at this Site although numbers varied considerably particularly at the southern end of the mountain between years and it may be that influxes or effluxes of this species are occurring to / from the wider moorland areas at Donald's Hill. There is some evidence of low intensity gamebird management in the wider 2 km Survey Area to the south and perhaps some red grouse shooting may be occurring, and this may explain the spatial variation between survey years (Figures 9.20 – 9.25; 9.39).
- Within the 500 m Survey Area between three and eight territories have been recorded with fewer in the 500 m buffer of the existing turbines (one to six) and similar in the proposed turbine 500 m buffer (two to six). The same maximum numbers of red grouse territories would be at risk since numbers of territories within the 500 m Survey Area and the 500 m buffers of the proposed turbines are similar to the baseline (Operational Rigged Hill Windfarm). An additional maximum of one to two pairs occurred (in 2015 and 2018 only) within 500 m of the proposed meteorological mast (Figures 9.50 & 9.53).
- Red grouse are not apparently affected by turbine development (Pearce-Higgins et al., 2009; Douglas et al., 2011) although 199. construction activity can depress the population initially, and temporarily (Pearce-Higgins et al., 2012). Published information

suggests a neutral impact on this species, since both Pearce-Higgins et al., (2009) and Douglas et al., (2011) indicate no effects of windfarms on red grouse.

- Thus, red grouse are not considered to be significantly affected by windfarms (Pearce-Higgins et al., 2009; Douglas et al., 2011; Pearce-Higgins et al., 2012). In supporting information, Pearce-Higgins et al. (2012) found continued negative impacts on waders, but re-iterated few impacts on red grouse and some species actually increased post- construction. Furthermore, all red grouse flights were recorded at <15m a.g.l. during observations at Rigged Hill (Technical Appendix A9.1) and thus vulnerability to collision is negligible.
- As a regionally red-listed species (Colhoun & Cummins, 2013) red grouse are classified as medium sensitivity and on the 201. basis of published information which shows negligible magnitude of change on this species, the considerable inter-annual spatial and numerical variation and the similar maximum spatial overlap with existing red grouse territories in both the proposed Development and the Operational Rigged Windfarm the magnitude of change between the baseline (Operational Rigged Hill Windfarm) and the Development is therefore negligible magnitude of change for red grouse in the repowering of Rigged Hill, leading to a negligible and not significance effect subject to the best practice measures outlined within the CMS covered in Section 9.6.

9.5.7.6 Raptors

At Rigged Hill and in the wider hinterland there are six breeding raptor species which have been documented, namely hen harrier, merlin, peregrine, buzzard, kestrel and sparrowhawk. The same species' assemblage was also recorded during the wintering seasons and hen harrier were recorded roosting in the wider area too. There were three breeding raptors recorded within 500 m of the existing or proposed turbines (Technical Appendix A9.1); merlin (one year only), sparrowhawk (one year only) and long-eared owl (two years). Three other species kestrel (1 pair), buzzard (2 pairs) and hen harrier (2 pairs) were also recorded nesting between 500 m and 1 km from turbines. Winter roosting hen harriers were recorded within 2 km. The risk of any direct displacement from breeding or wintering locations is reviewed by species since all species are located beyond published and/or recognised set-back / buffer distances (Currie & Elliot, 199748; Ruddock & Whitfield et al., 2007; Whitfield et al., 2008). The white-tailed eagle was a non-breeding, non-territory holding bird and was not detected in the area after the initial sightings and therefore is not considered further here.

9.5.7.7 Hen harrier

- Hen harrier are defined as high sensitivity at this locality since the species is listed on Annex I of the Birds Directive and is red-203. listed nationally (Eaton et al., 2015) and amber-listed regionally (Colhoun & Cummins 2013) and may be sensitive to windfarm development. As outlined above hen harriers may face the same generic risks to wind energy development that have been identified for other birds including behavioural avoidance; perturbation due to habitat modifications and mortality through collision. Hen harriers were recorded foraging relatively frequently during the summer and the winter (Technical Appendix A9.1) and a maximum of two pairs were recorded nesting and roosting at various localities during the study period within the 500 m and 2 km Survey Areas.
- There is a relatively detailed quantity of research on hen harriers which are indicates the species is potentially sensitive to 204. windfarm development (Percival, 2003; Pearce-Higgins et al., 2009) at up to 2 km (Bright et al., 2008; McGuiness et al., 2015) during both breeding and wintering seasons. The effects of windfarms have been considered a risk to hen harriers due to the spatial overlap with windfarms and wintering or breeding habitats (Haworth & Fielding, 2012⁴⁹).
- Harriers are considered to be at relatively low risk of collision and low-medium risk of displacement (Madders & Whitfield, 2006) with high (>99%) avoidance rates (Garvin et al., 2011; SNH, 2014; 2017) and will avoid wind turbines and considered to be less vulnerable to displacement. Madders & Whitfield (2006) reviewed several studies and found little evidence of largescale displacement and ultimately suggested that foraging avoidance mostly extended to approximately 100 m although nest displacement was reported at 200 m to 300 m.

- Despite the low-medium risks of collision identified by Whitfield & Madders (2006), hen harrier collisions have been reported Madders, 2006) and mortality of harriers may also be disproportionately lower than other raptors (Drewitt & Langston, 2008). Hen harriers may also be at lower risk of collision due to the majority of low elevation flights undertaken by the species (Madders, 2000⁵¹; Whitfield & Madders, 2006; Band et al., 2007) which does not normally predispose them to flying within the rotor swept zone and high frequency of avoidance responses observed (Garvin et al., 2011). Wilson et al. (2015) suggested that collision risk may be affected by the proximity of the nest and during breeding displays, but that collision probability is generally low.
- The key study examining displacement in hen harriers (Pearce-Higgins et al., 2009) found that avoidance extended to 250 m 207. from turbines with reduced flight activity and that breeding density would be consequently be reduced by 52.5% (range -1.2% to 74.2%). This study also found that risk exposure of hen harriers was unrelated to flying height and that there was no significant reduction in abundance affected by windfarm tracks or transmission lines although avoidance rates may be site specific. Haworth & Fielding, (2012) found that avoidance of 100 m to 250 m seems to be the consensus on minimum estimated avoidance for nesting and foraging (see also Madden & Porter, 2007; 10 m to 100 m).
- In Scotland, nests have been recorded at one site, Cruach Mhor, between 131 m and 476 m (average = 284 m) (SPR. 2009: 208 Robson, 2011⁵²) from turbines where there was an inclusive habitat enhancement area. Other nests have been recorded elsewhere in Scotland at 110 m away from turbines (Forrest et al., 2011⁵³) with a similar density of nesting pairs recorded in pre and post construction (2.6 pairs pre-construction phase; 2.4 pairs operational phase; with 4.5 pairs construction phase). Both of these sites also recorded Hen Harriers nesting within a few hundred metres during construction phases. McMillan (2011)⁵⁴ reports nesting hen harriers at 500 m from turbines and less than 200 m from access tracks whilst O'Donoghue et al., 2011⁵⁵; found an average displacement of 501m (range 140 m - 760 m). During windfarm construction, displacement has been suggested potentially to occur up to 500 m around construction sites with some disruption up to 1 km, depending on line of visibility (Madders 2004⁵⁶; Bright et al. 2006⁵⁷; Madden & Porter, 2007⁵⁸).
- 209 These studies show that individual responses may be highly variable (see review in Wilson et al., 2015) and typically extend between 50 m and 1 km. Taking the findings of Pearce-Higgins et al., (2009) with an average behavioural avoidance of 53% within 500 m by inference would imply that there would be no observed avoidance at 950 m (i.e. circa 1 km). Several reviews and recommendations for set-back distances (Currie & Elliot, 1997; Petty, 1998⁵⁹; Ruddock & Whitfield, 2007) in their reviews of hen harrier disturbance zones suggested buffers of 500 - 600 m; 500 - 1000 m and 500 - 750 m respectively and such metrics are frequently applied to windfarm developments (Obermeyer et al., 2011⁶⁰).
- Fernández-Bellon et al. (2015) examined proximity of turbines of breeding parameters of Irish hen harriers including metrics 210. and found there were no statistically significant relationships between breeding parameters (nest success; brood size; productivity) and distance of the nest from the nearest wind turbine. However, a near significant result was recorded with lower nest success within 1 km of wind turbines. This concurs with similar maximum direct disturbance or indirect displacement distances recorded in other studies (Ruddock & Whitfield 2007; Pearce-Higgins et al., 2009).

(Lekuona & Ursúa, 2005⁵⁰) but there does not appear to be a link between abundance and collision in hen harriers (Whitfield &

⁵⁰ Leukona, J.M & Ursúa, C. (2007). Avian mortality in wind power plants of Navarra (Northern Spain). In: de Lucas M, Janss GFE, Ferrer M

⁵⁶ Madders, M. (2004). The ecology of hen harriers in Scotland in relation to windfarms. Report on Penbreck and Carmacoup proposed

⁵⁷ Bright, J. A., Langston, R. H. W., J, E. R., Gardner, S., Pearce-Higgins, J. & Wilson, E. (2006). Bird sensitivity map to provide locational

Madden, B. & Porter, B. (2007). Do wind turbines displace Hen Harriers Circus cyaneus from foraging habitat? Preliminary results of a case

⁶⁰ Obermeyer, B., Manes, R., Kiesecker, J., Fargione, J. & Sochi, K. (2011). Development by Design: Mitigating Wind Development's Impacts

⁴⁸ Currie, F. & Elliott, G. (1997). Forests and birds: a guide to managing forests for rare birds. Cambridge: Forestry Authority and RSPB ⁴⁹ Haworth, P. F. & Fielding, A. H. (2012). A review of the impacts of terrestrial wind farms on breeding and wintering hen harriers. Report prepared for Scottish Natural Heritage.

⁽eds) Birds and wind farms: risk assessment and mitigation. Editorial Quercus, Madrid, pp 177-192 ⁵¹ Madders, M. (2000). Habitat selection and foraging success of Hen Harriers Circus cyaneus in west Scotland. Bird Study 47: 32-40.

⁵² Robson, P. (2011). Hen Harrier activity at Cruach Mhor windfarm: Review of monitoring data 2001 – 2011. ScottishPower Renewables. ⁵³ Forrest, J., Robinson, C., Hommel, C. & Craib, J. (2011). Flight activity and breeding success of Hen Harrier at Paul's Hill wind farm in north east Scotland. Poster presented at 2011 Conference on Wind Energy and Wildlife Impacts, Trondheim, Norway. ⁵⁴ McMillan, R.L. (2014). Hen harriers on Skye, 2000–12: nest failures and predation. Scottish Birds 34: 30-39. ⁵⁵ O'Donoghue, B., O'Donoghue, T. A. & King, F. (2011). The Hen Harrier in Ireland: conservation issues for the 21st Century. Biology & Environment: Proceedings of the Royal Irish Academy 111: 1-11.

windfarm

guidance for onshore wind farms. A report by the Royal Society for the Protection of Birds, study at the Derrybrien wind farm, County Galway. Irish Birds 8: 231-236. ⁵⁹ Petty, S.J. (1998). Ecology and conservation of raptors in forests. Forestry Commission Bulletin 118. HMSO, London.

on Wildlife in Kansas. PLoS One 6: e2669.

- There was a maximum of two pairs of hen harriers which were located at a variety of nesting locations. A third pair of hen harriers were recorded within 5 km in some years of survey but were not recorded foraging or utilising the windfarm area or any parts of the 2 km Survey Area. Two pairs represents (6.3% of the regional population; 32 pairs; Ewing et al., 2011) and 0.17% of the UK population (1,162 pairs; range 891-1462; Ewing et al., 2011; Musgrove et al., 2013).
- 212. The foraging minimum bounding geometry (MBG), also known as minimum convex polygons (MCP), joining all detected flight lines, points, nest sites and roost sites, were created to identify territorial zones for each pair (Figure 9.58) based on detections during foraging, nesting and roosting observation. The approximated observed territory sizes were 1,147 ha and 1,172 ha respectively. Both pairs were noted to display to the north and east of the closest nest sites and no display activity was recorded over the windfarm area in any year of study.
- 213. At the Site, nests were recorded closest at 690 m away and extended up to 2.1 4.2 km for the same two pairs which both moved closer to the Operational Rigged Hill Windfarm during the survey period (from 4.2 km to 930 m for the northern pair and from 2.1 km to 700 m for the eastern pair). The two nest sites were recorded closest within 1 km of the existing and proposed turbines (650 m and 670 m) nesting in second rotation forest habitats.
- 214. The species is known to utilise second rotation (pre-thicket stage) plantation forests extensively in Northern Ireland (Wooton et al., 2018) and Ireland (Ruddock et al., 2016). However, these are dynamic habitats and can only be utilised for a certain length of time when the shrub layer is sufficiently developed after clear-felling and replanting (circa 3 years) and until canopy begins to close and suppresses the shrub layer (circa 12-15 years). The dynamics of forest clear-felling and planting will therefore strongly drive the pattern of spatial occurrence in forest nesting sites such as this recorded at Cam Forest. The hen harriers have selected nesting vegetation that is suitable and over-time these parcels will become unsuitable and hen harriers will be required to relocate to alternative nesting areas. The hen harriers have selected to nest closer to the Operational Rigged Hill Windfarm due to the suitability and availability of a temporally available habitat.
- 215. Sensitivity of hen harriers to windfarms may occur up to 2 km (Bright et al., 2008; McGuinness et al., 2015). It should be noted that in some of the years of survey, records of this species were at more than 2 km from the Site. There are potential pathways from the observed nesting (and roosting) sites to the Rigged Hill windfarm since the Operational Rigged Hill Windfarm and Development are within foraging range of the hen harrier (2-10 km; Arroyo et al., 2009; Irwin et al., 2012⁶¹) and within range for considering connectivity to designated sites (SNH, 2016). Foraging behaviour of breeding pairs can be influenced by habitat changes at distances up to 2-3 km from the nest (Amar et al., 2004, Arroyo et al., 2009). Foraging and breeding and roosting hen harrier were recorded during the field surveys conducted here (Technical Appendix A9.1). Hen harriers are therefore within territorial range of the existing and/or proposed Development displaying nesting and foraging activity in close proximity to the proposed Development and the Operational Rigged Hill Windfarm.
- Previous research has indicated that avoidance of windfarms by breeding hen harriers may occur within 1 km of turbines (Pearce-Higgins et al., 2009) and that breeding parameters may be affected by wind turbines up to 1 km (Fernandez-Bellon et al., 2015). Fernandez-Bellon et al. (2015)⁶² found that there were no effects of turbine proximity on hen harrier breeding parameters (fledged brood size and productivity) but that there may be a negative effect on nest success extending approximately 1 km (see also Wilson et al., 2015; 2016). Productivity may also be reduced as shown by O'Donoghue et al. (2011) at a single hen harrier territory when comparisons are made between pre and post-construction periods (average of 2.63 young reduced to 1.27 young) over a 22-year period.
- Nesting avoidance may only extend to 200 m 300 m from wind turbines (Madders & Whitfield 2006; Robson, 2009; Forrest, 2011). The proposed turbines cannot therefore cause displacement of hen harriers from these identified nesting sites, i.e. all studies indicate that disturbance and/or displacement may occur at a range of distances 500-1000 m (Madders, 2004; Bright et al., 2006; 2008). Reviews of the direct disturbance of hen harriers have identified buffers of 500-600 m; 500-1000 m and 500-750 m (Currie & Elliot, 1997; Petty, 1998; Ruddock & Whitfield, 2007; Whitfield et al., 2008) to minimise disturbance. Hen harrier nest sites are presently known to occur within the 500 – 750 m range of the existing or proposed turbines which is the

recommended avoidance distance for this species (Ruddock & Whitfield, 2007). All identified hen harrier territories are located more than 600 m from turbines in field surveys (Technical Appendix A9.1).

- The proportion of the regional population that may be influenced by the Development (2 pairs; 6.3%) equates to a medium 218 magnitude of change which equates to the potential for a moderate effect on a high sensitivity species although it should be noted that via the design process the Development has implemented a minimum 500 m set-back (as agreed with NIEA; Table 9.1) and as agreed, this is an operational windfarm site where a level of habituation has been demonstrated by these pairs. This reduces the effect of direct disturbance to low, and not significant, subject to decommissioning and construction activity being managed to ensure a disturbance-free zone during any breeding season, and assuming that the nests remain within the same positions, check surveys are proposed to be undertaken prior to decommissioning/construction commencing which will inform this process, see Section 9.6. Hen harriers have selected to nest 700 m away from the existing turbines at this locality and appear habituated to turbines and associated infrastructure. There are no significant disturbance risks, since proposed turbines are 650 m and 670 m away which is 30 - 50 m difference from the baseline position. Subject to the measures outlined in Section 9.6) there are no significant effects predicted to arise due to direct disturbance. Similarly roost sites occur between 1.4 km and 4.4 km away from turbines, and no direct disturbance or displacement could occur. There appears to be no more than two pairs represented at the roost sites with a maximum of 1 female; 2 males; 1 male / female present at different sites in the vicinity and, although birds are unmarked, it appears likely the local breeding pairs are remaining in the area throughout the winter period.
- Displacement may occur where birds avoid areas around windfarms due to both infrastructure and loss of habitat. There 219 remains a risk of displacement of foraging area for hen harriers (Pearce-Higgins et al., 2009) and for collision during the operational lifetime of the windfarm since they are known to occur in the area. There is currently low-negligible risk of displacement of breeding locations during all phases of decommissioning, construction or operation to either of these 2 pairs and on the basis of current data and implementation of 500 m set-back and a Construction Management Strategy; and there is no risk of collision for hen harrier recorded (Technical Appendix A9.3) at the proposed Development. This species is also known to nest in close proximity to active windfarms (M. Ruddock, personal observation).
- Pearce-Higgins et al., (2009) indicated an average 53% avoidance at 500 m. Additional temporal avoidance of habitats is 220 likely to occur during foraging. Pearce-Higgins et al., (2009) also suggested avoidance may be up to 78% of the foraging time utilised by hen harriers. The windfarm may therefore remove a portion of existing and potential foraging and nesting habitat for the hen harrier although the baseline usage and occurrence of foraging hen harriers is relatively low at Rigged Hill (Technical Appendix 9.1). Foraging avoidance is likely to extend from a minimum of 100 m from wind turbines, extending to 250 m (Pearce-Higgins et al. 2009; Haworth & Fielding 2012).
- 221 buffer) and 95 - 110 seconds (in proposed turbine 500 m buffer) of flight activity which, when extrapolated equates to 13-25 minutes (existing) to 27-29 minutes (proposed). The temporal displacement of hen harrier foraging activity then at 53% average may reduce activity to 7.2 - 13.7 minutes (existing) to 14.4 - 15.8 minutes (proposed). The difference between baseline (Operational Rigged Hill Windfarm) and the Development is thus 0.7 - 8.6 minutes temporal displacement. Although Pearce-Higgins et al. (2009) recognise that -1.2% of temporal displacement may occur which equates to increased usage of the area.
- 222. Taking a (minimal) modelled spatial displacement/avoidance effect distance of 250 m from wind turbines (as described in Pearce-Higgins et al., 2009) results in a potential loss of habitat which may be available for nesting or foraging, of up to 100 ha around the operational wind turbines and up to 135 ha around the proposed wind turbines which is a differential displacement of 35 ha. However, the 250 m zones only partially overlaps with the respective hen harrier territories identified (Figure 9.58). At the northern territory the existing turbines overlapped by 27 ha (2.3%) and the proposed turbines by 41 ha (3.6%) which is a difference of 14 ha, whilst the eastern territory was overlapped by 70 ha (existing; 5.9%) and 91 ha (proposed; 7.8%) which is 21 ha difference. Maximum displacement is 35 ha although this primarily influences the eastern territory and can be categorised as a medium to low magnitude of displacement effect on hen harrier territories.
- Within the 500 m zone, Pearce-Higgins et al. (2009) indicates up to 53% displacement of foraging activity results in a potential 223. displacement zone foraging of up to 228 ha (53% of which is 120.8) around the operational wind turbines and up to 329 ha (53% of which is 174.4) around the proposed wind turbines which is a difference of 53.6 ha over which hen harrier foraging activity may be reduced thereby further reducing collision risk between the operational (baseline) and proposed Development.

Based on the sample of VPs (300 hours) during 13 months (4892 hours) and that 50 - 110 seconds (in existing turbine 500 m

Pearce-Higgins et al. (2009) indicates that hen harriers will totally avoid an area of approximately 250 m around wind turbines.

⁶¹ Irwin, S., Wilson, M. W., O'Donoghue, B., O'Mahony, B., Kelly, T. C. & O'Halloran, J. (2012). Optimum scenarios for Hen Harrier conservation in Ireland. Report to the Dept. of Agriculture, Food & the Marine. 47pp.

⁶² Fernández-Bellon, D., Irwin, S., Wilson, M. & O'Halloran, J. (2015). Reproductive output of Hen Harriers Circus cyaneus in relation to wind turbine proximity. Irish Birds. 10: 143-150.

There are 76 ha proposed for habitat remediation and restoration as part of the habitat management plan within the windfarm which will benefit bird species, including prey species for the hen harrier and linear feature creation / retention to mitigate for any displacement of hen harrier foraging and/or indirect loss of prey species at this locality (Section 9.6; Technical Appendix A3.2). Foraging observations of hen harrier were noted along prey-rich features in the wider site partially along the juxtaposition between lowland and upland habitat zones on the western side of the site and frequently utilising linear features, scrub, hedgerow, drains, tracks and field boundaries for foraging.

- The displacement modelling for total avoidance here therefore indicates that there is a larger potential zone of influence on hen harriers in the proposed Development compared to the Operational Rigged Hill Windfarm (baseline). This difference is proposed to be mitigation with up to 76 ha is proposed for restoration / and management. The compensation proposed for priority habitats via the Draft Habitat Management Plan (Technical Appendix A3.2) therefore 23 ha greater / equivalent to the maximum difference in potential habitat displacement effects (35 - 53 ha) for hen harriers and this habitat will be optimised (restored) such that it will be higher quality for foraging hen harrier should they occur during the operation of the proposed Development. In particular the removal of self-seeded conifers and restoration of such a large part of the mountain will be hugely beneficial to small passerines, red grouse, snipe and directly to hen harriers breeding and wintering in the area.
- The data collected here indicates a regular number of annual flight activity and transits through the proposed Development 225 within 500 m of hen harriers. Since flights of this species were at negligible risk of collision (i.e. one bird every 261 – 302 years; Technical Appendix A9.3) and hen harrier are present breeding and wintering in the wider area a negligible magnitude effect of collision is predicted based on published research and site specific metrics including adequate set-back distances to nearby nest and/or roost sites (Technical Appendix A9.1).
- The proposed turbines are further than minimum avoidance distances of disturbance / displacement effects (>500 m) for hen 226. harrier and there are medium - low magnitude effects of disturbance / displacement and negligible magnitude of effects of collision. Therefore, moderate and therefore significant effects are predicted on the hen harriers prior to implementation of habitat management measures to manage, create and restore habitats within the Site and avoid disturbance during the construction / decommissioning phases.
- 227. On the basis of published research which generally indicates a relatively low sensitivity to windfarms, low risk of collision and some displacement effects and the observed information at this locality which shows a relatively regular level of occurrence (Technical Appendix A9.1), no spatial overlap of both breeding (>500 m away) or wintering locations (>1.4 km away), and low collision risk estimates (Technical Appendix A9.3) in both the proposed Development and the Operational Rigged Hill Windfarm the magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed windfarm is therefore assessed as having an overall moderate effect prior to mitigation. The effect is reduced and not significant subject to appropriate mitigation measures (Section 9.6; Technical Appendix A3.2). There is also a marginally lower predicted risk of collision for the proposed Development turbines than for the operational turbines (Technical Appendix A9.3) indicating a potentially positive effect for the species locally and regionally by repowering.

9.5.7.8 Merlin

- Merlin are defined as medium sensitivity at this locality since the species is listed on Annex I of the Birds Directive and is red-228. listed nationally (Eaton et al., 2015) and amber-listed regionally (Colhoun & Cummins 2013). As outlined above merlin may face the same generic risks to wind energy development that have been identified for other birds including behavioural avoidance; perturbation due to habitat modifications and collision. Merlin were recorded foraging only infrequently during the summer and the winter within the Study Areas (Technical Appendix A9.1).
- There is scant information available on effects of windfarms on merlin, although there are some records of turbine-mediated 229. mortality (K. Duffy, personal communication; Hotker, 2006⁶³). Ruddock & Whitfield (2007) in that review noted a relative tolerance for some disturbance in this species and relative habituation to human activity in parts of the range (in the US) where urban nesting is frequently recorded although they are considered to be relatively sensitive to disturbance during the laying and egg-incubation stages.
- 230. A maximum of one pair of merlin occurs in the 2 km Survey Area and were recorded elsewhere in the wider hinterland and beyond the zone of influence, which represents (3.1% of the regional population; 32 pairs; Ewing et al., 2011) and 0.09% of

the UK population (1162 pairs; range 891-1462; Ewing et al., 2011; Musgrove et al., 2013). In one year of survey a second territory was recorded within 500 m of turbines, but the territory was occupied by a single bird and no nesting was recorded and thus lower weighting has been given to the occurrence here. A low magnitude of effect is therefore predicted.

- In Northern Ireland, the species is rarely recorded nesting on the ground, and more frequently recorded nesting in other species' nests (predominantly corvid) at the edge of forest plantations i.e. tree nesting and frequently along the edge of roads and paths. This is confirmed at this site, and nearby nests were located > 500 m - 2 km away (and up to 4.7 km away) from the existing and/or proposed turbines. Whilst these have been recorded historically to nest closer (M. Ruddock personal observation) to the Operational Rigged Hill Windfarm, including at the identified territory location to the north within 500 m but they were not nesting at this proximity during the field surveys conducted here.
- There is little information available for merlin and the effects of windfarms. Merlin home range may be in the order of 6-7 km² (Sodhi & Oliphant, 1992) and connectivity to designated sites should be considered at up to 5 km (SNH, 2016). Published literature (Becker, 1984; Currie & Elliot, 1997; Ruddock & Whitfield, 2007) confirms that disturbance effects on merlin are unlikely beyond 200-500 m. The findings here indicate a negligible risk of displacement, based on predominantly >1 km setback distance in most years of survey and that the closest territory was not confirmed to be a nesting pair and due to the negligible risk of collision (Technical Appendix A9.3).
- A range of buffers have been identified for merlin in order to avoid disturbance in the order of 200 m to 400 m (Currie & Elliot, 1997) and 300 m to 500 m (Ruddock & Whitfield, 2007) and this species occurs mostly beyond that distance here, therefore no disturbance or displacement is likely.
- On the basis of published research which generally indicates a relatively low sensitivity to disturbance (<500 m) and the observed information at this locality which shows one pair in the area, observed habituation (including with historical nesting adjacent to the Operational Rigged Hill Windfarm), a relatively low level of flight occurrence (Technical Appendix A9.1), limited spatial overlap of breeding locations (mostly > 1 km away and variable between years), and negligible collision risk estimates (Technical Appendix A9.3) in both the proposed windfarm and the Operational Rigged Hill Windfarm results in a low magnitude of change between baseline (Operational Rigged Hill Windfarm) and the proposed Development, which results in a minor and therefore a not significant effect for merlin. There is no predicted risk for collision in the proposed Development or for the Operational Rigged Hill Windfarm for merlin.

9.5.7.9 Peregrine

- both regionally and nationally green-listed having recovered from previous historical declines (Colhoun & Cummins, 2013; Eaton et al., 2015). As outlined above peregrines may face the same generic risks to wind energy development that have been identified for other birds including behavioural avoidance; perturbation due to habitat modifications and collision. Peregrine were recorded foraging only infrequently during the summer and the winter within the Study Areas (Technical Appendix A9.1) and identified territories are known nearby (>2.3 km and up to 3.9 km) which have been occupied (intermittently) throughout the operational lifetime of the existing windfarm.
- Peregrines may be vulnerable to collision with turbines during the operational phase. With no avoidance a maximum of 0.06 0.8 peregrines might be killed annually during the operational and/or proposed Development on the basis of current data, with recommended avoidance rate this is reduced to a negligible number of peregrines (Technical Appendix A9.3) with one bird predicted to be killed between 61 and 790 years at either the existing or proposed turbines which varies between years. This equates to a negligible amount of both the peregrine regional population in Northern Ireland (83 pairs; Wilson et al., 2018) and nationally (1,769 pairs; Wilson et al., 2018).
- from 25 m to 300 m) and no displacement is predicted at Rigged Hill. There is considered to be a relatively low rate of collision likelihood (Madders & Whitfield, 2006) although a small number of peregrine-turbine collisions are documented within Europe including the Orkney Islands, Scotland (Meek et al., 1993⁶⁴; Ruddock & Reid, 2010; K. Duffy, personal communication). The

Peregrine are defined as medium sensitivity at this locality since the species is listed on Annex I of the Birds Directive and are

Peregrines are known to nest in close proximity to turbines installed at quarry and moorland sites in Northern Ireland (ranging

⁶⁴ Meek, E.R., Ribbands, J.B., Christer, W.G., Davy, P.R. & Higginson, I. (1993). The effect of aerogenerators on moorland bird populations in

⁶³ Hötker, H. (2006). The impact of repowering of wind farms on birds and bats

the Orkney Islands, Scotland. Bird Study 40: 140-143.

ability for a population to tolerate extrinsic mortality factors is dependent on demographic parameters of the population being assessed; most notably productivity and survival rates (Ruddock et al., 2008; Whitfield et al., 2008; Fielding et al., 2009).

- The peregrine population in Northern Ireland ranges between 40 and 92 pairs and has declined recently to around 80 pairs per annum fledging, on average, approximately 110 young per annum (Wells & Ruddock, 200865). First year annual survival of juvenile peregrines is typically low (54.4%) and increases in adulthood (80%; Craig et al., 2004⁶⁶) although population specific survival rates in Ireland are largely unknown; and the local population, in parts of the range is threatened by persecution (Ruddock et al., 2008; Wells & Ruddock, 2008). The first year survival rate of 54% means conceivably 59.8 young peregrines (54.4% of 110 average young per year) could be dead within the first year due to other causes.
- Therefore, windfarm mediated causalities are comparatively low in relation to theoretical background or 'natural' mortality 239. levels. However, extrinsic mortality factors can be additive and post-construction monitoring of peregrines would be informative, particularly if peregrines are successful breeding in the wider area since young peregrines may be more prone to collision due to inexperience in flight and/or avoidance (Section 9.7). Given the predicted value of mortality is of low proportional magnitude of the national population and to "natural" peregrine mortality, the overall impact of collision risk is considered negligible on the peregrine population.
- Estimate for actual avoidance can be variable (Chamberlain et al., 2007) although the operational turbines have a lower 240. theoretical risk of collision than the proposed turbines (Technical Appendix A9.3) based on the proportion of flights within 500 m of the operational and/or proposed turbines and duration of time spent at risk height, this equates to mortality of only a negligible theoretical number of peregrines. Turbines at which mortality was recorded for peregrines (red kites and merlin) at Braes of Doune, Scotland were all independent of proximity to known nest sites (K. Duffy, personal communication). Therefore it is not possible to predict which, if any, of the turbines may be a source of mortality. Theoretical collision risk for this species is negligible (Technical Appendix A9.3).
- ^{241.} The closest existing and/or or proposed turbine to the peregrine nest is approximately 2.3 km away. Peregrines have various and occasionally utilised nest locations in the wider area up to 4 km away (M. Ruddock, personal observation) although are known to have alternative nesting areas much further away. Peregrines are recorded to nest within 200-300 m of active wind turbines in Northern Ireland (M. Ruddock, personal observation) in similar upland habitats.
- The buffer that is recommended for peregrines breeding during wind farm developments (typically multiple turbines in upland 242. habitats) is 750 m (M. Madders, personal communication). A comprehensive review by Ruddock & Whitfield, (2007, see also Whitfield et al., 2008) found recommended buffers or disturbance distance observations ranging from 8 m to 4,500 m. This study solicited fieldworker opinion on perceived disturbance and reports a mean distance of 199 m to 354 m although opinions ranged from 10 m to 750 m.
- The distance at which human disturbance occurs will vary on a site-specific basis and also seasonally. Whitfield et al. (2008) 243. recommends a buffer of 500 – 750 m during the breeding season. The upper limits found by Ruddock & Whitfield (2007) may be over-protective in pairs that are already habituated to human-activity; such as at this location. The design of the Development has avoided any risks to disturbance and/or displacement of peregrine falcons at the locality by achieving more than 2 km set-back from turbines.
- The published research and evidence of close occurrence generally indicates a relatively low sensitivity to wind turbines, and 244. there is a negligible risk of collision and displacement effects and the observed information at this locality which shows a relatively low level of flight occurrence (Technical Appendix A9.1). There is also no spatial overlap of both breeding (>2.3 km away) or wintering locations (>3.3 km away), which is greater than published set-back distances (500-750 m; Ruddock & Whitfield, 2007).
- The magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed Development is therefore 245 negligible for peregrine. There is a higher predicted risk for collision in the proposed Development than for the existing site (Technical Appendix A9.3) indicating a potentially negative effect for the species locally and regionally, however the mortality

predictions are in the order of several decades (up to 67 years) and overall collision risk is low. Therefore, a not significant effect is predicted for this species.

9.5.7.10 Buzzard

- Buzzard are defined as low-negligible sensitivity at this locality since the species is green-listed both regionally and nationally (Colhoun & Cummins, 2013; Eaton et al., 2015) but exhibited high frequency of occurrence here and may be vulnerable to collision and/or displacement. As outlined above buzzards may face the same generic risks to wind energy development that have been identified for other birds including behavioural avoidance; perturbation due to habitat modifications and mortality through collision. Buzzards were recorded foraging regularly during the summer and the winter within the Study Areas (Technical Appendix A9.1) and a number of identified territories are known nearby with closest pairs recorded at approximately 760 m.
- There are few specific studies of common buzzard published, although numerous studies are documented in the USA with 247 allied species such as red-tailed hawks Buteo jamaicensis (Garvin et al., 2011) with buzzard species considered to exhibit relatively higher-risk flight behaviours than other raptor species (see also Orloff & Flannery, 1992), but also showed signs of avoidance. Buzzard species have also been found beneath turbines during mortality searches (Smallwood, Rugge & Morrison, 200867: Garvin et al., 2011).
- Buzzard may be at collision risk throughout the operational lifetime of the windfarm with medium-low magnitude effects and with most prevalent risk likely during the breeding season. Buzzards have been recorded colliding with turbines, but flight activity may be reduced by up to 57.8% since they avoid windfarms (Pearce-Higgins et al., 2009) and collision risk therefore may be reduced. During the displacement modelling and research by Pearce-Higgins et al; foraging activity by buzzards was considered to be reduced within a windfarm (Pearce-Higgins et al., 2009) indicating avoidance of such facilities, which appears visually to be evident in the mapping of flight lines at the operational Rigged Hill windfarm (Figures 9.14 & 9.33).
- Based on Pearce-Higgins et al., (2009) there is a predicted average reduction of 41.4% of buzzard foraging activity and 249. therefore the collision risk estimates (caveated previously) are further likely to be over-estimated since there is considerable evidence of avoidance in the published literature. The population of buzzards in the UK and Ireland has seen exponential growth particularly since the 1990s (Balmer et al., 2013) with a national population of 57,000 - 79,000 pairs (Musgrove et al., 2013) and regional population of circa 2,000 pairs (Musgrove et al., 2013; Rooney, 2013). There are up to two pairs recorded in the 500 m Survey Area representing 0.003 - 0.004% of the UK population (Figures 9.20 - 9.25; 9.39) but all breeding sites are located more than 760 m away from existing / proposed turbines and there are negligible risks of direct impacts on the species.
- 250. risk of collision and displacement effects and the observed information at this locality shows a relatively low level of flight occurrence (Technical Appendix A9.1) and avoidance behaviour of the Operational Rigged Hill Windfarm. There is also no spatial overlap of breeding locations (760 m away), which is greater than the published set-back distances for similar species, red kite (300-600 m; Ruddock & Whitfield, 2007) and low collision risk estimates given the large population of this species (Technical Appendix A9.3) in both the proposed windfarm and the Operational Rigged Hill Windfarm.
- The magnitude of change between baseline (Operational Rigged Hill Windfarm) and the proposed Development is therefore 251. medium-low for buzzard in regards to the collision risk estimates provided. There is a higher predicted risk of collision in the proposed Development than for the existing site (Technical Appendix A9.3) indicating a potentially negative effect for the species, however the predictions are heavily caveated here and overall collision and a medium to low magnitude of change is the worst-case scenario presented here. Therefore a not significant effect is predicted for this species.

9.5.7.11 Kestrel

Kestrel are defined as low sensitivity at this locality since the species is amber-listed regionally and nationally (Colhoun & 252 Cummins, 2013; Eaton et al., 2015). However, this species may be more vulnerable to collision since research suggests they are frequently recorded as turbine casualties (Madders & Whitfield, 2006; SNH, 2014; 2017). Kestrel may be at collision risk

Published research and evidence of close occurrence generally indicates a relatively low sensitivity to wind turbines, medium

⁶⁵ Wells, J.H. & Ruddock, M. (2008). Population dynamics of the peregrine falcon (Falco peregrinus) in Northern Ireland. In Peregrine Falcon Populations - status and perspectives in the 21st Century J. Sielicki & T. Mizera (editors).

⁶⁶ Craig G.R., White G.C., Enderson J.H. (2004). Survival, recruitment, and rate of population change of the Peregrine Falcon population in Colorado. Journal of Wildlife Management 68: 1032-1038

⁶⁷ Smallwood, K.S., Rugge, L. & Morrison, M.L. (2009). Influence of behaviour on bird mortality in wind energy developments. Journal of Wildlife Management 73: 1082-1098.

throughout the operational lifetime of the windfarm with medium-low magnitude for negative effects, with most prevalent risk likely during the breeding season when activity was marginally higher (Technical Appendix A9.1).

- ^{253.} The population of kestrels in the UK and Ireland has seen some decline over time (Balmer et al., 2013) with a national population of 46,000 pairs (Musgrove et al., 2013) and regional population of circa 1,000 pairs (Musgrove et al., 2013). There is a maximum of one pair recorded in the 500 m Survey Area with 1-2 pairs recorded in the wider 2 km Survey Area. These 1-2 pairs represent 0.002 – 0.004% of the UK population (Figures 9.20 – 9.25; 9.39) but all breeding sites are located more than 580 m away existing / proposed turbines and therefore there are negligible risks of direct impacts on the species.
- ^{254.} In summary, published research and evidence of close occurrence generally indicates a medium sensitivity to wind turbines, medium-low magnitude risk of collision and displacement effects and the observed information at this locality shows a relatively low level of flight occurrence (Technical Appendix A9.1) equates to a negligible effect during construction / decommissioning and a minor to negligible effect during the operational phase. There is also no spatial overlap of breeding locations (580 m away), which is greater than published set-back distances for similar species, merlin (300-500 m; Ruddock & Whitfield, 2007) and medium-low collision risk estimates given the potential sensitivity of this species (Technical Appendix A9.3) in both the proposed Development and the Operational Rigged Hill Windfarm.
- 255. The magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed Development is therefore medium-low for kestrel in the proposed Development in regards to the collision risk estimates provided and medium sensitivity to windfarms and vulnerability to collision. There is a higher predicted risk for collision in the proposed windfarm than for the operational site (Technical Appendix A9.3) indicating a potentially negative effect for the species by repowering however the mortality predictions are heavily caveated here and overall collision effects on the receptor baseline are medium to low as the worst case scenario presented here. Therefore a not significant effect is predicted for this species.
- There was a kestrel collision mortality record during 2018 at Rigged Hill detected via the ScottishPower Renewables 256. monitoring protocol. This was the year of the closest recorded breeding, and higher flight activity was also recorded in the monitoring that year. Whilst the birds selected a nest site closer to the windfarm over time the installation of alternative nest site (boxes / baskets) away from the turbine area would further help avoid any potential (but unproven, since individuals were not specifically identifiable) links between proximity of nest and avoidance of collision risk by increasing separation distances. Thus, enhancement measures are proposed to install a series of alternative nesting locations suitable for kestrel but which equally may be utilised by species such as long-eared owl and merlin (see Section 9.6; Technical Appendix A3.2).

9.5.7.12 Sparrowhawk

- Sparrowhawk are defined as low sensitivity at this locality since the species is amber-listed regionally (Colhoun & Cummins, 2013) and green-listed nationally (Eaton et al., 2015). There is little information available on the impacts of windfarms on this species, but generally given the low altitude flights (typically <10 m a.g.l.) the likelihood of collision is negligible. At the Site, all nesting pairs identified were recorded at least 648 m from existing turbines, and at least 482 m from proposed turbines, so setback distances are closer for the proposed Development. This species nested closer to the Operational Rigged Hill Windfarm over time and is dependent on mature conifer plantation for nesting at the present locality, which are subject to future clearfelling.
- There were negligible observed or theoretical risks of displacement or collision given the set-back distances recorded 258. (>480 m) from existing turbines, and the low-level flights recorded, none of which were at collision risk height for either the existing or proposed turbines. There are two to three sparrowhawk pairs recorded within the 500 m Survey Area (Technical Appendix A9.1) which comprise 0.009 - 0.01% of the 35,000 pairs nationally (Musgrove et al., 2013) and 0.1% - 0.2% of the 2,000 pairs regionally (Musgrove et al., 2013).
- In summary, relatively low frequency of low altitude flights, generally indicates a relatively negligible sensitivity to wind 259. turbines, with a negligible risk of collision and of displacement effects, and observed information at this locality shows a relatively low level of flight occurrence (Technical Appendix A9.1). There is also no spatial overlap of breeding locations (> 480 m away), which is similar to published set-back distances for the similar, albeit larger species, goshawk (300-500 m; Ruddock & Whitfield, 2007) and negligible collision risk estimates are predicted, given the potential sensitivity of this species.
- Therefore, the magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed Development is 260. assessed to be negligible for sparrowhawk, due to negligible vulnerability to collision, disturbance or displacement. Therefore a not significant effect is predicted for this species.

9.5.7.13 Long-eared owl

- Long-eared owl are defined as low sensitivity at this locality since the species is green-listed regionally (Colhoun & Cummins, 2013) and nationally (Eaton et al., 2015) and that they are known to be vulnerable to collisions generally due to the nature of auditory foraging behaviours. There is little information available on the impacts of windfarms on this species, but generally given the low altitude flights (typically <15 m a.g.l.) the likelihood of collision is negligible. This species is more typically as road collision victims (O'Donoghue, 2016⁶⁸). At the Site, nesting 1 pair were identified along the forest edge during two survey years (2015 and 2016) and were recorded 226 - 252 m from existing turbines, and at 213 - 384 m from proposed turbines, so set-back distances are further away for the proposed Development in some years. Despite dusk and dawn vantage point surveys (Technical Appendix A9.1), this species was only recorded during snipe / grouse surveys and was observed flying along the forest edge (<15 m) and perching in the coniferous plantation.
- During 2018 the species was not recorded adjacent to the windfarm and were instead recorded 2.1 km from existing turbines and 2.0 km from proposed turbines. This species nested further away from the Operational Rigged Hill Windfarm over time and is dependent on mature conifer plantation for nesting at the locality, adjacent to the windfarm which are likely subject to future clear-felling. The clear-felling along the Cam Forest edge adjacent to the windfarm may have shifted the long-eared owls but also they were recorded to be nesting in an old abandoned hooded crow nest, which was known to have subsequently collapsed (over-winter in 2017). The availability of trees and nest sites therefore dictates the presence of the species where it occurs close to the windfarm.
- There were negligible observed or theoretical risks of displacement or collision given the set-back distances recorded (up to 2 km in some years), and the (typical) low-level flights recorded, none of which were at collision risk height for either the existing or proposed turbines. There is one pair recorded within the 500 m Survey Area (Technical Appendix A9.1) which comprise 0.02 - 0.06% of the 1,800 - 6,300 pairs nationally (Musgrove et al., 2013) and 0.1% - 0.5% of the 200 - 700 pairs regionally (Musgrove et al., 2013).
- In summary, relatively low frequency of low altitude flights, generally indicates a relatively negligible sensitivity to wind 264 turbines, with a negligible risk of collision and of displacement effects, and observed information at this locality shows a low level of flight occurrence and negligible collision risks. There is also no spatial overlap of breeding locations (> 200 m away), and nest sites are dictated by extrinsic factors and in some years were closer to existing turbines than proposed turbines indicating that there is no increased effects due to the Development. Although Currie & Elliot (1997)⁶⁹ indicate that whilst activity may disturb long-eared owl they are not considered a rare species in that review although the buffer estimate for barn owls are, albeit different species, provided is in the order of 150-250 m) in that study and negligible collision risk estimates are predicted, given the low potential sensitivity of this species.
- Therefore, the magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed Development is 265 assessed to be negligible for long-eared due to negligible vulnerability to collision, disturbance or displacement. Therefore, a not significant effect is predicted for this species.

9.5.7.14 Raven

- Whilst not a raptor, NIEA had requested further information on raven, which are defined as low-negligible sensitivity at this 266. locality since the species is green-listed regionally and nationally (Colhoun & Cummins, 2013; Eaton et al., 2015) and based on observational data there appears to be a high level of activity, but also avoidance behaviour (Figures 9.16 & 9.35). Collision risk estimates, whilst heavily caveated indicate that a collision risk may occur, but the evidence of avoidance further reduces any likelihood of risk at this locality.
- 267. population of 7,400 pairs (Musgrove et al., 2013) and regional population of circa 400 pairs (Musgrove et al., 2013). There is a maximum of two pairs recorded in the 500 m Survey Area with up to two more pairs recorded in the wider 2 km Survey Area. These two pairs represent 0.03% of the UK population (Figures 9.20 – 9.25; 9.39) and 0.5% of the regional population but all breeding sites are located more than 590 m away operational / proposed turbines and therefore there are negligible risks of direct impacts on the species.

The population of ravens in the UK and Ireland has seen some increases over time (Balmer et al., 2013) with a national

⁶⁸ O'Donoghue, B.O. (2015) Recording and Addressing Persecution and Threats to Our Raptors (RAPTORS) 2012 report by NPWS, Regional Vet Laboratory and State Laboratory.

⁶⁹ Forests and Birds. A Guide to Managing Forests for Rare Birds. F. Currie and G.D. Elliot (1997), RSPB, Sandy.

- In summary there is evidence of close occurrence to the existing turbines and apparent avoidance which generally indicates a relatively low sensitivity to wind turbines, with a medium-low risk of collision and displacement effects. The observed information at this locality shows widespread flight occurrence, rather than any specific roost flight paths or corridors (Technical Appendix A9.1) and apparent avoidance behaviour, including birds that were observed to fly through the existing turbine blades (rotor swept area). There is no spatial overlap of breeding locations (> 590 km away) and roost sites (570 m -1.1 km) but there is a medium-low collision risk given the large population of this species (Technical Appendix A9.3) in both the proposed Development and the Operational Rigged Hill Windfarm.
- The magnitude of change between baseline (Operational Rigged Hill Windfarm) and proposed Development is therefore 269 medium-low magnitude for raven in regards to the collision risk estimates provided. There is a higher predicted risk for collision in the proposed Development than for the existing site (Technical Appendix A9.3) indicating a potentially negative effect for the species, however the mortality predictions are heavily caveated here and the overall medium to low collision risk is presented as the worst-case scenario. Therefore a not significant effect is predicted for this species. However, a number of measures are also proposed (Section 9.6) which will further minimise any potential effects.

9.5.7.15 Swans & Geese

- There is no predicted risk to swans, or their nesting / roosting sites and/or collision on the basis of current field data and 270 therefore no predicted effects on these Lough Foyle SPA citation species. Some key ornithological receptor species of waterfowl/wildfowl were detected during surveys (whooper swan and greylag geese) (Technical Appendix A9.1), infrequently passing over the 500 m Survey Area or within the 2 km Survey Area.
- 271. The turbines are located more than 10 km from the nearest known historical wintering roost of whooper swans, which is greater than the published avoidance distances for swans and other wildfowl (Winkelman, 1985⁷⁰; Langston & Pullan, 2003; Fin et al., 2012⁷¹). Whilst there may be a risk of both collision and displacement of whooper swan at operational turbines (Rees, 2012) collision risk may be increased in poor visibility and at smaller turbines (Larsen & Clausen, 2002) and displacement at foraging sites may only extend to avoidance of 200 m - 400 m (Fijn et al., 2012) and one review suggests a maximum of 500 m - 600 m (Langston & Pullan, 2003). Flying swans were detected at distances of 379 m - 720 m to existing and 266 m - 720 m to proposed turbines but none of these flights were at risk of collision and/or displacement (barrier) effects and no significant commuting routes or foraging - roosting flyways were identified within 5 km.
- 272. In a detailed study of turbine avoidance by wintering pink-footed geese Larsen & Madsen (2000) suggest that 100-200 m was the avoidance distance for foraging geese and that over time they habituated (40-100 m) to the turbine presence (Madsen & Boertmann, 2008). The tolerance of turbines by Bewick's swans was also recorded to be a function of food supply and availability of supplementary food (beets; Fijn et al., 2012) and that they actually moved closer to turbines later in the wintering periods.
- ^{273.} Fijn et al., (2012) found that foraging Bewick's swans occurred on average 560 m from turbines (nine turbine windfarm with rotor swept height of 40 m - 140 m) but were recorded as close as 125 m. Since the nearest known roosts utilised by whooper swans and greylag (and other waterfowl), is currently >10 km from all turbines and the SPA is more than 10 km away for which some of these species are site features (Figures 9.5; 9.20 - 9.26; 9.39) therefore on the basis of majority of published tolerance information which ranges between 125 m and 600 m will result in negligible risk of displacement.
- 274. Swans and geese, and particularly whooper swans are rarely reported as turbine collision victims (Fijn et al., 2012; Rees, 2012) and more often are recorded to collide with power-lines (Rees, 2006; M. Ruddock, personal observation). It is likely that turbines in general will be avoided by all swans (see also Fijn et al., 2012) and most regularly swans are known to fly relatively low <10 m a.g.l. (M. Ruddock, personal observation). These data are confirmed by GPS satellite flight data which recorded flights at an average of 9m a.g.l. over terrestrial habitats and 31m a.g.l over aquatic habitats (Griffin et al., 2011).

- The documented terrestrial flying heights are below the rotor swept height of the proposed turbines and migrating flights as detected during surveys were actually above rotor height and there were no swan or goose migration or foraging / commuting fly-ways identified during surveys with only a small number of detected flight recorded either >150 m a.g.l.; outside the turbine envelopes(s) and/or more than 500 m away from the operational and/or proposed turbines and therefore no collision risks were detected. The small number of whooper swans and greylag geese were recorded that could be at theoretical risk of mortality if they passed through the proposed windfarm although the flights recorded here were >500 m from proposed turbines and/or above rotor height.
- It is concluded that there is no significant risk of displacement at the proposed Development since swans, if they occurred, are 276 considerably more than >560 m away (see Langston & Pullan, 2003) from the turbine and literature confirms that displacement is usually only temporary in wildfowl (Larsen & Madsen, 2000; Madsen & Boertmann, 2008; Fijn et al., 2012; see also Pearce-Higgins et al., 2012).
- 277. It is concluded that there is negligible risk of collision from both the proposed turbines based on observed flying heights and flying trajectories and on the basis of published information larger turbines can actually reduce collision risk (Larsen & Clausen, 2002) when compared to smaller turbines which is the effective results of the proposed Development and also when compared to those smaller turbines which occur in the wider vicinity (Technical Appendix A2.1). Overall then no significant impacts are predicted for the proposed turbines and appropriate set-backs are retained to any swans both historically and currently.
- Whooper swans are classified as medium sensitivity species since they are on Annex I of the Birds Directive and are red-listed 278 regionally and nationally (Colhoun & Cummins, 2013). On the basis of the set-back distances from wintering sites (>10 km) and low incidence of occurrence during vantage point observations and no evidence of significant impacts in the literature whooper swan (nor for other swans or geese) there is a negligible risk of displacement, disturbance or collision, and therefore there is negligible change in the magnitude of any construction / decommissioning or operational effects due to the proposed Development. Therefore, a not significant effect is predicted for these species.

9.5.7.16 Small passerines

- 279. Footprint analysis of breeding season data identified a small number of breeding territories within the turbine and infrastructure buffer, which varied spatially between years (Sections 9.6.1; 9.6.2). These small number of territories may be disturbed or displaced but research also indicates that some species e.g. skylark and stonechat may actually increase during construction (Pearce-Higgins et al., 2012). Whilst 1-2 territories of some species were recorded in the footprint of the Development the two predominant species in the footprint were meadow pipit and skylarks.
- Footprint analysis of wintering data identified only a small number of species within the turbine and infrastructure buffer, which 280. varied spatially between years all of which can move away to other adjacent habitats. Similarly snipe, and other species recorded here during the winter can readily displace to other adjacent habitats.
- Based on Pearce-Higgins et al., (2009) there is a predicted average loss of a small number of meadow pipit territories, 281. although there were similar predictions for both the operational and proposed turbines (with 11-13 territories difference between years; although footprint analysis indicates a higher potential displacement 18-21) and thus the magnitude of change between baseline and the proposed Development is medium - low magnitude since this represents up to 6.7% (Table 9.3) of local populations of birds in the area i.e. 312 - 397 meadow pipit territories which is 4.5 - 6.7% of the total number of territories recorded in the wider 500 m Survey Areas (Section 9.6.1) and no high or very high sensitivity species are likely to be affected during proposed Development phases. Skylark are not considered to be significantly affected by displacement (Pearce-Higgins et al., 2009; 2012) but may be vulnerable to disturbance and the difference between existing and operational footprints is between two and 10 territories which represents 3.2 - 5.2% of the 63 - 194 territories recorded in the wider 500 m Survey Areas (Section 9.6.1) which is a medium to low magnitude of effect.
- Whilst there are a number of medium sensitivity (red-listed), low sensitivity (amber-listed) and negligible sensitivity (green-282. listed) species in the wider 500 m Survey Area and footprint area none of these occur in internationally, nationally, regionally significant population thresholds and there are only small differences in the footprint analysis between existing/proposed turbine and infrastructure buffers (Section 9.6.1). Therefore a low magnitude, negative effect which equates to minor, and therefore not significant effect is predicted in the absence of mitigation during construction / decommissioning which is reduced to negligible, and a not significant effect on the displacement of small passerines (and also hen harrier, snipe and red grouse) breeding locations provided adequate construction disturbance reduction measures are put in place (Section 9.6).

⁷⁰ Winkelman, J.E. (1985). Impact of medium-sized wind turbines on birds - a survey on flight behaviour, victims and disturbance. Netherlands Journal of Agricultural Science 33: 75-78.

⁷¹ Fijn, R.C., Krijgsveld, K.L., Tijsen, W., Prinsen, H.A.M. & Dirksen, S. (2012). Habitat use, disturbance and collision risks for Bewick's Swans Cygnus columbianus bewickii wintering near a wind farm in the Netherlands. Wildfowl. 62: 97-116.
Receptor	Sensitivity	Potential Effect	Extent of Effect	Magnitude of Effect	Duration of Effect	Significance of Effect
Decommission	ning / Construe	ction Phase				-
Hen harrier	High	Disturbance	Regional	Medium-Low (>500 m; <750 m)	Short-term	Moderate
		Displacement	Regional	Medium-Low (>500 m; <750 m)	Short-term	Moderate
Merlin	Medium	Disturbance	Regional	Low (<500 m; not breeding pair)	Short-term	Minor
		Displacement	Regional	Low (<500m; not breeding pair)	Short-term	Minor
Peregrine	Medium	Disturbance	Regional	Negligible (>500 m)	Short-term	Negligible
		Displacement	Regional	Negligible (>500 m)	Short-term	Negligible
Buzzard	Low – Negligible	Disturbance	Local	Negligible (>500 m)	Short-term	Negligible
		Displacement	Local	Negligible (>500 m)	Short-term	Negligible
Kestrel	Low	Disturbance	Local	Negligible (>500 m)	Short-term	Negligible
		Displacement	Local	Negligible (>500 m)	Short-term	Negligible
Sparrowhawk	Low	Disturbance	Local	Negligible (<500 m)	Short-term	Negligible
		Displacement	Local	Negligible (<500 m)	Short-term	Negligible
Long-eared owl	Low	Disturbance	Local	Negligible (<500 m)	Short-term	Negligible
		Displacement	Local	Negligible (<500 m)	Short-term	Negligible
Raven	Low – Negligible	Disturbance	Local	Low (>500 m; <750 m)	Short-term	Negligible
		Displacement	Local	Low (>500 m; <750 m)	Short-term	Negligible
Golden plover	Medium	Disturbance	Local	Negligible (evidence of habituation)	Short-term	Negligible
		Displacement	Local	Negligible (evidence of habituation)	Short-term	Negligible
Curlew	High	Disturbance	Local	Negligible (>800 m)	Short-term	Minor
		Displacement	Local	Negligible (>800 m)	Short-term	Minor
Snipe	Low	Disturbance	Local	High - Medium (<400 m; evidence of sensitivity in literature)	Short-term	Moderate - Minor
		Displacement	Local	High - Medium (<400 m; evidence of sensitivity in literature)	Short-term	Moderate - Minor
Red grouse	Medium	Disturbance	Local	Negligible (<500 m)	Short-term	Negligible
		Displacement	Local	Negligible (<500 m)	Short-term	Negligible
Whooper swan	Medium	Disturbance	Regional	Negligible (>500 m)	Short-term	Negligible
		Displacement	Regional	Negligible (>500 m)	Short-term	Negligible
Greylag goose	Low	Disturbance	Local	Negligible (>500 m)	Short-term	Negligible
		Displacement	Local	Negligible (>500 m)	Short-term	Negligible

Receptor	ceptor Sensitivity Potential Extent of Magnitude of Effect Effect Effect		Extent of Effect	Magnitude of Effect	Duration of Effect	Significance of Effect	
Meadow pipit	Medium	Disturbance	Local	Medium - Low (small numbers may be disturbed)	Short-term	Moderate - Minor	
		Displacement	Local	Medium - Low (small numbers may be displaced)	Short-term	Moderate - Minor	
Skylark	Medium	Disturbance	Local	Medium - Low (small numbers may be disturbed)	Short-term	Moderate - Minor	
		Displacement	Local	Medium - Low (small numbers may be displaced)	Short-term	Moderate - Minor	
Small passerines	Medium / Low /	Disturbance	Local	Low - Negligible (small numbers may be disturbed)	Short-term	Minor - Negligible	
	Negligible	Displacement	Local	Low - Negligible (small numbers may be displaced)	Short-term	Minor - Negligible	
Operational Ph	nase						
Hen harrier	High	Displacement	Regional	Medium - Low (>500 m; <750 m regular occurrence; 35 – 53 ha difference of displacement)	Permanent but reversible	Moderate - minor	
		Collision	Regional	Negligible (>500 m)	Permanent but reversible	Minor	
Merlin	Medium	Displacement	Regional	Low (<500 m; low frequency of occurrence)	Permanent but reversible	Minor	
		Collision	Regional	Negligible (<500 m; low altitude flights)	Permanent but reversible	Negligible	
Peregrine	Medium	Displacement	Regional	Negligible (>500 m)	Permanent but reversible	Negligible	
		Collision	Regional	Negligible (>500 m)	Permanent but reversible	Negligible	
Buzzard	Low – Negligible	Displacement	Local	Negligible (>500 m)	Permanent but reversible	Negligible	
		Collision	Local	Medium - Low (>500 m)	Permanent but reversible	Minor - Negligible	
Kestrel	Low	Displacement	Local	Negligible (>500 m)	Permanent but reversible	Negligible	
		Collision	Local	Medium – Low (>500 m; vulnerable to collision; collision recorded locally)	Permanent but reversible	Minor - Negligible	
Sparrowhawk	Low	Displacement	Local	Negligible (<500 m)	Permanent but reversible	Negligible	
		Collision	Local	Negligible (>500 m)	Permanent but reversible	Negligible	

Receptor	Sensitivity	Potential Effect	Extent of Effect	Magnitude of Effect	Duration of Effect	Significance of Effect
Long-eared owl	Low	Displacement	Local	Negligible (<500 m)	Permanent but reversible	Negligible
		Collision	Local	Negligible (<500 m)	Permanent but reversible	Negligible
Raven	Low – Negligible	Displacement	Local	Low (>500 m; <750 m (nesting & roosting)	Permanent but reversible	Negligible
		Collision	Local	Medium - Low (>500 m)	Permanent but reversible	Minor - Negligible
Golden plover	Medium	Displacement	Local	Negligible (evidence of habituation)	Permanent but reversible	Negligible
		Collision	Local	Negligible (evidence of habituation)	Permanent but reversible	Negligible
Curlew	High	Displacement	Local	Negligible (>800 m)	Permanent but reversible	Minor
		Collision	Local	Negligible (>800 m)	Permanent but reversible	Minor
Snipe	Low	Displacement	Local	High - Medium (evidence of habituation on site; difference in displacement predictions between operational and proposed windfarm)	Permanent but reversible	Moderate - Minor
		Collision	Local	Negligible (low altitude flights)	Permanent but reversible	Negligible
Red grouse	Medium	Displacement	Local	Negligible (evidence of habituation on site; considerable annual variation in population size; no evidence of sensitivity to windfarms	Permanent but reversible	Negligible
		Collision	Local	Negligible (low altitude flights)	Permanent but reversible	Negligible
Whooper swan	Medium	Displacement	Regional	Negligible (>2 km)	Permanent but reversible	Negligible
		Collision	Regional	Negligible (>2 km; no flight routes or passage through rotor swept areas)	Permanent but reversible	Negligible
Greylag goose	Low	Displacement	Local	Negligible (>2km)	Permanent but reversible	Negligible
		Collision	Local	Negligible (>2km; no flight routes or passage through rotor swept areas)	Permanent but reversible	Negligible
Meadow pipit	Medium	Displacement	Local	Medium - low (small numbers may be displaced)	Permanent but reversible	Moderate - Minor

Receptor	Sensitivity	Potential Effect	Extent of Effect	Magnitude of Effect	Duration of Effect	Significance of Effect
		Collision	Local	Negligible (no evidence of collision risk)	Permanent but reversible	Negligible
Skylark	Medium	Displacement	Local	Medium - low (small numbers may be displaced; no evidence of sensitivity to windfarms)	Permanent but reversible	Moderate - Minor
		Collision	Local	Negligible (no evidence of collision risk)	Permanent but reversible	Negligible
Small passerines	Medium / Low / Negligible	Displacement	Local	Low – Negligible (small numbers may be displaced)	Permanent but reversible	Minor – Negligible
		Collision	Local	Negligible (no evidence of collision risk)	Permanent but reversible	Negligible

9.5.8 Potential effects on designated sites / site features

- The Lough Foyle SPA is located more than 10 km away from the existing turbines or proposed turbines. The two recently 283. installed single turbines at Terrydoo Walker are located closer than either proposed or operational Rigged Hill Windfarm. The SPA was original designated in 1999; after the construction of the Rigged Hill windfarm (1994) and is underpinned by contiguous ASSI, RAMSAR classifications. The SPA is designated for three wintering species (whooper swan, bar-tailed godwit and light-bellied brent geese) in addition to the supplementary designation for waterbird assemblage. The waterbird assemblage includes 21 species; red-throated diver, great-crested grebe, mute swan, Bewick's swan, greylag geese, shelduck, teal, mallard, wigeon, eider, red-breasted merganser, oystercatcher, golden plover, grey plover, lapwing, knot, dunlin, curlew, redshank, greenshank, Slavonian grebe.
- 284. Only one of the SPA citation species (whooper swan) were recorded during field surveys (see Section 9.5.7.14; Technical Appendix A9.3) and there were no regular migration, commuting, foraging or roosting sites identified within 5 km nor where there any significant pathways or flights corridors identified to the SPA for whooper swan nor any other SPA species or assemblage species at Rigged Hill. There were four of the assemblage species identified in the vicinity of Rigged Hill; greylag goose, mallard, golden plover and curlew but none of these were shown to have any connection to the SPA or via regular or significant flyways and there are also no significant effects are predicted for any of these species. (Sections 9.5.7.2; 9.5.7.3; 9.5.7.14; Technical Appendix A9.3).
- 285. Within 5 km there are two ASSI which cite secondary species which were detected at Rigged Hill, Coolnasillagh ASSI (curlew and snipe) and Ballyrisk More (willow warbler, meadow pipit) although both sites are primarily designated for species rich grassland. There were curlew recorded in the direction of (beyond) Coollnasillagh during wider species searches, but this ASSI is well beyond the 800 m buffer and the 2 km search area and no significant effects from direct or indirect pathways could influence curlew and/or snipe at the ASSI. It is noted that there is clearly a good population of waders (particularly snipe) in this wider area, and indeed within the Operational Rigged Hill Windfarm, and this may have led to the designation of that ASSI in 2009. There are no significant pathways for any of the species cited on these two ASSI sites and therefore no significant effects are predicted.

9.6 Mitigation and Residual Effects

- There are a number of significant effects predicted on ornithological features as a result of the Development, and therefore 286. measures are proposed to mitigate these effects. Much of this mitigation will also have the benefit of further reducing a number of the not significant effects identified.
- Moderate or moderate-minor, and therefore significant, effects are predicted on hen harrier (disturbance / displacement), snipe 287. (disturbance / displacement), meadow pipit / skylark (disturbance / displacement) which may occur during both construction / decommissioning and into the operational phases. The Development has been designed to avoid and maximise distance to known and recorded nest sites and territories, and it should also be noted that habituation was observed by both hen harrier and snipe locally, and both these priority species were observed to move closer to the Operational Rigged Hill windfarm over survey years, exhibiting spatial and abundance variation between years.

- Three key measures (Section 9.6.1 9.6.3) are proposed to mitigate these effects (i) a Construction Management Strategy (CMS); and (ii) Snipe Management, (iii) Hen Harrier Management, points (ii) and (iii) inform the basis of a number of the measures proposed within the Draft Habitat Management Plan (Technical Appendix 3.2). There are no specific small passerine mitigation measures proposed since the innate management measures for priority habitat restoration and proposed habitat management measures are also conducive to the recovery, expansion and support of small passerines including meadow pipit and skylark and a range of other small passerines. Some existing constraints on habitat have been identified, including widespread self-seeded conifers on moorland areas which directly affect small passerines (particularly meadow pipit and skylark) and indirectly hen harriers, with these trees creating a further loss of potential foraging habitat / prey species. Removal of this self-seeded area of trees has therefore been identified as an area of further enhancement and the rationale for this is outlined in Section 9.5.7.
- There are no significant effects predicted on any designated site or citation species, including at Lough Foyle SPA. No mitigation is therefore required.
- All other potential effects are assessed as minor or negligible, and not significant. No mitigation is therefore required and avoidance measures have been embedded in the Development through its design and any minor effects are further avoided through the Construction Management Strategy.
- Operational monitoring of the rate of collisions (of all species) is proposed in the post-construction monitoring protocol (Technical Appendix A9.4). No mitigation is required and avoidance measures have been embedded in the Development design.
- The closest turbines to the priority target breeding and wintering species identified here are predominantly beyond 1 km to 292. 2 km and therefore few species are at direct risk of disturbance, although some species may be sensitive to disturbance particularly during the decommissioning/construction activity. Turbines are placed >500 m away from most species (including hen harrier, peregrine, curlew, buzzard, kestrel, raven, whooper swans, greylag geese, woodcock), these set-back distances will be retained, and informed by pre construction check surveys, and guidance provided to contractors, to minimise risk to species, with any breeding season restrictions on decommissioning/construction activity applied, as required, within any recognised buffer zone (Section 9.6.1). Sparrowhawk, merlin and long-eared owl were all recorded within 500 m.
- Habitat management is proposed for the restoration and reinstatement and creation of priority habitats (Chapter 8: Technical 293. Appendix A3.2). The HMP proposes 76 ha to (i) off-set the difference between habitat displacement calculations for hen harrier in the proposed windfarm areas (ii) encourage the rapid recovery of snipe post-decommissioning/construction activity (iii) off-set the difference between the displacement calculations for snipe in the proposed windfarm areas (iv) provide improved habitat conditions for meadow pipit, skylark (and other small passerines) across the site and off-set the small numbers of any passerines that may be displaced. Further enhancement measures such as the removal of the existing selfseeded area of trees and nest boxes for kestrel, with benefit for other species, are also proposed.
- The proposed habitat management thus offers further biodiversity (bird) benefits for a wide range of species for breeding and 294. foraging by the reversal of historical drainage and past peat cutting and extraction, removal of invasive conifers from moorland, and wider wader management, the details of which are set out within the Draft HMP (Technical Appendix A3.2).
- ^{295.} Further to the details proposed in the Draft HMP additional best practice measures are proposed to further minimise any potential effects, namely:
 - In accordance with existing management practices, stock welfare will be checked on a frequent basis and any fallen stock removed from the site to dissuade any scavengers (e.g. ravens) (Technical Appendix A3.2);
 - Raven and buzzard and kestrel perch management including removal of the existing lattice structure met mast on Operational Rigged Hill Windfarm used for perching ravens;
 - Management of grazing activities, as required to facilitate the restoration of priority habitats and wader management measures as part of the HMP which will benefit the restoration / reinstatement of habitats will be beneficial for biodiversity and target species (Technical Appendix A3.2); and
 - Avoidance of disturbance across open habitats by site visitors, agricultural users, windfarm maintenance staff / contractors, operational staff / contractors, wherever possible, via the production of a leaflet and/or signage applicable for all site user groups explaining the risks of wildlife or habitat disturbance away from pathways, including the public right of

way through the site (Ulster Way) including a map which shows clear demarcation of accessible / inaccessible areas. This will be incorporated with the health and safety and visitor information for the windfarm.

- The following paragraphs provide the context for the best practice provisions set out in the Construction Management Strategy 296 (CMS). During the decommissioning/construction phases, and the activities proposed (see Chapter 3) prior to commencement of decommissioning/construction. Welstead et al. (2013)⁷² recommends surveys to establish risk (which have been undertaken at Rigged Hill; Technical Appendix A9.1) and careful construction management, including the appointment of an ecological clerk of works (ECOW; see Technical Appendix A3.1).
- There are some breeding bird locations identified during surveys which are associated with the existing trees, hedgerows, 297. scrub, meadows, rush pasture, stone walls, water features, ditches and trees along field margins, and within less heavily grazed fields. It will be necessary to clear some areas of longer vegetation (typically rush or grasses) during the enabling works which will involve removing vegetation which could conceivably contain nesting (or wintering) species, and implementing some temporal and spatial restrictions on activities, if required, during such works.
- The Wildlife (Northern Ireland) Order 1985 legislation (as amended) with the exception of species listed in Schedule 2, and for certain specified purposes under licence, makes it an offence to intentionally or recklessly:
 - kill, injure, or take any wild bird;
 - other time in relation to habitually used nests by a wild bird listed on Schedule A1);
 - obstruct or prevent any wild bird from using its nest or;
 - take or destroy an egg of any wild bird.
- Therefore, in order to further reduce any potential effects during the decommissioning/construction phases a CMS is 299. proposed.

9.6.1 Construction Mitigation Strategy (CMS)

- 300. It is likely that the proposed development footprint will be impacted by (i) pre-construction (site clearance) activities and (ii) decommissioning/construction activities. Birds are able to more readily move away from disturbance sources during the winter and from foraging habitats but less so when confined to a breeding site or nest site and thus disturbance effects may be lower over the winter period (September - February) each year rather than during the breeding season (March - August). In the first instance the Development has avoided high risk ornithological habitats and particularly since much of the proposed Development follows the route of existing windfarm access tracks and footprint thereby minimising overall effects.
- This will include the following measures: 301.
 - Where possible, enabling, decommissioning and construction works will take place between September and February, outside of the breeding season, to avoid disturbance or displacement of breeding birds;
 - Key features and habitats that might be used by breeding birds will be checked by a qualified ornithologist prior to decommissioning/construction works commencing during the breeding season;
 - Activities during the breeding season (1st March to 31st August) may be allowed, subject to check surveys being non-breeding as determined by a qualified ornithologist under licence, where required from the Northern Ireland Environment Agency (NIEA);
 - along the route to avoid both disturbance and displacement and in order to implement any nest specific mitigation measures required;
 - If any nests are located, no works will be undertaken until the status of those nests are obtained and a clear written protocol is established for each nest including maps and distances to the proposed works;

take, damage, destroy or otherwise interfere with the nest of any wild bird while that nest is in use or being built (or at any

undertaken, provided extant habitats are deemed unoccupied by breeding birds and/or extant species are proven to be

The ornithologist will be appointed to oversee enabling works, site clearance, and to maintain on-going checks for nests

• Where necessary, the mitigation protocol will consider the following options (i) spatial relocation of works if nests are located less than recommended buffer distances by agreement with NIEA (e.g. snipe 400 m; curlew 800 m; hen harrier

⁷² Welstead, J., Hirst, R., Keogh, D., Robb, G. & Bainsfair, R. (2013). Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591.

500 - 750 m;) or (ii) order to avoid disturbance and/or destruction nests will be monitored until nestlings have fledged and works will only be undertaken after fledging in the vicinity of the identified nests; (iii) any protocol or licences or other legislative requirements will be discussed with NIEA wildlife team and agreed in writing before commencement of works;

- A map of indicative bird locations, nests and/or sensitive habitats, derived from this report and the any other preconstruction nest check or monitoring studies, will be provided before decommissioning/construction commences in a given area and supplied to contractors including relevant spatial buffers, where required;
- The ornithologist will advise the Applicant and all contractors of the indicative locations of significant bird species and habitats prior to the commencement of works. This will be done by the provision of maps and an induction talk on wildlife law and disturbance to birds.
- ³⁰² It is proposed to quantify bird distribution and abundance post-construction to validate any residual effects of the construction mitigation strategy (Section 9.6.2). Based on site-specific evidence it is likely birds will habituate to the presence of the turbines and infrastructure in due course.
- With mitigation measures employed, the impact on breeding birds is reduced to negligible and therefore not significant, and shall be monitored in the post-construction period.

9.6.2 Snipe Management and Rationale

- Since there is a differential level of displacement predicted between the Operational Rigged Hill Windfarm and the Development, some snipe management measures are proposed which are detailed in the draft Habitat Management Plan (Technical Appendix A3.2) and are outlined here. These and the rationale behind them include, but are not limited to:
 - Removal of self-seeded conifers / invasive species from moorland and open habitats (also beneficial for meadow pipit and ٠ skvlark):
 - Drainage management and monitoring (including drain blocking / raising of water levels in the habitat management areas);
 - Creation of wader features including scrapes / pools in the habitat management areas;
 - The key measures that are proposed are the creation of wet scrapes and/or wet ditches to improve feeding opportunities for snipe within the habitat management areas (HMA);
 - Habitat management typically includes re-wetting and restoration of habitats which are important for the enhancement of habitats for waders (see RSPB, 2005⁷³; DARD, 2005⁷⁴; DAERA, 2017 a⁷⁵, b⁷⁶);
 - Typically, drainage management for increasing water levels is carried out as per SNH guidelines (2014b) by installing dams, and also with reference to EFS Guidance for breeding waders depending on the width of drains which require blocking. It is recognised any wet areas created around need to be in areas that are already wet and of suitable topography for creation of scrapes;
 - As identified in the best practice EFS Guidance (AWC) the minimum surface area of a scrape will be 4 m²; with an irregular shape; with a gently sloping edge with a rough uneven base to a maximum depth of 40 - 70 cm at the centre. There will be no spoil banked around the perimeter of the scrape, and scrapes will not be fenced off;
 - The RSPB wader management manual (RSPB, 2005) will be used as best practice guidance during creation of these water features within the habitat management area;
 - There will be a minimum of 1 2 wet scrapes created per hectare within the habitat management area. The locations will be selected by the Ecological Clerk of Works and Ornithologist based on local site conditions, for example on level ground that will be able to retain water effectively;
 - Some scrapes may also be combined with the drain-blocking measures outlined above if topographical conditions are appropriate;
 - The re-wetting of the HMA may favour the expansion of rushes in the medium to long term. The presence of occasional patches of rushes is considered to be beneficial for birds, as it contributes to the heterogeneity of the habitat and provides nesting cover;

- If rushes become extensive in the HMA, it is possible that they may reduce the suitability of the area for snipe and other waders, as these species typically prefer more open habitats not wholly dominated by rush;
- Periodical monitoring of rush coverage in the area will be undertaken, and if they are found to be too abundant or • spreading rapidly, some rush management measures (e.g. mowing during the non-breeding season) will be undertaken; Monitoring of grazing and enacting appropriate management of grazing / livestock to ensure optimal habitat structure; and Monitoring of vegetation structure in the habitat management areas and enacting appropriate management (e.g. rush
- cutting; continued conifer seedling removal) if necessary.

9.6.3 Hen Harrier Management and Rationale

- Since there are up to two pairs of hen harriers located within 750 m of the Development (despite noting the increased 305. distances recorded between survey years) and there is a differential level of displacement predicted between the Operational Rigged Hill Windfarm and the Development some hen harrier management measures are proposed which are covered by the detail in the draft Habitat Management Plan (Technical Appendix A3.2), and are outlined here, alongside the rationale behind them. These include, but are not limited to:
 - Prevention of disturbance to nesting / roosting sites (as part of Construction Management Strategy) by 500 m 750 m during construction / decommissioning:
 - Removal of self-seeded conifers / invasive species from moorland and open habitats (also beneficial for meadow pipit and skylark);
 - Implementation of 76 ha habitat management areas (also beneficial for small passerines, including meadow pipit and skylark);
 - Retention and maintenance of existing scrub and prey-rich habitat features within the Site Boundary where these are contiguous with the identified hen harrier territory boundaries (MCP) and linear foraging features that are used by hen harriers:
 - Creation of linear foraging features to increase habitat connectivity and abundance of linear foraging features; in particular ٠ 1.1 km of linear foraging features will be created along the riverine corridor (see Technical Appendix A3.2) according to EFS guidance for creation of 10 m riparian buffer planted with native trees including mixed usage of native trees and shrubs alder, birch, willow, crab apple, oak, scots pine, wild cherry, hazel, rowan whitebeam, juniper, wych elm, aspen, holly, wild pear, wild plum/damson, bird cherry, guelder rose, blackthorn, hawthorn, hazel, whin (gorse), holly, dog rose and willow;
 - Using native trees and shrubs to establish a c.10 m wide buffer next to a watercourse will reduce the potential for pollution from fertilisers and pesticides. Riparian buffers planted with native trees can also reduce soil erosion, river siltation, and transportation of diffuse pollutants and reduce peak flood flows. It is expected that the creation of this habitat in an otherwise eroded and overgrazed riparian corridor will create breeding and wintering habitats for small passerines (such as willow warbler, robins, wrens, chaffinch, thrushes) and thereby increase prev availability / sources for hen harriers locally:
 - Creation of linear hedgerow features along field boundaries / margins (see Technical Appendix A3.2) according to EFS guidance on planting new hedgerows and utilise only native species such as including mixed usage of native trees and shrubs alder, birch, willow, crab apple, oak, scots pine, wild cherry, hazel, rowan whitebeam, juniper, wych elm, aspen, holly, wild pear, wild plum/damson, bird cherry, guelder rose, blackthorn, hawthorn, hazel, whin (gorse), holly, dog rose and willow:
 - Creation of wild bird cover along field boundaries and margins (see Technical Appendix A3.2) according to EFS guidance Provision of winter feed crop for wild birds; including usage of oats, wheat, barley, triticale, mustard, linseed, quinoa, oilseed rape;
 - This measure will be used to provide foraging habitat and food, primarily during the winter period, as crop and weed seed for farmland birds and thereby increase prev availability / sources for hen harriers locally along various linear features and in the wider hen harrier territories; and
- Monitoring of grazing and enacting appropriate management of grazing / livestock to ensure optimal habitat structure; Monitoring of vegetation structure in the habitat management areas and enacting appropriate management (e.g. cutting /
- trimming, weed management) if necessary.

⁷³ RSPB (2005). Wet grassland practical manual: breeding waders. Report prepared by the RSPB.

⁷⁴ DARD (2005). Department of Agriculture and Rural Development Agri-environment Scheme Management Plan Guidance Booklet

⁷⁵ DAERA (2017a). EFS(h) species specific advice breeding for breeding waders. Department of Agriculture, Environment & Rural Affairs, Northern Ireland

⁷⁶ DAERA (2017b). EFS information sheet - (H) - NPI -Creation of scrapes (COS). Department of Agriculture, Environment & Rural Affairs, Northern Ireland.

9.6.4 Monitoring

- The assessment has been undertaken on the basis of worst case/conservative assumptions, giving confidence in the level of effects assessed.
- Monitoring measures are recommended to further inform the knowledge base around disturbance / displacement and/or 307 collision risk, if any, of birds, at the Development. This monitoring will be used to inform subsequent responses, if any. It is recommended that further monitoring is prescribed as part of the planning conditions.
- Whilst it is recognised that monitoring post construction to quantify effects, if any, of repowering may be useful in informing the 308. knowledge base, particularly in relation to the first repowering projects in Northern Ireland it is important that monitoring is undertaken to include specific objectives which are measurable and meet a particular monitoring need. It is recognised that there is a range of published literature and reviews on the effects of windfarms and wider monitoring information is desirable.
- ^{309.} It is also recognised that extensive reviews of historical monitoring (<u>www.swbsg.org</u>) and emergent research (Whitfield et al., in prep) has revealed the difficulties with assessing the nature and extent of change within post-construction monitoring works especially where small numbers of birds / territories occur i.e. small sample sizes. Furthermore the difficulties associated with obtaining a matched / comparable control / reference site are difficult particularly likely to occur where the baseline is an operational windfarm (e.g. Rigged Hill Operational Windfarm) alongside inter-annual variability (i.e. natural population variation) and extrinsic factors in defining the cause and effect associated with observed changes due to wind turbines / windfarms.
- 310. It is recognised that the proposed habitat management and restoration measures for priority habitats and species will help maintain the hen harrier, snipe and small passerine populations and could also have potential beneficial effects on other species in the vicinity. It is hypothesised that the habituation observed in the Site during baseline will re-occur within a short temporal time frame post-construction (1-3 years).
- ^{311.} Specifically, the objectives for monitoring are that hen harrier, snipe, red grouse and small passerine populations (particularly meadow pipit) on the site should be maintained at the minimum baseline levels (Technical Appendix A9.1; Table 9.7), and/or increased post-construction. It is recognised that hen harrier nest sites in particular may become unsuitable over time (due to forest maturation) and this shall be taken into account during monitoring (i.e. habitat suitability / availability). Trends will be reported, reviewed and a reactive management strategy deployed if necessary. This should include, but not be limited to further habitat and/or agricultural management if necessary.
- The Ornithological Monitoring Plan (OMP) includes, but is not limited to monitoring of hen harrier, snipe, red grouse and small passerines at the Development to assess effects of construction and/or Construction Mitigation Strategy (CMS), Snipe Management Strategy (SMS) and Harrier Management Strategy (HMS) and to implement an on-going and continual monitoring protocol (BMP; Technical Appendix A9.4) throughout the operational lifetime of the windfarm to assess effects of collision, if any, during the operational phase.
- The draft OMP is outlined here to include, but not be limited to: 313.
 - Monitoring using methods as detailed in these baseline studies (Technical Appendix A9.1) in order to provide ٠ comparable data during construction and post-construction phase in order to inform comparative reporting against baseline results:
 - Standardised data will be collected within the 500 m Survey Area to include all Development infrastructure and a 500 m buffer:
 - Monitoring specific spatial and temporal data during the construction and post-construction periods to monitor the effects, if any, within the 500 m Survey Area of specific species / assemblages that have been identified at risk of disturbance and/or displacement and/or collision at the Development (Table 9.9);
 - Monitoring during years zero (construction), year one, year two and year three;
 - Review of the findings after year three and compare these to the baseline (Technical Appendix A9.1) and then implement further monitoring and review programme and/or habitat / species specific management as required.
 - Monitoring, review and management until such time as populations are at the minimum levels recorded during the baseline studies (Technical Appendix A9.1);
 - Monitoring distribution and abundance data of target species including for hen harrier, snipe, red grouse and small passerines;

- Monitoring spatial distribution and abundance of priority species breeding within appropriate buffers to specifically include, but not limited to: hen harrier (2 km), red grouse (500 m) and snipe (500 m) within the 500 m Survey Area;
- Monitoring spatial distribution and number of breeding meadow pipit and skylark and other passerines within the 500 m • Survey Area;
- After year three the Applicant will then implement an extensive review to examine trends and findings. Further monitoring and management may then be implemented pending results to examine post-construction effects, if any;
- Annual reporting, analysis, review and response strategy, to include liaison with stakeholders and statutory authorities; Publication and reporting on the outcome of this monitoring to establish the effects, if any, of the Development to inform
- best practice and future management.
- and the negligible effects of collision, on primary ornithological receptors and minor negligible effects predicted for three secondary ornithological receptors (buzzard, kestrel, raven) it is recommended to include monitoring (Technical Appendix A9.4) to quantify actual collision rates, if any, of all species.
- The dOMP is outlined here to include, but not limited to:
 - Preparation of a final ornithological mitigation and monitoring plan (OMMP; including CMS, BMP and OMP) in consultation and by written agreement with the planning authority prior to construction commencement; Routine searches below turbines and windfarm infrastructure throughout the operational lifetime of the windfarm;

 - Estimates of scavenger removal rates on Site;
 - Estimates of searcher efficiency on Site;
 - Protocol for searching, handling, recording and reporting of all dead birds, if any, found at the windfarm; this protocol is already in place for SPR Operational Rigged Hill Windfarms (Technical Appendix A9.4);
 - Annual review (and whenever mortality is recorded) for it to be reported and a reactive management strategy deployed; Reactive management should include, but not be limited to the creation of a theoretical population model for collision affected species, in Northern Ireland, which integrates the observed mortality data and to inform reactive response
 - strategy;
 - Annual reporting, analysis, review and response strategy, to include liaison with stakeholders and statutory authorities; and
 - Publication and reporting on the outcome of this monitoring to establish the effects, if any, of the Development to inform best practice and future management.

9.7 Cumulative Effect Assessment

- All key ornithological receptors (snipe, red grouse, curlew, hen harrier, merlin, and peregrine) which are reviewed for cumulative effects; within 500 m, 800 m and 2 km Survey Areas are considered. Hen harrier and whooper swan are further considered up to a 5 km Survey Area and in relation to the nearby Lough Foyle SPA and/or known wintering areas.
- There are a number of operational, consented and proposed turbines in the wider landscape (Technical Appendix A2.1) with 317. two other single operational turbines recorded within 500 - 800 m of the Development. Two additional operational single turbines are recorded just beyond 2 km. Other windfarms (Dunmore and Dunbeg) are located to the north beyond the Keady Mountain ridge. It is understood there is a consented site at Craiggore for 10 turbines to the south and At Cam Burn to the east but neither are yet operational. These locations were plotted in order to consider any cumulative spatial overlap with ornithological receptors.
- The proposed Development creates no additional cumulative effects on either of the designated site species for the Lough 318. Foyle SPA.
- There are some spatial overlaps with the single turbines within the 500 m turbine buffers between one and two of the same 319. pairs of snipe and buzzard and merlin (just beyond 500 m) as recorded within the Operational Rigged Hill Windfarm 500 m buffers. In some years, other two single turbines immediately adjacent (which have been erected after the Operational Rigged Windfarm) are spatially located closer to the northern hen harrier territory than either existing or proposed Rigged Hill turbines.
- Based on available cumulative data there is not considered to be any significant cumulative increased effect on snipe 320. regionally, although up-to-date territory statistics from all sites and a wider cumulative assessment for Northern Ireland as a whole would be required to assess cumulative displacement predictions (Pearce-Higgins et al., 2009) or population-level

^{314.} In the wider absence of empirical mortality data (Stewart et al., 2007), particularly in Northern Ireland (Ruddock & Reid, 2010)

effects. There are some snipe territories predicted to be displaced at Rigged Hill which have been mitigated appropriately and thereby eliminating any cumulative effect.

- ^{321.} In relation to Craiggore, that site would appear to be closer to hen harrier winter roost sites, curlew, peregrine and within range of snipe, kestrel and red grouse identified here than Rigged Hill based on data collected here and also within 500 m - 1 km of an additional breeding pair of hen harrier. Craiggore would appear likely to have effects on these species outlined the effects on these species have been appropriately avoided and/or mitigated for Rigged Hill and therefore no cumulative effects could arise. Cam Burn appears further away but curlew were also observed in this vicinity when driving to / from the site and hen harrier from the eastern site may range as far as Cam Burn site in recent years based on ad hoc sightings made during field surveys and when travelling to / from Rigged Hill.
- For hen harrier there are other single turbines recorded closer to the identified hen harrier territories. Any individual or cumulative collision risk is reduced particularly by the reduction of hen harrier collision risk due to the proposed Development (Technical Appendix A9.3). All turbines are located further away than best practice guidance and requisite set-backs (>500 m).
- similarly, for merlin, Craiggore turbines are recorded closer to one of the identified (pair occupied) merlin territories and therefore the proposed Development has lesser potential effects compared to the other sites nearby. All turbines are located further away than best practice guidance and requisite set-backs (300-500 m).
- 324. The Development site is located further away from the peregrine falcon territory than other single turbines, which have been erected in recent years; or consented windfarms at Craiggore / Cam Burn. Peregrines are known to occur much closer (<100 m) at other breeding sites in Northern Ireland than any of the cumulatively located turbines at Rigged Hill. No significant cumulative displacement effects are thus likely.
- 325. The proposed Development has enacted appropriate set-back distances to known priority species including hen harrier, peregrine, curlew and other raptor territories and/or proposed the implementation of appropriate measures to reduce any predicted effects (on hen harrier, snipe and small passerines) to negligible. No cumulative effects are therefore predicted.
- There are considered to be no specific cumulative effects on individual birds or territories as a result of the Development. As outlined above the reduction in the numbers of turbines, results in increases in spatial separation / set-back distances to some species including snipe and red grouse. There are fewer turbines proposed and collision risk for key species, including hen harrier are actually lower. Therefore, the potential for any cumulative effects resulting from the addition of the proposed Development are actually further diminished.
- In the absence of wider national cumulative impacts of windfarm developments data, and/or specific bird population thresholds 327. of mortality there is currently considered to be no national, regional or local significant cumulative effect on any known breeding bird population. There are no other predicted cumulative effects for other species on basis of currently available data.

9.8 Summary of Effects

- It is predicted that any residual effects of the Development during the decommissioning/construction phases will be of negligible magnitude and temporary (i.e. until decommissioning and construction works are completed) on the breeding or wintering species within the Development area, construction footprint and 500 m buffer due to availability of other suitable habitats nearby and/or conservation status.
- Prior to mitigation, from the primary field surveys and assessment there are considered to be negligible effects on extant bird 329. species. However, some moderate effects are predicted for the construction phase on hen harrier, snipe, red grouse and meadow pipit and skylark. Snipe, hen harrier, skylark and meadow pipit are also assessed as moderate - minor displacement effects during the operational phase. Following mitigation, these effects are assessed as being of negligible magnitude, and not significant.
- 330. Kestrel have been recorded as a single collision victim at the Operational Rigged Hill Windfarm and this was in the year in which they were recorded nesting closest to the turbines. This species may remain vulnerable to collision at the Site and the installation of alternative nest boxes / baskets has been proposed by way of enhancement in order to increase set-back distance for this species and reduce any potential proximity mediated collision risk / site usage.

- There are no raptors or other priority species that will be directly impacted by the Development subject to the implementation of disturbance management measures during construction / decommissioning. The majority of species are avoided by appropriate buffer distances to turbines (Technical Appendix A9.1). Specifically, the raptor and wader known breeding locations will not be directly affected by the proposed Development subject to mitigation measures being implemented during these phases (Section 9.6) and habitat management to minimise long-term displacement effects.
- 332. Several species including red grouse, snipe, merlin, buzzard, sparrowhawk, peregrines and hen harriers have been recorded nesting within 50-300 m of existing turbines in Northern Ireland including at Rigged Hill (M. Ruddock, personal observation) thus no long-term implications are predicted following cessation of decommissioning/construction activities and given the observed set-back distances for priority species including any species associated with the Lough Foyle SPA (>10 km) and nearby ASSI (<5 km).
- 333. benefit snipe, small passerines and hen harrier, and set-back distances and seasonal and spatial restrictions on decommissioning/construction activity are also proposed. The proposed windfarm design has incorporated ornithological constraints, where possible, including avoidance of extant priority species and bird-habitats. Measures are proposed where adverse effects are predicted on the basis of published research and/or site specific evidence, this specifically includes construction management strategy, and snipe and hen harrier management to avoid disturbance / displacement / collision risks to ornithological site features, which will be realised via the implementation of the measures set out within the Draft Habitat Management Plan (Technical Appendix 3.2).
- In order to further examine residual effects, if any, a comprehensive bird monitoring programme (Section 9.6; Technical 334. Appendix A9.4) has been outlined.
- Residual cumulative effects are assessed as being of negligible magnitude and not significant with the implementation of a 335 CMS, supported by the HMP to support habituation and reduce effects of displacement.
- ^{336.} There are considered to be no significant effects of the proposed Development on ornithology, subject to implementation of the measures and monitoring commitments outlined within this chapter, which can be secured via appropriately worded planning conditions.
- 337. Table 9.9 provides a summary of the effects detailed within this chapter and identifies both the embedded and proposed measures set out in this chapter.

Table 9.9: Summary of Effects

Receptor	Potential Effect	Significance of Effect	Proposed Measures / Embedded Mitigation	Residual Effect
Decommission	ing / Constructior	n Phase		
Hen harrier	Disturbance	Moderate risk of disturbance	Avoidance by design (>500 m) and CMS	Minor
	Displacement	Moderate risk of displacement	Maintenance of set-back >500 m and CMS	Minor
Merlin	Disturbance	Minor risk of disturbance	None - Avoidance by design (<500 m; not breeding pair; most pairs >1 km)	Negligible
	Displacement	Minor risk of displacement	Maintenance of Set-back >500 m	negligible
Peregrine	Disturbance	Negligible risk of disturbance	None - Avoidance by design (>500 m)	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Buzzard	Disturbance	Negligible risk of disturbance	None - Avoidance by design (>500 m)	Negligible

Specific measures to further reduce assessed displacement effects including management of habitats are proposed, which will

Receptor	Potential Effect	Significance of Effect	Proposed Measures / Embedded Mitigation	Residual Effect
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Kestrel	Disturbance	Negligible risk of disturbance	None - Avoidance by design (>500 m)	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Sparrowhawk	Disturbance	Negligible risk of disturbance	Avoidance by design (<500 m) and CMS	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back <500 m and CMS	Negligible
Long-eared owl	Disturbance	Negligible risk of disturbance	Avoidance by design (<500 m) and CMS	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back <500 m and CMS	Negligible
Raven	Disturbance	Negligible risk of disturbance	None - Avoidance by design (>500 m)	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Golden plover	Disturbance	Negligible risk of disturbance	No breeding birds on site; passage and wintering presence only	Negligible
	Displacement	Negligible risk of displacement	Evidence of habituation and negligible effects	Negligible
Curlew	Disturbance	Minor risk of disturbance	None - Avoidance by design (>800 m)	Minor
	Displacement	Minor risk of displacement	Maintenance of set-back >800 m	Minor
Snipe	Disturbance	Moderate - minor risk of disturbance	Avoidance by CMS	Negligible; Monitoring post-construction
	Displacement	Moderate - minor risk of displacement	Avoidance by CMS and mitigation via HMP, SMS	Negligible; Monitoring post-construction
Red grouse	Disturbance	Negligible risk of disturbance	Avoidance by CMS	Negligible; Monitoring post-construction
	Displacement	Negligible risk of displacement	Avoidance by CMS	Negligible; Monitoring post-construction
Whooper swan	Disturbance	Negligible risk of disturbance	Avoidance by design (>500 m)	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Greylag goose	Disturbance	Negligible risk of disturbance	None - Avoidance by design (>500 m)	Negligible
	Displacement	Negligible risk of displacement	Maintenance of set-back >500 m	Negligible
Meadow pipit	Disturbance	Moderate - minor risk of disturbance	Avoidance by CMS	Negligible; Monitoring post-construction
	Displacement	Moderate - minor risk of displacement	Avoidance by CMS and mitigation via OMP	Negligible; Monitoring post-construction

Receptor	Potential Effect	Significance of Effect	Proposed Measures / Embedded Mitigation	Residual Effect
Skylark	Disturbance	Moderate - minor risk of disturbance	Avoidance by CMS	Negligible; Monitoring post-construction
	Displacement	Moderate - minor risk of displacement	Avoidance by CMS and mitigation via HMP OMP	Negligible; Monitoring post-construction
Small passerines	Disturbance	Minor - negligible risk of disturbance	Avoidance by CMS	Negligible; Monitoring post-construction
	Displacement	Minor - negligible risk of displacement	Avoidance by CMS and mitigation via HMP, OMP	Negligible; Monitoring post-construction
Operational Pl	hase			
Hen harrier	Displacement	Moderate - minor risk of displacement	Avoidance by design (>500 m) and CMS and mitigation via HMP, OMP	Minor; 35 – 53 ha of difference between operational / proposed displacement
	Collision	Minor risk of collision	Maintenance of set-back >500 m	Minor; Monitoring post-construction
Merlin	Displacement	Minor risk of displacement	Avoidance by design (>500 m); HMP beneficial for merlin	Negligible
	Collision	Negligible risk of collision	Maintenance of set-back >500 m	Negligible; Monitoring post-construction
Peregrine	Displacement	Negligible risk of displacement	Avoidance by design (>500 m)	Negligible
	Collision	Negligible risk of collision	Maintenance of set-back >500 m	Negligible; Monitoring post-construction
Buzzard	Displacement	Negligible risk of displacement	Avoidance by design (>500 m); avoidance behaviour observed	Negligible
	Collision	Minor - negligible risk of collision	Maintenance of set-back >500 m; avoidance behaviour observed; removal of carrion; perch management	Negligible; Monitoring post-construction
Kestrel	Displacement	Negligible risk of displacement	Avoidance by design (>500 m)	Negligible
	Collision	Minor - negligible risk of collision	Maintenance of set-back >500 m; perch management; installation of alternative nest boxes / baskets	Negligible; Monitoring post-construction
Sparrowhawk	Displacement	Negligible risk of displacement	Avoidance by design (<500 m)	Negligible
	Collision	Negligible risk of collision	Maintenance of set-back >500 m	Negligible; Monitoring post-construction
Long-eared	Displacement	Negligible risk of displacement	Avoidance by design (<500 m)	Negligible
UWI	Collision	Negligible risk of collision	Maintenance of set-back >500 m	Negligible; Monitoring post-construction
Raven	Displacement	Negligible risk of displacement	Avoidance by design (>500 m);	Negligible

Receptor	Potential Effect	Significance of Effect	Proposed Measures / Embedded Mitigation	Residual Effect	
			avoidance behaviour observed		
	Collision	Minor - negligible risk of collision	Maintenance of set-back >500 m; avoidance behaviour observed; removal of carrion	Negligible; Monitoring post-construction	
Golden	Displacement	Negligible risk of displacement	Low risk species; habituated	Negligible	
piovei	Collision	Negligible risk of collision	Low risk species; habituated	Negligible; Monitoring post-construction	
Curlew	Displacement	Minor risk of displacement	Avoidance by design (>800 m)	Negligible	
	Collision	Minor risk of collision	Maintenance of set-back >800 m	Negligible; Monitoring post-construction	
Snipe	Displacement	Moderate - minor risk of displacement	HMP beneficial to snipe; SMS to mitigate displacement; disturbance management;	Negligible; Monitoring post-construction	
	Collision	Negligible risk of collision	Low level flights – no risk of collision	Negligible; Monitoring post-construction	
Red grouse	Displacement	Negligible risk of displacement	Low sensitivity to windfarm effect; HMP beneficial to red grouse; disturbance management	Negligible; Monitoring post-construction	
	Collision	Negligible risk of collision	Low level flights – no risk of collision	Negligible; Monitoring post-construction	
Whooper	Displacement	Negligible risk of displacement	Avoidance by design (>500 m)	Negligible	
Swan	Collision	Negligible risk of collision	Maintenance of set-back >500 m	Negligible; Monitoring post-construction	
Greylag	Displacement	Negligible risk of displacement	Avoidance by design (>500 m)	Negligible	
goose	Collision		Maintenance of set-back >500 m	Negligible; Monitoring post-construction	
Meadow pipit	Displacement	Moderate - minor risk of displacement	HMP & OMP beneficial to meadow pipit; disturbance management;	Negligible; Monitoring post-construction	
	Collision	Negligible risk of collision	Unlikely risks of collision	Negligible; Monitoring post-construction	
Skylark	Displacement	Moderate - minor risk of displacement	HMP & OMP beneficial to skylark; disturbance management;	Negligible; Monitoring post-construction	
	Collision	Negligible risk of collision	Unlikely risks of collision	Negligible; Monitoring post-construction	
Small passerines	Displacement	Minor - negligible risk of displacement	HMP, OMP beneficial to small passerines; disturbance management	Negligible; Monitoring post-construction	
	Collision	Negligible risk of collision	Unlikely risks of collision	Negligible; Monitoring	

9.9 Statement of Significance

- ^{338.} From the primary field surveys and assessment there are considered to be negligible magnitude and not significant effects on extant bird species, subject to the implementation of mitigation measures.
- 339. Some moderate and minor effects are predicted for some species, mainly due to decommissioning and construction activities on hen harrier, snipe, red grouse and small passerines and some displacement for hen harrier, snipe and small passerines during the operational phase compared to baseline and some collision risk for secondary species, which are nesting within the 2 km Survey Area. These predicted effects have been mitigated via specific measures to reduce likelihood and magnitude of effects including spatial and temporal construction management; management of habitats (as part of an HMP) which will benefit snipe, hen harrier and other small passerine species, and all priority species are spatially protected by appropriate setback distances. In addition, various management and monitoring measures are outlined for implementation as part of the windfarm operational policies.
- The proposed Development design has incorporated ornithological constraints, where possible, including avoidance of extant 340. priority species, and it is noted that several of the priority species in close proximity to the Operational Rigged Hill Windfarm are present based on a temporally available habitat (including hen harrier, long-eared owl, merlin, kestrel, buzzard, sparrowhawk and raven) and have selected to nest in close proximity to the Operational Rigged Hill Windfarm.
- ^{341.} Further measures are outlined on the basis of published research, and best practice, to prevent nesting bird disturbance as required under wildlife legislation. In order to further test and examine residual effects, if any, there is a comprehensive monitoring programme which has been detailed.
- further measures proposed will ensure that there is no potential for cumulative effects resulting from the Development, in combination with the other sites considered.
- Following implementation of proposed mitigation, and best practice measures, there are considered to be no significant effects of the proposed Development on ornithology. The implementation of the measures outlined within this chapter, and the proposed monitoring recommendations can be secured via planning conditions.

³⁴²Based on available cumulative data there is not considered to be any potential for significant cumulative effects to arise. The

10 Noise

10.1 Introduction

This Chapter of the ES evaluates the effects of noise due to the Development. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus). The assessment considers the potential effects of the Development during the following development stages:

- Decommissioning of the Operational Rigged Hill Windfarm (initial phase of the Development);
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development; and
- Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worst-case scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these first two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- This Chapter of the ES is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:
 - A10.1: Survey Record sheets; and ٠
 - A10.2: Cumulative Noise Emission Data.
- This chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - Assessment of Potential Effects (this includes cumulative effects);
 - Mitigation and Residual Effects;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary.
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

10.2 Legislation, Policy and Guidance

The guidance, legislation and information sources set out in the following sections have been considered in carrying out this assessment.

10.2.1 Construction Noise

- The Environmental Protection Act 1990 (EPA 1990)¹; and •
- BS 5228:2009+A1:2014².

10.2.1.1 The Environmental Protection Act 1990

The EPA 1990 specifies mandatory powers available to Local Authorities in respect of any noise that either constitutes or is likely to cause a statutory nuisance, which is also defined in the Act. A duty is imposed on Local Authorities to carry out

³ Department of the Environment, Planning and Environmental Policy Group, Planning Policy Statement 18, 'Renewable Energy', August 2009

inspections to identify statutory nuisances, and to serve abatement notices against these. Procedures are also specified with regards to complaints from persons affected by a statutory nuisance.

10.2.1.2 BS 5228:2009+A1:2014

- BS 5228:2009+A1:2014 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. The discussion below relates mainly to Part 1- Noise, however, the recommendations of Part 2 in terms of vibration are broadly very similar.
- The standard stresses the importance of community relations, and states that early establishment and maintenance of these 9 relations throughout site operations would go some way towards 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.
- Recommendations are made regarding the supervision, planning, preparation and execution of works, emphasising the need 10. to consider noise at every stage of the operation.
- Measures to control noise are described, including: 11.
 - Control of noise at source by, e.g.:
 - Substitution of plant or activities by less noisy ones;
 - Modification of plant or equipment to reduce noise emissions;
 - The use of noise control enclosures;
 - The siting of equipment and its method of use; and
 - Equipment maintenance; and
 - provision of acoustic screening.
- The standard includes a discussion of noise control targets, and example criteria for the assessment of the significance of 12 noise effects, which are not mandatory.
- Methods of calculating the levels of noise resulting from construction activities are provided, as are source levels for various 13. types of plant, equipment and construction activities.

10.2.2 Operational Noise

- The following guidance, legislation and information sources applicable to operational noise have been considered in this assessment, as agreed during consultation with the Environmental Health Department of Causeway Coast & Glens Borough Council (CCGBC). Further details on the consultation process are presented in Section 10.3.1:
 - Planning Policy Statement 18: Renewable Energy Planning NI (PPS 18)³ and its Best Practice Guidance⁴;
 - ETSU-R-97 The Assessment and Rating of Noise from Windfarms⁵; and •
 - A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise⁶ and associated Supplementary Guidance Notes (SGNs).

⁴ Department of the Environment, Planning and Environmental Policy Group, Best Practice Guidance to Planning Policy Statement 18, 'Renewable Energy', August 2009

⁵ ETSU-R-97, The Assessment and Rating of Noise from Windfarms, ETSU for the DTI, 1996

· Controlling the spread of noise, e.g., by increasing the distance between plant and noise-sensitive premises or by the

⁶ Institute of Acoustics, A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, 2013.

¹ UK Government The Environmental Protection Act 1990

² BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

10.2.2.1 Planning Policy Statement 18: Renewable Energy - Planning NI

- PPS 18 sets out the Department of the Environment's planning policy for development that generates energy from renewable resources that requires submission of a planning application and is therefore relevant to the Development.
- The aim of PPS 18 is to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment. Its objectives include ensuring that the environmental and amenity impacts of renewable energy developments are adequately addressed.
- Policy RE 1 states that renewable energy developments will be permitted provided that they do not result in an unacceptable 17 adverse impact on inter alia human health or residential amenity. Such potential impacts are relevant in the context of a noise assessment. It goes on to state that the Best Practice Guidance to PPS 18 will be taken into consideration in assessing proposals.
- Furthermore, applications for wind energy development will be required to demonstrate that inter alia the development has taken into consideration the cumulative impact of existing wind turbines, those which have permissions and are currently the subject of valid but undetermined applications, and that the development will not cause significant harm to the safety or amenity of any sensitive receptors arising from noise. Sensitive receptors include habitable (though not necessarily occupied) residential accommodation, future occupants of committed developments, hospitals, schools and churches.

10.2.2.2 Best Practice Guidance to PPS 18

- The Best Practice Guidance (BPG) provides background information on the various renewable energy technologies that may come forward in Northern Ireland. Section 1 relates to applications for onshore wind energy and includes a discussion of various planning issues, including noise.
- It states that well designed windfarms should be located so that increases in ambient noise levels are kept to acceptable 20. levels with relation to background noise, normally achieved through good turbine design and ensuring adequate separation between turbines and noise-sensitive receptors. The characteristics of wind turbine noise are discussed, and it is stated that ETSU-R-97 makes a series of recommendations that can be regarded as relevant guidance on good practice and that it should be used in the assessment and rating of noise from wind energy developments. A summary of the recommendations of ETSU-R-97 is provided below.

10.2.2.3 ETSU-R-97

- The assessment methodology for operational noise is described in ETSU-R-97 'The Assessment and Rating of Noise from Windfarms'. The aim of ETSU-R-97 is to provide:
- "Indicative noise levels thought to offer a reasonable degree of protection to windfarm neighbours, without placing 22. unreasonable restrictions on windfarm development or adding unduly to the costs and administrative burdens on windfarm developers or local authorities".
- The report makes it clear from the outset that any noise restrictions placed on a development must balance the environmental 23. effects of the development against the national and global benefits which would arise through the development of renewable energy sources.
- Noise criteria (or limits) are specified, which are a combination of a margin of 5 decibels (dB) above the prevailing, wind speed-dependent background noise level and fixed lower noise limits that are applicable in low background noise situations. The fixed lower noise limits are defined as:
 - 35 40 dB, LA90,10min during the day, with the value chosen dependent on the number of affected properties, the effect on the number of kWh (kilowatt-hours) generated and the duration and level of exposure;
 - 43 dB, LA90,10min at night, a level chosen to safeguard against sleep disturbance; and
 - 45 dB, LA90,10min, during both the day and night, at properties where the occupier has a financial involvement in the proposed development.
- The specified noise limits relate to the cumulative effects of all wind turbines that affect a particular location.
- To carry out a noise assessment in accordance with ETSU-R-97, the following steps are required: 26.

- Specify the number and locations of the wind turbines;
- Identify the locations of the nearest, or most noise sensitive, neighbours;
- Determine the background noise levels as a function of site wind speed at the nearest neighbours, or a representative • sample of the nearest neighbours;
- Determine the quiet day time and night-time criterion curves from the background noise levels identified at the nearest neighbours;
- Specify the type and noise emission characteristics of the wind turbines proposed for the site (or candidate turbine considered);
- Calculate the noise immission levels due to the operation of the wind turbines as a function of site wind speed at the nearest neighbours; and
- Compare the calculated noise immission levels with the derived criterion curves and assess in the light of relevant planning requirements.

10.2.2.4 A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise

- The Good Practice Guide (GPG) was published by the Institute of Acoustics (IOA) in May 2013 and has been endorsed by the 27 Northern Ireland Executive as current industry good practice. The guide presents current good practice in the application of ETSU-R-97 assessment methodology for wind turbine developments at the various stages of the assessment process. The recommendations provided in the GPG have been followed throughout this assessment.
- In 2014, the IOA published a suite of six Supplementary Guidance Notes (SGNs) intended to support the GPG and provide additional clarification where considered necessary. The recommendations of the SGNs have been followed where relevant in this assessment.
- The GPG provides advice on the assessment of cumulative noise impact, detailing a number of possible cumulative scenarios 29. and recommended approaches. Advice is also provided with regard to the geographical scope of a cumulative noise assessment, to determine the area within which a cumulative noise assessment is necessary.
- Where a new noise source is introduced to a given scenario with a noise level which is predicted to be 10 dB or more below the existing level, the increase in the total noise level is negligible. On this basis, the necessary extents of a cumulative noise assessment can be determined. Paragraph 5.1.4 of the GPG states..."If the proposed wind farm produces noise levels within 10 dB of any existing wind farm(s) at the same receptor location, then a cumulative noise impact assessment is necessary".
- As stated in ETSU-R-97, noise from existing wind turbines should not form part of the background noise level from which 31. noise limits for new wind energy developments are derived.

10.3 Assessment Methodology and Significance Criteria **10.3.1** Scoping Responses and Consultations

32. the specific elements such as the selection of baseline noise monitoring locations with the organisations shown in Table 10.1.

Table 10.1: Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
CCGBC	Scoping Response	CCGBC concurred with the noise- related elements of the Scoping report, including the proposed approach and methodologies.	The approach and methodologies presented in the Scoping report have been followed throughout this assessment.
		CCGBC concurred with the suggested approach to determine background levels by the subtraction of predicted noise levels due to the existing turbines from the measured background	Background noise levels have been corrected for existing wind turbines, as described in Section 10.4. At the time of the survey, it was found that no other wind turbines had been constructed in

Consultation for this ES topic was initially undertaken via the Scoping process, with further consultation carried out to agree

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
		noise level. CCGBC highlighted a number of windfarms which may require consideration in the background noise level corrections.	sufficient proximity to the monitoring locations to have the potential to influence background noise levels, other than the Operational Rigged Hill Windfarm.
CCGBC Environmental Health Officer (EHO)	Telephone call and Email 12/09/2017 Telephone 28/09/2017	An initial noise contour plot and two suggested baseline noise monitoring locations were provided to the EHO on 12/09/2017. The EHO confirmed the suggested locations were acceptable.	The survey was undertaken at the agreed locations, subject to an amendment of the location at 37 Temain Road, where the resident denied permission monitor. Monitoring was undertaken at the closest neighbour, 29 Temain Road.
CCGBC EHO	Email 28/02/2018	A summary of the baseline noise analysis and resulting charts was provided to the EHO on 28/02/2018. Confirmation was received on 09/04/2018 that the EHO was happy with the baseline noise analysis.	Agreed baseline noise charts are presented in Section 10.4 .

10.3.2 Scope of Assessment

The Development phases for the assessment of potential noise effects relating to the Development are described in Chapter 3: Development Description, and summarised below:

- Effects during Decommissioning of the Operational Rigged Hill Windfarm (Initial Phase of the Development);
- Effects during the Construction of the Development (likely to occur in tandem with the above phase); and
- Effects during Operation of the Development (including the potential for up to 50 m micro-siting for all infrastructure).
- Decommissioning of the Development (Final Phase)

10.3.3 Elements Scoped Out of Assessment

10.3.3.1 Decommissioning/Construction Phase Noise

As the Development consists of the repowering of an existing windfarm, a number of elements of the existing site infrastructure such as access tracks will be reused, thereby minimising the amount of construction works required. In addition, due to the large separation distances from the Development site to the nearest noise sensitive receptors, no significant decommissioning/construction effects are anticipated. Notwithstanding this, a summary of best practice construction methods, along with a commitment to adhere to best practice means of controlling noise from construction activities, as advocated by BS 5228, is presented in Section 10.5.1.

10.3.3.2 Low Frequency Noise and Infrasound

A study⁷, published in 2006 by acoustic consultants Hayes McKenzie on the behalf of the Department of Trade and Industry (DTI), investigated low frequency noise from windfarms. This study concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines, but that complaints attributed to low frequency noise were, possibly due to a phenomenon known as Amplitude Modulation (AM), described in Section 10.3.3.4.

Bowdler et al., (2009)⁸ concluded that:

"...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from windfarms generally has adverse effects on windfarm neighbours".

37. In February 2013, the Environmental Protection Authority of South Australia published the results of a study into in infrasound levels near windfarms⁹. This study measured infrasound levels at urban locations and rural locations with wind turbines close by, and rural locations with no wind turbines in the vicinity. It found that infrasound levels near windfarms are comparable to levels away from windfarms in both urban and rural locations. Infrasound levels were also measured during organised shut-downs of the windfarms; the results showed that there was no noticeable difference in infrasound levels whether the turbines were active or inactive.

10.3.3.3 Vibration

- 38. significantly below criteria for 'critical working areas' given by British Standard BS6472:1992 Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz), and were lower than limits specified for residential premises by an even greater margin.
- Ground-borne vibration from wind turbines can be detected using sophisticated instruments several kilometres from the 39. windfarm site as reported by Keele University¹¹. This report clearly shows that, although detectable using highly sensitive instruments, the magnitude of the vibration is orders of magnitude below the human level of perception and does not pose any risk to human health.

10.3.3.4 Amplitude Modulation

- In its simplest form, AM, by definition, is the regular variation in noise level of a given noise source. This variation (the 40. modulation) occurs at a specific frequency, which, in the case of wind turbines, is defined by the rotational speed of the blades, i.e. it occurs at the rate at which the blades pass a fixed point (e.g. the tower), known as the Blade Passing Frequency. A certain level of AM is typically present in wind turbine noise, and is referred to as 'blade swish' in ETSU-R-97. The noise limits recommended in ETSU-R-97 account for blade swish effects.
- A study¹² carried out in 2007 on behalf of the Department for Business, Enterprise and Regulatory Reform (BERR) by the University of Salford investigated the incidence of noise complaints associated with windfarms and whether these were associated with excessive levels of AM. The study defined AM as aerodynamic noise from wind turbines with a greater degree of fluctuation than normal at blade passing frequency (later referred to as 'Other AM' (OAM)). Its aims were to ascertain the prevalence of OAM on UK windfarm sites, to try to gain a better understanding of the likely causes, and to establish whether further research into OAM was required.
- The study concluded that OAM had occurred at only a small number (4 of 133) of windfarms in the UK, and only for between 7% and 15% of the time. It also stated that, the causes of OAM are not well understood and that prediction of the effect was not currently possible.
- This research was updated in 2013 by an in-depth study undertaken by Renewable UK¹³, which has identified that many of the previously suggested causes of OAM have little or no association to the occurrence of OAM in practice. The generation of OAM is based upon the interaction of a number of factors, the combination and contributions of which are unique to each site. With the current state of knowledge, it is not possible to predict whether any particular site is more or less likely to give rise to OAM, and the incidence of OAM occurring at any particular site remains low, as identified in the University of Salford study.
- 44 of windfarm noise. This technique is supported by the Department of Business, Energy & Industrial Strategy (BEIS, formerly The Department of Energy & Climate Change) who have published guidance¹⁵, which follows on from the conclusions of the

Research undertaken by Snow in 1996¹⁰ found that levels of ground-borne vibration 100 m from the nearest wind turbine were

In 2016, the IOA proposed an objective measurement technique¹⁴ to quantify the level of AM present in any particular sample

⁷ Hayes McKenzie (2006). 'The measurement of low frequency noise at three UK windfarms', Hayes Mckenzie, The Department for Trade and Industry, URN 06/1412, 2006.

⁸ Bowder et al (2009). 'Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects'. Acoustics Bulletin, Vol 34 No2 March/April 2009, Institute of Acoustics.

⁹ Environment Protection Authority (2013). 'Infrasound levels near windfarms and in other environments'. Available Online At:

http://www.epa.sa.gov.au/xstd_files/Noise/Report/infrasound.pdf (Accessed on 26/06/2017).

¹⁰ ETSU (1997), Low Frequency Noise and Vibrations Measurement at a Modern Windfarm, prepared by D J Snow.

¹¹ Microseismic and infrasound monitoring of low frequency noise and vibrations from Windfarms: recommendations on the siting of Windfarms in the vicinity of Eskdalemuir, Scotland". Keele University, 2005 12 University of Salford (2007). 'Research into aerodynamic modulation of wind turbine noise'. Report by University of Salford, The Department for Business, Enterprise and Regulatory Reform, URN 07/1235, July 2007. 13 Renewable UK (2013). 'Wind Turbine Amplitude Modulation: Research to improve understanding as to its Cause and effects', Renewable UK. 2013.

¹⁴ Institute of Acoustics, (2016) A Method for Rating Amplitude Modulation in Wind Turbine Noise, 15 BEIS, (2016), Review of the evidence on the response to amplitude modulation from wind turbines,

IOA study in order to define an appropriate assessment method for AM, including a penalty scheme and an outline planning condition. Notwithstanding this, the suggested outline planning condition is as yet unvalidated, remains in a draft form and would require site-specific legal advice on its appropriateness to a specific development.

Section 7.2.1 of the GPG therefore remains current, stating: "The evidence in relation to 'Excess' or 'Other' Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM".

10.3.3.5 Energy Storage

As described In Chapter 3: Development Description, the Development includes an Energy Storage Unit. Based upon Arcus' substantial experience of such facilities, they emit relatively low levels of noise; the Energy Storage Units likely to comprise a number of containerised modules, with the primary noise source being the air conditioning units used to regulate the temperature of the storage system. Given this, coupled with the substantial (approximately 2 km) separation distance between the Energy Storage Unit and the closest noise-sensitive receptors, there is no reasonable prospect of a significant effect. This element has therefore not been considered further.

10.3.4 Study Area

The Study Area for the noise assessment is defined as the area in which cumulative windfarm noise levels could potentially exceed 35 dB(A), in accordance with ETSU-R-97 and in which the predicted noise levels from the Development are within 10 dB of those from other windfarms in the area, in accordance with the GPG. Figure 10.1 illustrates this area, and identifies potential noise-sensitive receptors within the Study Area.

10.3.5 Design Parameters

- The GPG notes that most sites at planning stage will not have selected a preferred turbine, therefore a candidate turbine representative of a range of turbines should be selected to provide appropriate noise levels. Once noise levels have been predicted at the potentially affected properties, compliance with noise limits can be assessed and design advice provided if compliance with the limits is considered unlikely.
- The candidate wind turbine model for the purposes of assessment is the Vestas V117 3.6 MW with a hub height of 80 m, equating to the Development's maximum tip height of 137 m. This assessment assumes the turbines are fitted with the serrated trailing edge (STE) blades, and operate in full power mode at all times (i.e., not in a noise-reduced mode). The manufacturer's noise emission documentation excludes any margin for uncertainty, and as such an additional 2 dB has been included in the sound power levels in this assessment, as detailed in Table 10.2.
- The noise emission documentation for the Vestas V117 3.6 MW is presented relative to hub height wind speeds. For the 50. purposes of assessment in accordance with ETSU-R-97 and the GPG, the sound power levels have been adjusted to standardised 10 m wind speeds.

Table 10.2: Noise Em	ission	Data – Ve	stas V11	7 3.6, 80	m hub he	eight		
10m Standardised	3	4	5	6	7	8	9	
Wind Sneed ms ⁻¹								

Wind Speed, ms ⁻¹										
Sound Power Level,	94.4	97.7	102.3	106.4	108.8	109.0	109.0	109.0	109.0	109.0
Lwa, dB including 2										
dB allowance for										
uncertainty										

11 12

The octave-band frequency spectrum data for the V117 3.6 MW is presented in Table 10.3, scaled to the maximum sound power level (including 2 dB to account for uncertainty) of 109.0 dB,LwA.

Table 10.3: Octave-Band Spectrum

Octave Band Centre Frequency, f, Hz	63	125	250	500	1000	2000	4000	8000
Octave-Band Sound Power Level, Scaled to 109.0 dB, L _{WA}	90.6	98.1	101.1	102.8	103.4	100.8	96.8	85.3

10.3.5.1 Micro-siting

As set out in Chapter 3: Development Description, a 50 m micro-siting allowance has been included to avoid any further 52. unknown or unrecorded onsite environmental or technical constraints uncovered at the time of construction. In the event that a turbine is required to be micro-sited closer to any noise-sensitive receptor identified in **Table 10.7** of this Chapter than is currently proposed, predicted noise levels will be updated, and assessed against the noise limits specified in the Development's planning conditions. In the event that an exceedance of noise limits is identified, a noise mitigation scheme will be developed, operating one or more turbines in a reduced-noise mode under the required wind speeds and / or wind directions in order to ensure compliance with noise limits is maintained.

10.3.6 Baseline Survey Methodology

- Potential noise-sensitive receptors are defined in PPS 18 as habitable residential accommodation (although not necessarily 53 occupied), future occupants of committed developments, hospitals, schools and churches. Such buildings have been identified from Land and Property Services Northern Ireland PointerPLUS¹⁶ data and plotted as shown in Figures 10.1 and 10.2.
- From these, two properties have been identified for the purposes of baseline noise monitoring as presented in Table 10.4, and 54 agreed in consultation with the CCGBC.
- Background noise monitoring was carried out at these locations, in accordance with ETSU-R-97 and the GPG. The following 55. specific measures ensured this compliance:
 - Type 1¹⁷ measuring equipment (Rion NL-31) was used, which was calibrated at the start of the survey and at each site visit. No significant calibration drift occurred (i.e. no more than 0.5 dB);
 - the GPG:
 - Measurements were performed at a height of 1.4 m AGL, in free-field conditions, i.e., a minimum of 3.5 m from any reflective surface other than the ground;
 - Background noise levels were recorded at continuous 10-minute intervals, as LA90,10min;
 - speeds, following the procedure described in the GPG;
 - A logging rain gauge were deployed at 90 Terrydoo Road;
 - mowing) were identified and excluded from analysis; and
 - location, after exclusions are taken into account. This was exceeded at all monitoring locations.
- in Technical Appendix A10.1.
- 57. As noted in Section 10.3.1, it was initially agreed with CCGBC that noise monitoring would be undertaken at 37 Temain Road, however permission to monitor was denied by the resident. Monitoring was therefore undertaken at 29 Temain Road as an alternative, being the closest neighbour, and with a similar acoustic environment. Notwithstanding this, 37 Temain Road was

Noise monitoring equipment was equipped with specially-designed, dual-layer windshields manufactured by Rion, which have been confirmed by the supplier as being suitable for use in elevated wind speeds and meeting the requirements of

During the survey, wind speeds were measured using an on-site meteorological mast. Measurements taken at a height of 80.9 m were taken as being equivalent to hub height (80 m) wind speeds, and used to calculate standardised 10 m wind

Any periods of elevated background noise levels which were not considered representative of the location (e.g. lawn

The GPG recommends at least 200 valid data points in each quiet daytime and night time period for each monitoring

Survey record sheets and calibration certificates for noise and wind monitoring equipment used during the survey are included

¹⁶ A database which combines Royal Mail and Local Council address data with buildings identified on large-scale Ordnance Survey Northern Ireland Mapping and provides addresses, descriptions and grid references

used as the receptor location for the purposes of assessment (see Section 10.6.1), being closer to the Development than 29 Temain Road.

Table 10.4 details the baseline noise monitoring locations.

Table 10.4: Baseline Noise Monitoring Locations

Location Name	Easting	Northing	Description of Location
29 Temain Road	273557	419293	Northern edge of garden, shielded from a watercourse to the south of the property
90 Terrydoo Road	273712	419829	Grassed area to side (south) of house). Other areas are fields so not suitable.

The background noise data were analysed according to the following process: 59.

- Synchronisation of measured noise level (LA90.10min), 10 m standardised wind speed, wind direction and rainfall data, correcting for differences in the timestamp averaging period (i.e. start or end of the 10-minute period) for each;
- Exclusion of any 10-minute periods where rainfall was recorded, where rainfall was recorded in the preceding 10-minute • period, and any other atypical periods judged to have been affected by rainfall or noise from watercourses;
- Elimination of any periods where the sound level meters recorded 'over-range' measurements as these are likely to be associated with short-duration, high intensity noise events or sources, such as barking dogs or machinery which may not be typical of the background noise environment;
- Exclusion of any data points which were considered 'outliers' relative to the overall dataset and located above the resulting trendline:
- Sorting of data into 'quiet daytime' and night-time periods, as defined in ETSU R-97; •
- Preparation of an X-Y scatter plot of measured noise levels against standardised 10 m wind speed for quiet daytime and night-time periods:
- Application of a polynomial trendline to the plot, using Microsoft Excel's 'Trendline' function; and
- Determination of the prevailing background noise level from the trendline curve.
- Following filtering, resulting charts were found to show a good correlation between noise level and wind speed, and confirmed as being acceptable by CCGBC (see **Section 10.3.1**)

10.3.7 Correction for Operational Turbines

It is a key principle of the ETSU-R-97 methodology that noise from operational wind turbines should not be regarded as a 61 component of background noise. The measured background levels were therefore corrected to account for the existing level of wind turbine noise. This process is described in Section 10.4.

10.3.8 Methodology for the Assessment of Effects 10.3.8.1 Noise Limits

As discussed at Section 10.2.2.3, the noise limits described in ETSU-R-97 are a combination of a 5 dB margin above the prevailing wind speed-dependent background noise level and fixed lower limits, applicable where background noise levels are low. These limits apply to cumulative effects. The daytime fixed lower noise limit is defined as a value within the range

- 35 to 40 dB, LA90, 10min, with the value chosen dependent on the following three factors:
- The number of affected properties:
- The effect on the number of kilowatt-hours produced; and •
- The duration and level of exposure.

63. For the purposes of this assessment, fixed lower limits of 35 dB, LA90 during daytime periods and 43 dB, LA90 during night-time periods have been applied at all receptors. These are the lowest, and therefore most stringent fixed lower limits available under ETSU-R-97 methodology.

10.3.8.2 Noise Predictions

- Noise predictions have been made using the ISO 9613-2 noise model, taking account of the following specific data and 64 parameters recommended in the GPG:
 - The turbine sound power levels should be stated and these should include an appropriate allowance for measurement additional 2 dB should be included;
 - Atmospheric absorption should be calculated based on conditions of 10°C and 70% relative humidity;
 - The ground factor assumed should be G=0.5 (mixed ground) except in urban areas or where noise propagates across large bodies of water, where G=0 (hard ground) should be assumed;
 - A receiver height of 4.0 m should be assumed;
 - effect may be included:
 - An additional 3 dB should be added to noise immission levels at properties located across a valley or with heavily concave ground between the receptor location and the wind turbine(s)¹⁸; and
 - The predicted noise levels (L_{Aeq,t}) should be converted to the required L_{A90,10min} by subtracting 2 dB.
- 65. ISO 9613-2 provides a prediction of noise levels likely to occur under worst-case conditions; those favourable to the propagation of sound, i.e., down-wind or under a moderate, ground-based temperature inversion as often occurs at night (often referred to as stable atmospheric conditions). The specific measures recommended in the GPG have been shown to provide good correlation with levels of wind turbine noise measured at operational windfarms^{19,20}.

10.3.8.3 Cumulative Noise Assessment

- ETSU-R-97 states that the assessment should take account of the effect of noise from all wind turbines that may affect a particular receptor. In order to facilitate this, a screening exercise was conducted to identify any wind turbines either operational, consented, or subject of a current planning application, with the potential to result in cumulative noise effects when assessed in conjunction with the Development. Technical Appendix A2.3: List of Cumulative Sites contains the full list of windfarms and single turbines used to inform the wind turbines and windfarms identified.
- The following cumulative developments were identified: 67.
 - Craiggore Windfarm (consented, awaiting construction);
 - Temain Road (37) (single turbine, consented, awaiting construction);
 - Terrydoo Road (34)/1 (single turbine, operational);
 - Terrydoo Road (34)/2 (single turbine, operational).
- In order to identify the area (and thereby the noise-sensitive receptors) requiring a cumulative assessment, a screening tool 68. has been developed. This involves calculating noise grids for both the Development and the cumulative sites under consideration, based on the maximum sound power levels for the turbines from each development. The difference between the grid values is then calculated to identify the area in which the difference in noise levels is less than 10 dB, in line with the requirements of the GPG discussed in Section 10.3.4.
- This 'difference map' is then overlaid with the cumulative 35 dB(A) contour. The area where the cumulative level is greater 69 than 35 dB(A) and the difference between the Development and the cumulative sites is less than 10 dB defines the area with the potential for cumulative effects.
- Figure 10.1 presents the results of this screening process. The receptors with the potential to experience a cumulative noise effect are those located within both the blue area (i.e. the area where difference between the Development and the cumulative sites is less than 10 dB) and the cumulative 35 dB, La90,10min contour, from which a representative selection of these have been

²⁰ Cooper & Evans (2013). Effects of different meteorological conditions on wind turbine noise.

uncertainty. If the data provided contains no allowance for measurement uncertainty, or uncertainties are not stated, an

Barrier attenuation should not be included, unless there is no line of sight from the receptor, in which case a 2 dB barrier

¹⁸ Equation to determine concave ground as presented in Section 4.3.9 of the GPG.

¹⁹ Bullmore et al. (2009). Wind Farm Noise Predictions and Comparison with Measurements, Third International Meeting on Wind Turbine Noise, Aalborg, Denmark 17 - 19 June 2009.

assessed. Details of the noise emission data for each cumulative development have been sourced from the respective noise assessment, and are presented in Appendix A10.2.

10.3.8.4 Apportioned Noise Limits

- Cumulative noise effects have been addressed through the derivation of apportioned noise limits. Apportioned noise limits are 71 created by logarithmically subtracting the cumulative noise scenario (i.e., excluding noise due to the Development), from the cumulative noise limits (Section 10.9). The result is the remaining noise budget available to the Development. Should no additional noise budget be available at a given property, limits at that property for noise due to the Development are set 10 dB below the cumulative noise limit, ensuring that any contribution to cumulative noise due to the Development is negligible.
- The method of predicting windfarm noise levels is described in the GPG as discussed in Section 10.3.8.2. This method has 72. been applied to all operational noise predictions within this Chapter of the ES.

10.3.8.5 ESTU Limits and Significance

The acceptable limits for wind turbine operational noise are clearly defined in ETSU R-97. Therefore, this assessment 73. determines whether the calculated immission levels at nearby noise sensitive properties lie below the noise limits derived in accordance with ETSU-R-97. Where the noise immission levels at noise sensitive properties are shown to be below derived noise limits the effect is considered to be not significant in terms of the EIA Regulations²¹.

10.3.9 Assessment Limitations

- Baseline noise monitoring locations were selected to provide a conservative representation of the background noise levels in 74. the local area, and corrected to account for the influence of existing wind turbines, following advice contained within the GPG.
- Valid background noise measurements were obtained during the baseline noise survey for the full range of wind speeds 75. required by the GPG for both daytime and night time periods, after exclusions were taken into account.
- Wind speeds were measured at a hub height of 80 m, and standardised to a height of 10 m in accordance with the GPG. 76.
- It is therefore concluded that no significant assessment limitations exist. 77.

10.4 Baseline Description

Charts 10.1 to 10.4 detail the results of the background noise data analysis for quiet daytime and night periods, as defined in 78. ETSU-R-97. The charts also show the cumulative noise limits applicable under ETSU-R-97, taking account of the appropriate daytime fixed lower noise limit identified in Section 10.3.8.

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²¹ The Planning (Environmental Impact Assessment) Regulations 20152012

Chart 10.1: Quiet Daytime – 29 Temain Road



Chart 10.2: Night-time – 29 Temain Road



Chart 10.3: Quiet Daytime – 90 Terrydoo Road



Chart 10.4: Night-time – 90 Terrydoo Road



- It is a key principle of the ETSU-R-97 methodology that noise from operational wind turbines should not be regarded as a 79. component of background noise. Therefore, in order to ensure all contributions from existing wind turbines were fully excluded, it was agreed with CCGBC (see Section 10.3.1) that the existing level of wind turbine noise at each noise monitoring location would be predicted through noise modelling, and used to correct the measured background levels.
- Noise levels due to the existing scenario at the time of the baseline monitoring (i.e. noise due to the Operational Rigged Hill 80 Windfarm)²² were calculated in accordance with the GPG, following the procedure descried in Section 10.3.8.2. Details of the noise emission data for the Operational Rigged Hill Windfarm are presented in Technical Appendix A10.2. The predicted noise levels resulting from the existing scenario was then logarithmically subtracted from the measured level. It should be noted that predicted noise levels are worst-case, based upon the assumption that each receptor was directly downwind of the existing turbines at all times during the survey period.
- Table 10.5 details this process for each monitoring location, for daytime and night-time periods. The corrected background 81. noise levels, highlighted in bold, were then used to derive the ETSU-R-97 limits, as presented in Table 10.6.

Table 10.5: Prevailir	g Background Noise Levels

				Standard	dised 10	m Wind S	Speed, m	s ⁻¹		
Receptor	3	4	5	6	7	8	9	10	11	12
			Preva	iling Bac	kground	Noise Le	evel, dB,	LA90,10min		
29 Temain Road										
Quiet Daytime										
Measured Background Level	35.8	36.5	37.1	37.7	38.2	38.8	39.4	40.0	40.8	41.7
Predicted Existing Turbine Noise Level	28.7	28.9	29.1	29.3	29.5	29.8	30.0	30.2	30.4	30.6
Corrected Background Level	34.9	35.7	36.4	37.0	37.6	38.2	38.8	39.5	40.4	41.3
Night-time						·	•	•		
Measured Background Level	36.8	36.9	36.9	37.1	37.3	37.6	38.0	38.7	39.5	40.5
Predicted Existing Turbine Noise Level	28.7	28.9	29.1	29.3	29.5	29.8	30.0	30.2	30.4	30.6
Corrected Background Level	36.1	36.1	36.2	36.3	36.5	36.8	37.3	38.0	38.9	40.1
90 Terrydoo Road							•			•
Quiet Daytime										
Measured Background Level	32.5	33.4	34.2	35.1	36.0	36.9	37.7	38.6	39.5	40.4
Predicted Existing Turbine Noise Level	29.8	30.0	30.2	30.4	30.7	30.9	31.1	31.3	31.5	31.7
Corrected Background Level	29.1	30.7	32.0	33.3	34.5	35.7	36.6	37.7	38.8	39.8
Night-time		1			-		-	,		•
Measured Background Level	34.1	34.1	35.4	36.1	36.4	36.6	36.7	37.0	37.7	38.9
Predicted Existing Turbine Noise Level	29.8	30.0	30.2	30.4	30.7	30.9	31.1	31.3	31.5	31.7
Corrected Background Level	32.1	31.9	33.8	34.7	35.1	35.3	35.3	35.6	36.5	38.0

²² Cumulative developments Terrydoo Road (34)/1, Terrydoo Road (34)/2 and Temain Road (37) had not been constructed at the time of the baseline noise survey, and therefore did not form part of the existing scenario at the time of baseline monitoring.

Table 10.6 details the corresponding ETSU-R-97 noise limits. It is from these limits that apportioned noise limits applicable to 82. the Development are derived.

Table 10.6: Cumulative Noise Limits

	Standardised 10 m Wind Speed, ms ⁻¹									
Receptor	3	4	5	6	7	8	9	10	11	12
			Cı	Imulative	e Noise I	₋imit, dB	, L A90,10m	in		
Daytime										
29 Temain Road	39.9	40.7	41.4	42.0	42.6	43.2	43.8	44.5	45.4	46.3
90 Terrydoo Road	35.0	35.7	37.0	38.3	39.5	40.7	41.6	42.7	43.8	44.8
Night-time										
29 Temain Road	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	45.1
90 Terrydoo Road	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0

10.5 Embedded Mitigation

10.5.1 Construction Noise

During the Development's design phase, consideration was given to the turbine and Energy Storage Unit positioning and 83. layout to enable the existing infrastructure to be reused as far as practicable.

10.5.2 Operational Noise

- 84. During the Development's design phase, the turbine and Energy Storage Unit layout was developed such that the distance from the turbines to noise-sensitive receptors was maximised as far as practicable.
- Noise immission levels at surrounding receptors were considered at each of the main layout iterations and contributed to the 85. development of the final layout.

10.6 Assessment of Potential Effects 10.6.1 Assessment Locations

- The assessed receptors are identified in Figures 10.1 and 10.2. For each of these receptors, Table 10.7 details the source of 86. the respective background noise levels, from which the cumulative noise limits are derived.
- As noted in Section 10.3.1, baseline monitoring was undertaken at 29 Temain Road as an alternative to 37 Temain Road, where permission to monitor was refused. Notwithstanding this, and as shown in Table 10.7, 37 Temain Road has been used as the receptor location for the purposes of assessment, being closer to the Development.

Table 10.7: Assessed Receptors	
Location Name	Source of Background Noise Data
37 Temain Road	29 Temain Road
36 Terrydoo Road	90 Terrydoo Road
66 Terrydoo Road	90 Terrydoo Road
90 Terrydoo Road	90 Terrydoo Road

10.6.2 Calculation of Apportioned Noise Limits

The cumulative developments included in this assessment are detailed in Section 10.3.8.3. When assessing cumulative 88. noise levels, consideration should be given to any noise limits or other noise-related planning conditions applicable to each development.

- Where there is no reasonable prospect of a cumulative development producing noise levels up to its consented (or proposed) 89. limits, the GPG recommends that predicted noise levels should be used along with an additional safety margin. This approach prevents the sterilisation of an area in which existing wind turbine noise levels are substantially lower than the ETSU-R-97 limits, enabling further appropriate development to be considered. An additional safety margin of 2 dB has therefore been applied to the noise emissions of each cumulative development, on top of the required addition for uncertainty (typically a further 2 dB). Where this additional safety margin results in predicted noise levels greater than the applicable noise limit at a given wind speed, noise emission levels have been set such that the limit is just met at that wind speed.
- Details of the noise emission data for each cumulative development are presented in Appendix A10.2, detailing the required 90 adjustments in each instance.
- Table 10.8 details the predicted 'adjusted' cumulative noise levels (excluding noise due to the Development) for each of the 91. assessed receptors identified in Table 10.7. It should be borne in mind that as the noise assessment follows GPG advice with regard to cumulative noise effects, the noise levels presented in Table 10.8 are a theoretical worst case; a number of conservative assumptions have been made as detailed in the previous sections of this chapter, such as the assumption that each receptor is directly downwind of all turbines simultaneously, which cannot occur in practice.

Table 10.8: Adjusted Predicted Cumulative Immission Levels

	Standardised 10 m Wind Speed, ms ⁻¹										
	3	4	5	6	7	8	9	10	11	12	
Receptor			Adjı	usted Cun	nulative N	oise Leve	I, dB, LA90	,10min			
37 Temain Road	21.7	23.9	26.3	28.1	28.9	30.0	30.1	30.1	30.2	30.3	
36 Terrydoo Road	26.9	29.2	31.5	33.7	36.0	38.4	38.5	38.7	38.9	39.1	
66 Terrydoo Road	22.6	24.9	27.2	29.5	31.5	33.8	33.9	34.0	34.2	34.4	
90 Terrydoo Road	20.7	22.9	25.4	27.5	28.8	30.4	30.5	30.6	30.8	30.9	

10.6.3 Apportioned Noise Limits

- As described in Section 10.3.8.3, the adjusted cumulative wind turbine noise levels (Table 10.8) have then been 92. logarithmically subtracted from the total cumulative ETSU-R-97 noise limits (Table 10.6) to determine apportioned noise limits applicable to the Development in isolation.
- 93. The resulting apportioned limits applicable to the Development in isolation are presented in **Table 10.9**. These limits may be presented in the planning conditions of any consent for the Development, and will ensure the Development's compliance with ETSU-R-97 when considered both individually and cumulatively.

Table 10.9: Apportioned Noise Limits

	Standardised 10 m Wind Speed, ms ^{.1}									
	3	4	5	6	7	8	9	10	11	12
Receptor				No	ise Limit,	dB, LA90,10	Omin			
Daytime										
37 Temain Road	39.8	40.6	41.3	41.8	42.4	43.0	43.6	44.3	45.3	46.2
36 Terrydoo Road	34.3	34.6	35.6	36.4	36.9	36.8	38.7	40.5	42.1	43.4
66 Terrydoo Road	34.7	35.3	36.5	37.7	38.7	39.7	40.8	42.1	43.3	44.4
90 Terrydoo Road	34.8	35.5	36.7	37.9	39.1	40.3	41.2	42.4	43.6	44.6
Night-time										
37 Temain Road	43.0	42.9	42.9	42.9	42.8	42.8	42.8	42.8	43.7	45.0
36 Terrydoo Road	42.9	42.8	42.7	42.5	42.0	41.1	41.1	41.0	40.9	40.7
66 Terrydoo Road	43.0	42.9	42.9	42.8	42.7	42.4	42.4	42.4	42.4	42.4

	Standardised 10 m Wind Speed, ms ⁻¹											
	3	4	5	6	7	8	9	10	11	12		
Receptor	Receptor Noise Limit, dB, LA90,10min											
90 Terrydoo Road	43.0	43.0	42.9	42.9	42.8	42.8	42.7	42.7	42.7	42.7		

10.6.4 Predicted Noise Levels due to the Development

94. described in Section 10.3.8.2, and using the noise emission data presented in Section 10.3.5. As previously noted, predicted noise levels are worst-case, based upon the assumption that each receptor is directly downwind of the Development. Noise levels will therefore be lower than presented for other wind directions.

Table 40.40. Predicted Operational Naise Levels due to the Develo

	·			Standard	lised 10 m	n Wind Sp	eed, ms ⁻¹				
Receptor	3	4	5	6	7	8	9	10	11	12	
Predicted Noise Level, dB, LA90,10min											
37 Temain Road	21.6	24.9	29.5	33.6	36.0	36.2	36.2	36.2	36.2	36.2	
36 Terrydoo Road	17.8	21.1	25.6	29.7	32.1	32.4	32.4	32.4	32.4	32.4	
66 Terrydoo Road	20.0	23.3	27.9	31.9	34.3	34.6	34.6	34.6	34.6	34.6	
90 Terrydoo Road	21.9	25.2	29.7	33.8	36.2	36.4	36.4	36.4	36.4	36.4	

Table 10.11 details the difference (margin) between predicted noise immission levels (Table 10.10) and the apportioned noise 95. limits (Table 10.9) for the assessed receptors. A negative margin indicates that the predicted noise level is below the derived noise limit.

				Standa	rdised 10	m Wind S	peed, ms ⁻	1			
Receptor	3	4	5	6	7	8	9	10	11	12	
					Mar	gin, dB					
Daytime											
37 Temain Road	-18.2	-15.7	-11.8	-8.3	-6.4	-6.8	-7.4	-8.1	-9.1	-10.0	
36 Terrydoo Road	-16.5	-13.5	-9.9	-6.7	-4.8	-4.5	-6.3	-8.1	-9.7	-11.1	
66 Terrydoo Road	-14.8	-12.0	-8.7	-5.8	-4.4	-5.1	-6.2	-7.5	-8.7	-9.8	
90 Terrydoo Road	-13.0	-10.3	-7.0	-4.1	-2.9	-3.8	-4.8	-6.0	-7.1	-8.2	
Night-time					•						
37 Temain Road	-21.3	-18.0	-13.4	-9.3	-6.9	-6.6	-6.6	-6.6	-7.5	-8.8	
36 Terrydoo Road	-25.1	-21.7	-17.0	-12.7	-9.9	-8.8	-8.7	-8.6	-8.5	-8.4	
66 Terrydoo Road	-23.0	-19.6	-15.0	-10.9	-8.3	-7.9	-7.9	-7.8	-7.8	-7.8	
90 Terrydoo Road	-21.1	-17.8	-13.2	-9.1	-6.6	-6.3	-6.3	-6.3	-6.3	-6.3	

As **Table 10.11** shows, worst-case noise levels due to the Development are below the apportioned limits applicable to the 96. Development. Therefore, noise due to the Development has been shown to be compliant with the requirements of ETSU-R-97.

Table 10.10 details the predicted noise immission levels due to the operation of the Development, following the methodology

10.7 Mitigation and Residual Effects

10.7.1 Decommissioning/Construction Phase

The Development infrastructure has been located as far as practicable from residential dwellings in order to minimise the effect of noise during decommissioning/construction. The good practice measures detailed below will be implemented to manage the effects of noise during operations, and will be required of all contractors:

- Operations shall be limited to times agreed with CCGBC;
- Deliveries of turbine components, plant and materials by HGV to site shall only take place by designated routes and within times agreed with CCGBC;
- The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery and activities, as advocated in BS 5228;
- Where practicable, the work programme will be phased, which would help to reduce the combined effects arising from several noisy operations;
- Where necessary and practicable, noise from fixed plant and equipment will be contained within suitable acoustic enclosures or behind acoustic screens;
- All sub-contractors appointed by the main contractor will be formally and legally obliged, and required through contract, to comply with all environmental noise conditions:
- Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night-time construction activities likely to generate significant noise levels, e.g., turbine erection; and
- Any plant and equipment normally required for operation at night (23:00 07:00), e.g., generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45 dB, LAeq, night shall not be exceeded at the nearest noise-sensitive receptors.
- Application of the above measures to manage decommissioning/construction noise will ensure that effects are minimised as far as is reasonably practicable and that the construction process is operated in compliance with the relevant legislation.
- Should the Development require decommissioning, the level of noise produced is likely to be no greater than that during the 99 initial decommissioning / construction phases. Any legislation, guidance or best practice relevant at the time of final decommissioning would be complied with.

10.7.2 Operational Phase

No mitigation beyond the embedded mitigation set out in Section 10.5.2 is necessary to meet the requirements of guidance and avoid significant effects, and therefore none is proposed.

10.8 Summary of Effects

- An assessment of potential noise effects associated with the Development has been carried out.
- Decommissioning/construction noise will be limited in duration and confined to working hours as specified by the CCGBC and 102. therefore can be adequately controlled through the application of good practice measures and secured by planning condition. This will ensure that any noise from the Development site during construction will be adequately controlled.
- Given the substantial (approximately 2 km) separation distance between the Energy Storage Unit and the closest 103. noise-sensitive receptors, along with the low levels of noise likely to be emitted by the Energy Storage Unit, there is no reasonable prospect of a significant effect.
- Operational noise has been assessed in accordance with ETSU-R-97 and in line with current best practice. It has been 104 shown that the Development would comply with the requirements of ETSU-R-97 at all receptor locations.
- The cumulative effects of the Development in conjunction with nearby wind energy developments either operational, 105. consented or the subject of a current planning application were taken into consideration in the above assessment, in accordance with ETSU-R-97 and the GPG.

10.9 Statement of Significance

Decommissioning / construction noise will be limited in duration and confined to working hours agreed with CCGBC, and can therefore be adequately controlled through planning condition. The application of mitigation measures where applicable will also ensure that any noise from site will be adequately controlled such that construction noise effects are not significant.

The effect of operational noise has been assessed using the methodology described in ETSU-R-97. Apportioned noise limits have been calculated for the relevant noise-sensitive properties, and predictions made based on the candidate turbine type. The predicted noise levels are calculated to be below the apportioned limits and therefore the effect of operational noise is not significant.

10.10 Glossarv

- 108 (usually 90%) of a period of time. As such it excludes any short-duration noises, such as individual passing cars (but not continuous traffic), dogs barking or passers-by. Sources of background noise typically include such things as wind noise, traffic and continuously operating machinery (e.g. air conditioning or generators).
- Decibel (dB): The decibel is the basic unit of noise measurement. It relates to the cyclical changes in air pressure created by the sound (Sound Pressure Level) and operates on a logarithmic scale, ranging upwards from 0 dB. 0 dB is equivalent to the normal threshold of human hearing at a frequency of 1000 Hz. Each increase of 3 dB on the scale represents a doubling in the Sound Pressure, and is typically the minimum noticeable change in sound level under normal listening conditions. For example, while an increase in noise level from 32 dB to 35 dB represents a doubling in sound pressure, this change would only just be noticeable to the majority of listeners.
- dB(A): Environmental noise levels are usually discussed in terms of dB(A). This is known as the A-weighted sound pressure level, and indicates that a correction factor has been applied, which corresponds to the human ear's response to sound across the range of audible frequencies. The ear is most sensitive in the middle range of frequencies (around 1000-3000 Hertz (Hz)), and less sensitive at lower and higher frequencies. The A-weighted noise level is derived by analysing the level of a sound at a range of frequencies and applying a specific correction factor for each frequency before calculating the overall level. In practice this is carried out automatically within noise measuring equipment by the use of electronic filters, which adjust the frequency response of the instrument to mimic that of the ear.
- Frequency: The frequency of a sound is equivalent to its pitch in musical terms. The units of frequency are Hertz (Hz), which represents the number of cycles (vibrations) per second.
- **Noise Emission:** The sound power level emitted from a given source. 112.
- Noise Immission: The sound pressure level detected at a given location (e.g. nearest dwelling). 113.
- 114. is used as a measure of the background noise level.
- 115. LAeg,: This term is known as the A-weighted equivalent continuous sound pressure level for a period of time, t. It is similar to an average, and represents the sound pressure level of a steady, continuous noise which has the same energy as the actual measured noise.
- 116. below 250 Hz. Should not be confused with infrasound, which is sound below the lowest normally audible frequency, 20 Hz.
- turbines, etc.).
- Noise-sensitive receptors: Locations that may potentially be adversely affected by the addition of a new source of noise 118. (typically residential dwellings).
- Sound power (W): The sound energy radiated per unit time by a sound source, measured in watts (W). 119.
- Sound power level (L_w): Sound power measured on the decibel scale, relative to a reference value (Wo) of 10⁻¹² W. 120.
- Sound pressure (P): The fluctuations in atmospheric pressure relative to atmospheric pressure, measured in Pascals (Pa). 121
- Sound pressure level (L_p): Sound pressure measured on the decibel scale, relative to a sound pressure of 2 x 10⁻⁵ Pa.

Background Noise: The background noise level is the underlying level of noise present at a particular location for the majority

LA90.t: This term is used to represent the A-weighted sound pressure level that is exceeded for 90% of a period of time, t. This

Low-frequency noise: Noise at the lower end of the range of audible frequencies (20 Hz – 20 kHz). Usually refers to noise

Noise: Unwanted sound. May refer to both natural (e.g. wind, birdsong etc.) and artificial sounds (e.g. traffic, noise from wind

- 123. **Tonal element:** A characteristic of a sound where the sound pressure level in a particular frequency range is greater than in those frequency ranges immediately above higher or lower. This would be perceived as a humming or whining sound.
- 124. **Vibration:** In this context, refers to vibration carried in structures such as the ground or buildings, rather than airborne noise.

11 Archaeology and Cultural Heritage

11.1 Introduction

This chapter of the Environmental Statement (ES) evaluates the effects of the Development on the archaeology and cultural heritage resource. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus). The assessment considers the potential significant effects of the Development during the following phases of the Development:

- Decommissioning of the Operational Rigged Hill Windfarm (initial phase of the Development);
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development: and
- Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur 2 partly in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worst-case scenario for assessment purposes. Any effects arising as a result of the decommissioning of the Development, are considered to be no greater than the effects arising when these first two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction Table 1.4. 3.
- This Chapter of the ES is supported by the following Technical Appendix provided in Volume 3 Technical Appendices:
 - A2.3 List of Cumulative Sites; and
 - A11.1: Archaeological Desk-Based Assessment. .
- This Chapter includes the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - Assessment of Potential Effects;
 - Mitigation and Residual Effects;
 - Cumulative Effect Assessment;
 - Summary of Effects:
 - Statement of Significance; and
 - Glossary.

11.2 Legislation, Policy and Guidance

This section sets out guidance, legislation and information sources that have been considered in carrying out this assessment.

- Statutory protection for archaeology is principally outlined in:
 - Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995)¹, and ٠
 - The Planning (Listed Buildings) Regulations (Northern Ireland) 2015², as amended.

- The assessment was undertaken using planning guidelines set out in the:
 - Planning Policy Statement (PPS) 6: Planning, Archaeology and Built Heritage (March 1999) 3;
 - Strategic Planning Policy Statement for Northern Ireland (SPPS) (September 2015)⁴;
 - The Northern Area Plan 2016 (NAP 2016)⁵; and
 - The emerging Causeway Coast and Glens Borough Council Local Development Plan 2030⁶.
- Several government and professional organisations have established guidelines relevant to assessing development impacts on archaeology and cultural heritage which are considered best practice. These include:
 - International Council on Monuments and Sites (ICOMOS) guidance on heritage impact assessments⁷;
 - Standards and Guidance for Archaeological Desk-Based Assessments provided by the Chartered Institute for Archaeologists (ClfA)8; and
 - Department for Communities' Guidance on Setting9.
- These are discussed further in Chapter 5: Planning of this ES and within the stand-alone Planning Statement submitted separately as part of the application.

11.3 Assessment Methodology and Significance Criteria 11.3.1 Scoping Responses and Consultations

Consultation for this ES topic was undertaken with the organisations shown in Table 11.1. Chapter 2: EIA Methodology of this ES summarises the Scoping process and responses and sets out the aspects that were agreed to be excluded from the scope of the EIA.

I	able	11.1:	Consultation	Res	ponses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Historic Environment Division (HED) of Department for Communities	Scoping Response, 13/10/17	An assessment of effect upon archaeological resources is required. There are a number of archaeological sites within the environs dating to the Bronze Age and Medieval Period with several sites within the Development boundary. Consideration should be given to Scheduled and State Care sites beyond 5 km. A comprehensive cumulative assessment is required.	The archaeological baseline is presented in Technical Appendix 11.1 , Archaeological Desk-Based Assessment. Section 11.5 of this ES considers any potential significant effects on archaeological resources within the Site, and designated heritage assets out to 5 km. As no significant effects were identified on Scheduled Monuments within 5 km, Scheduled Monuments beyond 5 km are not considered further as they are unlikely to receive a significant effect in line with EIA Regulations. One Scheduled Monument within State Care and which falls within the zone of theoretical visibility (ZTV) but beyond 5 km is included in the assessment in

⁵ Department of the Environment (September 2015) The Northern Area Plan 2016 (NAP 2016). Available at https://www.planningni.gov.uk/northern_2016.htm [Accessed 22/03/2019] ⁶ Causeway Coast and Glens Borough Council (on-going). Development Plan. https://www.causewaycoastandglens.gov.uk/live/planning/development-plan [Accessed 22/03/2019] 7 ICOMOS (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties ⁸ CIFA (Dec 2014, updated Jan 2017) Standards and Guidance for Archaeological Desk-Based Assessments. Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf [Accessed 22/03/2019] ⁹ Department for Communities (2018) Guidance on Setting and the Historic Environment

¹ Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995. Available at

http://www.legislation.gov.uk/nisi/1995/1625/contents/made [Accessed 22/03/2019]
² The Planning (Listed Bridlings) Regulations (Northern Ireland) 2015. Available at http://www.legislation.gov.uk/nisr/2015/108/contents/made [Accessed 22/13/2019]

³ Department of the Environment Northern Ireland (March 1999) Planning Policy Statement 6 (PPS 6): Planning, Archaeology and Built Heritage. Available at https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/pps06archaeology-built-heritage.pdf [Accessed 22/03/2019]

⁴ Department of the Environment Northern Ireland (September 2015) •Strategic Planning Policy Statement for Northern Ireland (SPPS). Available at https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf [Accessed 22/03/2019]

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
			Section 11.5 as requested by HED, as summarised in Section 11.3.2.2.
			A cumulative assessment is provided in Section 11.7.

11.3.2 Study Area

The archaeological study areas used to support the assessment are set out below in Table 11.2 and are shown on Figure 11.1 and Figure 11.2.

Table 11.2: Archaeology and Cultural Heritage Study Areas

Effect	Name	Range	Description	Figure
Direct	Archaeological Core Study Area	Site Boundary at the time of Scoping	Area within which the Development may have direct effects upon known and unknown archaeological remains. Further information is provided in Section 11.3.2.1 .	11.1
Direct	1 km Study Area	1 kilometre (km) radius surrounding the Core Study Area	Area used to ensure a full understanding of the archaeological resource and the potential for unknown archaeology to survive within the Core Study Area. Further information is provided in Section 11.3.2.1.	11.1
Indirect	5 km Study Area	5 km surrounding the Core Study Area	Area within which the Development has potential to cause likely significant indirect effects upon the heritage assets as a result of changes to their setting and hence requiring detailed assessment in lines with the EIA Regulations. Further information is provided in Section 11.3.2.2 . The 5 km Study Area includes the land within a 5 km radius of the Site Boundary at Scoping. As such, some assets within the '5 km Study Area' may lie at a distance greater than 5 km when measurements are given to the nearest turbine.	11.2
Cumulative	Cumulative Study Area	10 km surrounding the Core Study Area	Only windfarm developments (subject to a valid planning application, consented, under construction or operational windfarms) within 10 km of the Development are considered likely to give rise to a cumulative effect. Significant effects are most likely to occur within 5 km of a windfarm development (i.e. where cultural heritage features lie within the overlapping 5 km ranges where significant effects are most likely associated with a specific windfarm). Further information is provided in Section 11.3.7 .	6.12

¹⁰ Historic Environment Digital Datasets. Available at <u>https://www.communities-ni.gov.uk/publications/historic-environment-digital-datasets</u>

11.3.2.1 Direct Effects

The study areas used to support the assessment are set out in Table 11.2 and are shown on Figure 11.1, Figure 11.2 and Figure 6.12. The 'Core Study Area', as referred to in Technical Appendix 11.1: Desk-Based Assessment, is equivalent to the area contained within the Site Boundary as defined at scoping and covers an area of 453 hectares (ha). The archaeological 1 km Study Area includes the Core Study Area and land within a 1 km radius. Data was collected within the Core Study Area and 1 km Study Area to inform the potential for direct effects on known and unknown archaeology. The 1 km Study Area covers an area substantially larger than the Core Study Area in order to ensure a full understanding of the archaeological resource and potential for unknown subsurface archaeology that may survive within the Core Study Area.

11.3.2.2 Indirect Effects

- heritage assets within 15 km. Following consultation, a review of the data obtained and the ZTV, and in conjunction with site visits and professional judgement, only heritage assets lying within the 5 km Study Area (as shown on Figure 11.2) were deemed to have the potential to receive a significant effect on their setting. It was therefore deemed that these assets required further detailed assessment in line with the EIA Regulations.
- One designated asset (Scheduled Monument LDY024:011) beyond the 5 km Study Area, but which has theoretical visibility of 15 the Development, is also included in the assessment of indirect effects, as highlighted in Figure 11.2. Based on scoping consultation responses from the HED and its status as a Scheduled Monument in State Care it was deemed to require further assessment.

11.3.3 Scope of Assessment

- The key issues for the assessment of potential cultural heritage effects relating to the Development are:
 - Temporary, reversible effects arising from the initial decommissioning of the Operational Rigged Hill Windfarm and cause reduced access to and / or reduced visibility and appreciation of the historical environment;
 - Permanent, direct effects to archaeological features due to damage or destruction as a result of land take by the foundations, access tracks, and other infrastructure; and
 - in the event that the Development is decommissioned (Final Phase).

11.3.4 Design Parameters

- No additional design parameters, other than those set out in Chapter 3: Development Description and Chapter 4: Site Selection and Design of this ES, are required for the assessment presented in this Chapter.
- As set out in Chapter 3: Development Description, the possibility of micro-siting within 50 m (in all directions) of the Development footprint, where constraints allow, may be utilised to avoid any further unknown or unrecorded onsite environmental or technical constraints uncovered at the time of decommissioning/construction activity. Consideration has been given to the micro-siting tolerances specified, and this would not affect any concluding statements of significance arrived at as part of this assessment. Micro-siting allowances can minimise effects upon unknown archaeological deposits of significance should they be encountered during decommissioning and construction activities as this allows for the ability to relocate infrastructure to avoid direct effects.

11.3.5 Baseline Survey Methodology

- inform the baseline, based on the Core Study Area and 1 km Study Area outlined in Section 11.3.2 above. The DBA is provided in Technical Appendix 11.1. The DBA has been based on readily available and relevant documentary sources. The following archives were considered:
 - Databases of archaeology and cultural heritage assets maintained by Department for the Communities¹⁰;

For the assessment of indirect (setting) effects on Designated Heritage Assets, data was initially collected on all designated

construction phase of the Development, such as noise, signage and higher vehicular and pedestrian activity which may

Indirect visual effects upon heritage assets as resulting in changes to their setting. Such visual effects are likely to occur as a consequence of the presence, size and scale of the Development in the landscape. This is likely to impact on cultural heritage assets located on high ground where their historical significance lies in their wider landscape setting including long views to and from the asset. Examples of these types of assets are raths and forts. These effects would be reversible

A Desk-Based Assessment (DBA) was undertaken using available documentary, cartographic and photographic evidence to

- Cartographic Evidence as held by the Public Record Office of Northern Ireland (PRONI)¹¹; and
- Contemporary Aerial Photography, as held by PRONI¹².
- A site visit was undertaken on 25th January 2019 to validate the historic environment record of the area and to identify and 20. (where possible) record any previously unrecorded cultural heritage features within the Core Study Area and 1 km Study Area. Site visits to heritage assets within the 5 km Study Area were also conducted, along with other heritage assets assessed within this chapter.
- Information on heritage assets within the 5 km Study Area and 10 km Cumulative Study Area was also obtained from the 21. same archive sources listed above and are reported in Section 11.4-11.7.

11.3.6 Methodology for the Assessment of Effects

Table 11.3: Framework for Determining Sensitivity of Recentors

The assessment of effects is based on the final design of the Development. In line with ICOMOS guidance¹³, the assessment of effects upon heritage assets is undertaken by establishing the asset's significance and how that significance could be changed as a result of the Development. In order to do this, the appraisal starts with a consideration of the sensitivity of a cultural heritage asset against the magnitude of any potential change, to arrive at the significance of the effect, as informed by professional judgement.

11.3.6.1 Sensitivity of Receptors

- The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Development or 23. the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and professional judgement.
- The sensitivity of the cultural heritage assets / receptors has been equated with designated status, as shown in Table 11.3, 24. however, each individual asset is considered on its own individual characteristics with its final degree of sensitivity informed by site visits and by professional judgement in order to take account of any changes to an asset's setting since its designation.
- Listed Buildings are designated, subject to grading (Category A, B+ and B) and placed on a list that is maintained by the 25. Department for Communities. For the purposes of this assessment, the categorisation of each Listed Building has been used to define the level of sensitivity.

Sensitivity of Receptor	Definition
Very High	World Heritage Sites - these are internationally important.
High	Scheduled Monuments, Category A Listed Buildings, Historic Battlefields, Historic Parks, Gardens and Demesnes – these are considered to be nationally important.
Medium	Category B+ Listed Buildings, regionally important archaeological features and areas (as defined in the Sites and Monuments Record (SMR)), and Conservation Areas – these are considered to be regionally important.
Low	Category B (B1/B2) and Record Only Listed Buildings, locally important sites and archaeological features (as defined in the SMR) – these are considered to be locally important.
Negligible	Badly preserved and/ or damaged or very common archaeological features and buildings of little or no value at local or any other scale.

11.3.6.2 Magnitude of Effect

The magnitude of potential effects will be identified through consideration of the Development, the degree of change to 26. baseline conditions predicted as a result of the Development, the duration and reversibility of an effect, and with regard to professional judgement as informed by best practice guidance and legislation.

Magnitude is the measure of change as a result of the expected effect of the Development. It has been classified, for both 27. direct and indirect effects, as shown in Table 11.4. For the purpose of assessing indirect visual effects, an assets proximity to the Development, and presence within the ZTV, combined with the specific attributes or interests of an asset (e.g. whether the importance of an asset is derived from its long uninterrupted views and positioning within a largely unchanged landscape) have been taken as two attributes in the determination of magnitude.

able 11.4: Framework for Determining Magnitude of Effect			
Magnitude of Effects	Definition		
Very High	Total loss of or major alteration to a s archaeological feature).		
	Blocking or severance of key visual o		
High	Major damage to or significant alterat		
	Extensive change to the setting of a f sightline).		
Medium	Damage or alteration to a site, buildin to have a high archaeological potentia		
	Moderate change in the setting of a fe		
Low	Minor damage or alteration to a site, where it is considered there is low po		
	Minor change in the setting of a featu		
Negligible	Limited physical impact.		
	Slight or no change in setting.		

Some heritage assets will receive no change as a result of the Development. Where this is the case, the heritage asset will receive a reduced assessment.

11.3.6.3 Significance of Effect

The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 11.5 summarises guideline criteria for assessing the significance of effects.

Table 11.5: Framework for	Assessment of	of the	Significance
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Magnitude of	Sensitivity of Receptor				
Effect	Very High	High	Medium	Low	Negligible
Very High	Major	Major	Moderate	Moderate	Minor
High	Major	Major	Moderate	Minor	Negligible
Medium	Moderate	Moderate	Moderate	Minor	Negligible
Low	Moderate/Minor	Minor	Minor	Negligible	Negligible
Negligible Minor	Minor	Negligible	Negligible	Negligible	Negligible

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in green in the above table. Where potential scores of moderate or major significance have been predicted for features using the matrix-based approach shown in Table 11.5, such features have been selected for a more detailed consideration in Section 11.5. This section defines heritage assets and contributions of setting to their significance, considering its designation status, essential attributes etc. An assessment is made using professional judgement of the extent to which, changes in setting as a result of the Development, affect the heritage asset and an assessment of significance of the effect is given. Simple intervisibility does not necessarily contribute to a change in setting, but may result in a change to the

site, building or other feature (e.g. destruction of

- or other relationship.
- tion to a site, building or other feature.
- feature (e.g. loss of dominance, intrusion on key view or

ng or other feature. Encroachment on an area considered ial for buried remains.

feature (e.g. intrusion on designed sight-lines and vistas).

building or other feature. Encroachment on an area otential for buried archaeological remains to exist.

ire (e.g. above historic skylines or in designed vistas).

of Effects

¹¹ PRONI Historical Maps Viewer. Available at https://www.nidirect.gov.uk/information-and-services/search-archives-online/proni-historicalmaps-viewer

¹² Ibid

¹³ ICOMOS (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties

wider landscape context of a heritage asset. Potential effects that are assessed as minor or negligible are not significant in the context of the EIA Regulations.

- The assessment has taken an approach in which the designation status (sensitivity) of a feature is set against the magnitude of the effect of the Development. For the purposes of assessing indirect (visual) effects, distance from the asset to the Development is considered a determinant in the degree of magnitude of any change that might be caused. Simple intervisibility with the Development is not necessarily considered to be harmful, unless it is clear that this negatively affects the integrity of the asset and its relationship with its wider landscape setting (where this has been identified as a key attribute of its setting/listing). Where relevant, consideration has therefore been given to the effect that the Development will have on changes to the settings of heritage assets in views towards/across the asset which include the Development, as well as in views towards the Development from the asset. Distances given are always from the nearest proposed turbine.
- It is also important to consider that forestry and woodlands, as well as buildings, within landform can provide visual screening 31. to cultural heritage features. However, it is noted that in managed forests the level of screening will alter and views which previously did not exist, may be opened up over time.

11.3.7 Assessment of Cumulative Effects

- A cumulative effect is an additional effect which arises from the Development in combination with other effects caused by 32. other existing, consented or proposed developments on a given cultural heritage resource. Based upon the scale of the Development, professional judgement and experience, heritage assets that lie at a distance greater than 5 km from a given windfarm are considered unlikely to receive a significant effect. For the purposes of the assessment of cumulative effects, only windfarm developments (subject to a valid planning application, consented, under construction or existing operational windfarms) within 10 km of the Development have been initially considered (i.e. where cultural heritage features lie within the overlapping 5 km ranges where significant effects are most likely associated with a specific windfarm). The potential for a significant cumulative effect is considered likely to occur within the 5 km zone where the ZTVs for each windfarm development, included in the cumulative effect assessment, would overlap within this range; i.e. where each is theoretically simultaneously visible. The windfarms within this 10 km zone have then been further considered. Heritage assets, where there is potential for a significant cumulative effect, are assessed further within this ES.
- Further detail on cumulative effects on landscape can be found in Technical Appendix A2.3 List of Cumulative Sites and 33. Chapter 6: Landscape and Visual Impact Assessment of this ES. Locations of cumulative development sites considered as part of the landscape cumulative assessment are shown in Figure 6.12, and those that are relevant to the Cultural Heritage assessment are listed in Table 11.6 below. As with the Landscape and Visual Impact assessment, developments in Scoping have not been considered, as detailed in Chapter 6: Landscape and Visual Impact Assessment, Section 6.5.7 of this ES.
- The selection of cumulative sites focused on larger wind developments (i.e. with more than 2 turbines or heights greater than 100 m) within the 10 km Cumulative Study Area and single turbines below 100 m within 5 km of the Development, as listed in Table 11.6. In this assessment, windfarms that are operational or under construction are considered as 'baseline' windfarms and considered further as part of the main assessment. There is less certainty that consented and application stage windfarms will be constructed, therefore these are treated as a less certain cumulative scenario.

Table 11.6: Cumulative Developments within 10 km of the Development

Development	Summary	Distance from Development Turbines
Operational Rigged Hill Windfarm	Operational - Ten turbines Scheme which the Development would replace.	N/A
34 Terrydoo Road	Operational – 2 Turbines, 45 m to tip	900 m NW
28 Betts Road	Operational – 1 Turbines, 54.5 m to tip	4.5 km SW
60 Kilhoyle Road	Operational – 1 Turbines, 55 m to tip	2.9 km S
Dunbeg Windfarm	Operational – 14 Turbines, 125 m to tip	5.7 km N
Dunmore Windfarm	Operational – 7 Turbines, 125 m to tip	7.0 km N

Development	Summary	Distance from Development Turbines
Brockaghboy Windfarm	Operational – 15 Turbines, 125 m to tip	9.9 km SE
7/1 Belraugh Road	Operational – 1 Turbine, 46 m to tip	4.5 km E
61 Ballyavelin Road	Operational – 1 Turbine, 55 m to tip	4.4 km W
Smulgedon Windfarm	Under Construction – 7 Turbines, 120 m to tip	4.5 km S
16 Cloghan Road	Consented – 1 Turbine, 55 m to tip	2.7 km SW
25 Belraugh Road	Consented – 1 Turbine, 61 m to tip	4.1 km E
31 Drumhappy Road	Consented – 1 Turbine, 59.9 m to tip	4.3 m SW
37 Temain Road	Consented – 1 Turbine, 58.5 m to tip	300 m S
Cam Quarry	Consented – 1 Turbine, 76 m to tip	4.3 km NE
Dunbeg Quarry	Consented – 1 Turbine, 61 m to tip	5 km N
Dunbeg Windfarm Extension	Consented – 3 Turbines, 120 m to tip	5.5 km N
Dunmore Windfarm Extension	Consented – 8 Turbines, 126 m to tip	7.0 km N
Evishagaran Windfarm	Consented – 14 Turbines, 125 m to tip	8.6 km S
Craiggore Windfarm	Consented – 10 Turbines, 125 m to tip	2.3 km S
Upper Ballyrogan Windfarm	Consented – 5 Turbines, 120 m to tip	4.3 km SE
Cam Burn Windfarm	Consented – 6 Turbines, 120 m to tip	7.3 km E
26 Mill Road	Consented (possibly lapsed) – 1 Turbine, 26.5 m to tip	4.4 km SW
84 Rigsend Road	Consented (possibly lapsed) – 1 Turbine, c 30 m hub	2.7 km NW
146 Craigmore Road	Consented (possibly lapsed) – 1 Turbine, 47 m to tip	3.3 km NE
121 Craigmore Road	Consented (possibly lapsed) – 1 Turbine, 55 m to tip	4.5 km NE
Dunbeg South Windfarm Extension	Application (Appeal) – 9Turbines, 149.9 m to tip	4 km N

11.3.8 Assessment Limitations

No gaps in knowledge have been identified. It should be noted that the assessment undertaken is based upon a desk-based 35 assessment aided by site walkovers and visits to heritage assets. No intrusive survey has been carried out.

11.3.9 Embedded Mitigation

The design of the layout has sought to avoid any known archaeological features within the Core Study Area; therefore, 36 avoiding any direct impacts and securing preservation in situ.

11.4 Baseline Description

11.4.1 Desk-Based Assessment - Core Study Area

- The archaeological Core Study Area is approximately 6 km south-east of Limavady in County Derry / Londonderry and includes the Operational Rigged Hill Windfarm. It is characterised by rough unimproved grasses on lower elevations with the upper elevations of the hill an open moorland character. The predominant land use, in conjunction with the Operational Rigged Hill Windfarm, is agricultural with rough grazing on the slopes of the hill. Elevations within the Core Study Area range from approximately 100 m AOD in the west to approximately 350 m AOD in the east.
- There are 14 recorded cultural heritage assets within or partially within the Core Study Area. None of these are designated heritage assets. They are listed in Table 11.7 and shown in Figure 11.1.

Reference Number	DBA Site ID	Name	Period
LDY017:024	12	A.P. SITE - circular cropmark	Uncertain
LDY017:030	13	A.P. SITE - cropmarks	Uncertain
LDY017:037	18	A.P. SITE - sub-circular cropmark	Uncertain
Historic Mapping (HM)-2	22	Settlement near Little Derry which appears to include house, agricultural buildings, enclosure and field systems	Post-Medieval
HM-3	23	Settlement near Terrydoo which appears to include house, agricultural buildings, enclosure and field systems	Post-Medieval
HM-4	24	Possible agricultural building or enclosure near Little Derry	Post-Medieval
HM-5	25	Possible agricultural building or enclosure near Terrydoo	Post-Medieval
HM-6	26	Possible agricultural building or enclosure near Little Derry	Post-Medieval
HM-7	27	Possible agricultural building or enclosure near Terrydoo	Post-Medieval
HM-8	28	Settlement near Terrydoo Walker which appears to include house, agricultural buildings, enclosure and field systems	Post-Medieval
HM-9	29	Settlement near Terrydoo Walker which appears to include house, agricultural buildings, enclosure and field systems	Post-Medieval
HM-10	30	Settlement near Terrydoo Walker which appears to include house, agricultural buildings, enclosure and field systems	Post-Medieval
HM-12	32	Possible enclosure and field system	Post-Medieval
HM-13	33	Possible enclosure	Post-Medieval

Table 11.7: Heritage Features within the Core Study Area

11.4.2 Desk- Based Assessment – 1 km Study Area

- The majority of the 1 km Study Area to the west is in use as pastoral farmland with scattered housing along the roadways. The 39 upland areas, in which the Development is sited and to the east of the Operational Rigged Hill Windfarm, are dominated by commercial forestry, with Cam Forest lying adjacent to the eastern Site boundary and grassland and wet heath habitats, with the hill summit to the east, supporting wet heath and bog habitats.
- There are 33 heritage features located within this 1 km Study Area, which includes the 14 within the Core Study Area. There is 40. one Listed Building and one Scheduled Monument within this 1 km Study Area. There are no Historic Parks and Gardens, Historic Battlefields, Conservation Areas or World Heritage Sites within the 1 km Study Area. Further details are found in Technical Appendix A11.1.

11.4.3 Archaeological Potential

The archaeological potential of the Core Study Area is considered to be low due to its exposed upland, moorland nature and 41 the existing operational windfarm. Any remains within the Core Study Area are considered most likely to date to the postmedieval period, although earlier, isolated findspots many occur. Unknown post-medieval remains, if present, would likely survive near extant farmsteads and along lower elevations rather than where the turbines are to be located. Any unknown remains within the Core Study Area would likely reflect transhumance use of upland moorlands. As the cartographic coverage is good and has likely identified many of the archaeological remains, the potential for unrecorded post-medieval remains to survive is low. Further details are found in **Technical Appendix 11.1.**

11.4.4 Designated Assets within the 5 km Study Area

- There are a total of one Historic Park and Garden and two supplementary Parks and Gardens, 13 Scheduled Monuments and 42. 21 Listed Buildings (of all categories) within the 5 km Study Area. The 5 km Study Area extends from the Core Study Area not the nearest turbine, hence some heritage assets selected for assessment are beyond 5 km from the nearest turbine. These are illustrated in Figure 11.2. There are no World Heritage Sites, Historic Battlefields or Conservation Areas within the 5 km Study Area.
- These heritage assets have the potential to receive a significant effect as a result of the Development and are summarised 43. below (Table 11.8, Table 11.9, and Table 11.10) and are subject to a detailed assessment as part of this ES.
- In addition to these assets, LDY024:011, a Church, Graveyard and Tomb, which is a Scheduled Monument in State Care, has 44. been included within the assessment as requested by HED. This asset is included in Table 11.8.
- These assets are discussed in Section 11.5. 45.

11.4.4.1 Registered Parks and Gardens within the 5 km Study Area

There is one Registered Historic Park and Garden and two supplementary sites within the 5 km Study Area, all of which lie within the ZTV, these are listed in Table 11.8 and are assessed and discussed in Section 11.5.

Table 11.8: Historic Parks, Gardens and Demesne within the 5km Study Area			
Record Number	Historic Park and Garden Name	Approximate Distance and Direction from the Core Study Area	
Historic Parks and Gardens L-006	Drenagh	4.5 km north-west	
Historic Parks and Gardens Supplementary Site L-041	Dog Leap	4.9 km west	
Historic Parks and Gardens Supplementary Site L-022	Roe Valley Park	4.7 km west	

11.4.4.2 Scheduled Monuments

- There are 13 Scheduled Monuments within the 5 km Study Area, eight of which are situated within the ZTV in whole or part. 47. Views across a Scheduled Monument can contribute to its setting, and this may include the presence of turbines even if the Scheduled Monument itself does not lie within the ZTV. As such, all Scheduled Monuments within the 5 km Study Area have been selected for detailed assessment in Section 11.5, and are listed in Table 11.9.
- In order to address comments received during scoping consultation, one additional Scheduled Monument in State Care 48. (Church, graveyard and tomb: LDY024:011) which lies outwith the 5 km Study Area will also be included in the assessment. This asset is listed in Table 11.9 and is assessed and discussed in Section 11.5.

Index Number	Scheduled Monument	Approximate Distance and Direction from the Core Study Area
LDY 010:001	Drumachose Church	4.4 km north-west
LDY 010:006	Rath	4.2 km north-west; not within ZTV
LDY 010:007	Cairn and enclosure	2.6 km north-west
LDY 010:011	Rath	1.7 km north-west
LDY 010:014	Sweat house	5.8 km north; not within ZTV
LDY 011:001	Nicholl's Ground, Graveyard and Souterrain	3.3 km north-east
LDY 016:003	Castle (site): O Cahan's Castle	5 km west
LDY 017:001	Large enclosure: Cashel	2.3 km south-east
LDY 017:004	Rath; King's Fort	2.5 km south ; not within ZTV
LDY 017:010	Central court tomb: 'stone circle'	3.6 km south-west
LDY 017:016	Killeen, Possible Souterrain	3.3 km south; not within ZTV
LDY 017:018	Wedge Tomb	2.9 km south; not within ZTV
LDY 017:058	Cairn: The Fairy Bush	650 m west
LDY 024:011	Church, graveyard and tomb	10 km south-west of T4*

*Scheduled Monument in State Care beyond 5 km Study Area included within the assessment as requested by HED

11.4.4.3 Listed Buildings

^{49.} There are 21 Listed Buildings of all categories within the 5 km Study Area; 16 lie within the ZTV. Of these one is Category A, two are Category B+, 15 are Category B, and three are record only. Views towards/across a Listed Building can contribute to its setting, and this may include the presence of turbines even if the asset itself does not lie within the ZTV. As such, all Listed Buildings within the 5 km Study Area have been selected for detailed assessment in Section 11.5 and are listed in Table 11.10.

Table 11.10: Listed Buildings within the 5km Study Area

HB Number	Listed Building Address	Designation	Approximate Distance and Direction from the nearest turbine
HB02/11/002A	Drenagh House Drenagh Estate 17 Dowland Road Fruithill Limavady Co Londonderry	A	5 km west-north-west
HB02/03/008	Dog leap Powerhouse Roe Valley Country Park 43 Dog leap Road Largy Limavady Co Londonderry	В+	5 km west; not within ZTV
HB02/08/009	Carrick Footbridge Carrick East Roe Valley Country Park Limavady Co Londonderry	B+	4.7 km west-south-west;not within ZTV

HB Number	Listed Building Address	Designation	Approximate Distance and Direction from the nearest turbine
HB02/08/004	Church of Ireland Church Ballyquin Road Carrick Limavady Co Londonderry	B1	4.2 km west-south-west
HB02/08/022	Carrickmore House 175 Ballyquin Road Limavady Co Londonderry	B1	4.7 km west-south-west
HB02/11/002 E	Viewing Platform, Drenagh Estate 17 Dowland Road Fruithill Limavady Co Londonderry	B1	4.9 km north
HB02/11/002 G	East lodge (Logan's Lodge), Drenagh Demesne 38 Broad Road Limavady Co Londonderry	B1	4.7 km north-west
HB02/03/009	Largy Bridge Dog leap Road Ballykelly Co Londonderry	B2	4.9 km west; not within ZTV
HB02/03/014 B	South Watch Tower Roe Green Roe Valley Country Park Largy Limavady Co Londonderry	B2	4.5 km west; not within ZTV
HB02/03/015	Weaving Shed Museum Roe Valley Country Park Dogleap Road Largy Limavady Co Londonderry	B2	4.9 km west
HB02/08/003	Cenotaph Ballyquin Road Limavady Co Londonderry	B2	4.2 km south-west
HB02/08/010	21 Lislane Road Gortnarney Limavady Co Londonderry	B2	530 m south-west
HB02/11/002 B	Drenagh Estate Coach house 17 Dowland Road Fruithill Limavady Co Londonderry	B2	5 km west-north-west
HB02/11/002 C	Drenagh Estate Gardener's House & Barn 17 Dowland Road Fruithill	B2	5 km west-north-west

HB Number	Listed Building Address	Designation	Approximate Distance and Direction from the nearest turbine
	Limavady Co Londonderry		
HB02/11/002 I	Gamekeeper's House (The Pheasantry) Drenagh Demesne 66 Broad Road Limavady Co Londonderry	B2	4.3 km north-west
HB02/11/020	77 Bolea Road Bolea Limavady Co Londonderry	B2	4.5 km north-west
HB03/04/010	St Mary's Roman Catholic Church Boleran Coleraine Co. Londonderry	B2	5 km east; not within ZTV
HB03/04/025	21 Boleran Park Garvagh Coleraine Co. Londonderry	B2	4.7 km east
HB02/08/001	St Matthew's R C Church 300 Drumsurn Road Limavady Co Londonderry	Record Only	3 km south-south-west
HB02/08/007	St Canice's C of I Church Balteagh Parish Drumsurn Road Limavady Co Londonderry	Record Only	2.3 km west
HB02/11/005	Appletree House 31 Drumsurn Road Limavady Co Londonderry	Record Only	4.5 km north-northwest

11.5 Assessment of Potential Effects

11.5.1 Potential Decommissioning/Construction Effects

11.5.1.1 Direct Effects

Within the Core Study Area, there are 14 undesignated cultural heritage assets, as shown in Figure 11.1. These consist of crop marks and agricultural buildings, primarily from the post-medieval period. The access track as part of the Development has the potential to directly affect a possible cropmark site (DBA reference 13) which is recorded but consists of no surface remains. As an undesignated asset of low sensitivity and a very high magnitude of change this effect is assessed as Major, which is significant in terms of the EIA regulations. Appropriate mitigation is proposed in Section 11.6. All other infrastructure in the Development has avoided known heritage features, including those identified in the Desk-Based Assessment presented in Technical Appendix 11.1. The additional 13 cultural heritage assets are of low sensitivity with no change, and the effect is assessed as negligible which is not significant in terms of EIA Regulations.

There is low potential for further unknown archaeological remains to be situated within the Core Study Area. Any such 51. remains, if present, are likely to relate to past pastoral and transhumance use of the land and of low sensitivity. Due to the relatively limited footprint of the Development, with focus on the utilisation of existing infrastructure linked to the Operational Rigged Hill Windfarm, the likelihood of damage of unknown subsurface archaeological remains is limited.

- Whilst archaeological potential for extant subsurface remains to survive is low, potential direct effects upon unknown and unrecorded archaeological features as a result of activity undertaken during the decommissioning/construction phases of the Development would result in the permanent damage or destruction of the feature, effects of high magnitude on assets of low sensitivity. The potential effect is therefore assessed as minor and not significant in terms of the EIA Regulations.
- If necessary, any limited direct effect resulting from the Development can be further mitigated by the implementation of a 53 programme of archaeological evaluation, likely to consist of a targeted watching brief in undisturbed portions of the Site, leading to preservation by record.

11.5.1.2 Indirect Effects

Indirect visual effects are considered likely during the initial decommissioning of the Operational Rigged Hill Windfarm, and 54. construction phases of the Development (see Chapter 3: Development Description for further details). They will occur in the form of the visual appearance of cranes during turbine dismantling and erection and associated traffic activities. These effects are short term and will cease once the Development has been constructed. These effects are similar in nature to the indirect effects likely to occur during the operational phase of the Development. Indirect effects on the settings of cultural heritage features resultant from the operational phase are discussed fully in Section 11.5.2.2 below.

11.5.2 Potential Operational Phase Effects 11.5.2.1 Direct Effects

As discussed in Section 11.5.1.1, any direct effects will be on heritage assets of low sensitivity and therefore the effect is 55 assessed as Minor which is not significant in term of EIA Regulations. Any effects will be mitigated during the decommissioning of the Operational Rigged Hill Windfarm and construction phase of the Development, if necessary. It is therefore anticipated that no further direct effects will occur on the archaeological record during the operational phase of the Development.

11.5.2.2 Indirect Effects

The assessment of indirect effects has considered designated and regionally significant cultural heritage assets within the 5 km Study Area, and any additional heritage assets highlighted during consultation which fall outwith the 5 km Study Area. Where appropriate these have been assessed in groups.

11.5.2.2.1 Historic Parks, Gardens and Demesnes within 5 km Study Area

57. Within the 5 km Study Area there is one Historic Demesne, Drenagh (L-006), which lies 5.4 km north-west of T7, and two supplementary historic parks and gardens, Roe Valley Park (L-002) and Dog Leap (L041), both which lie 7 km west of T6.

L-006 Drenagh

- Drenagh (L-006) is a historic demesne 5.4 km north-west of T7, as shown in Figure 11.2. The designated boundary surrounds 58. the Drenagh estate and includes one Scheduled Monument; Drumachose Church (LDY 010:001) and six Listed Buildings including Drenagh House a grade A listed 19th century historic house (HB02/11/002 A), two grade B listed coach houses (HB02/11/002 B and HB02/11/002 C), a grade B listed viewing platform (HB02/11/002 E), a grade B listed lodge (HB02/11/002 G), and a grade B listed gamekeepers house (HB02/11/002 I), all of which are assessed in Section 11.5.2.2.3). The demesne consists of historic 18th century woodland in the south of the estate and terraced gardens and fields to the north which encompasses the surviving historical landscape features of Drenagh. Long distance views from within the estate are largely restricted by the woodland and trees along the field boundaries within the estate, with some open long distance views to the south.
- The setting of this demesne does not extend beyond the designation boundary though the immediately adjacent agricultural 59. fields retain some elements of historic rural land use. Drenagh House, the designed gardens and woodland to the south, and agricultural fields to the north provides the understanding and context for the historic importance of the demesne and its distinctive character as a country estate. Key views are insular and between elements of the demesne with long distance views largely unavailable and not contributing to the cultural significance. As the Development lies outwith this setting, over 5 km to the south-east, the understanding and character of Drenagh estate is not affected, and as such there is no change to the setting of this heritage asset as a result of the Development.
- The wider landscape context contributes to the experience and enjoyment of this Historic Demesne and is provided by the 60. surrounding agricultural fields. The Development lies beyond this in a separate upland landscape context which is

characterised by wind turbines. This includes the existing Operational Rigged Hill Wind Farm, 3.8 km to the south-east; and Dunbeg Windfarm and Dunmore Wind Farm, both approximately 5 km to the north-east. These wind farms, including the Development, maybe visible in available long distance views when looking east. Additionally, there are two small scale turbines (34 Terrydoo Road) 4.7 km to the south-east. As the Development would replace the Operational Scheme, there would be a slight change consisting of a small increase in the scale of turbines visible above a ridgeline in views to the southeast, which lies in a distant landscape context that does not majorly contribute to the experience or appreciation of this Historic Demesne. This slight change combined with the high turbine presence within the wider landscape context will result in negligible change.

As a Historic Demesne of high sensitivity with no change to its setting and a negligible change to the landscape context there 61. is a minor effect on this Historic Demesne as a result of the Development. This is assessed as not significant in EIA Regulations.

L-002 Roe Valley Park

- 62. Roe Valley Park (L-002) is a supplementary Historic Demesne located within the Roe Valley Country Park south of Limavady and 7 km west of T6, as shown in Figure 11.2. The designated boundary for Roe Valley Park includes the O'Cahan's Castle (LDY 016:003) and two Listed Buildings including a grade B listed powerhouse (HB/02/03/008), and a grade B listed Bridge over River Roe (HB02/03/0009), which are assessed in Section 11.5.2.2.3. This park is comprised of historic deciduous woodland which surrounds the steep banks of the River Roe. Key views are focused along the river and the exposed rocks of Dog's Leap which are located within the southern part of the Historic Demesne. The River Roe provides understanding and historical context for the heritage assets which lie within the park.
- The setting is limited beyond the designated boundary due to focus along the River Roe and the surrounding steep banks and 63. woodland which creates a sense of enclosure that is distinct from the surrounding open, agricultural rural landscape. The Development is located over 7 km to the east and would largely be screened from within the designation by the historic woodland. At over 7 km away the Development would not affect the understanding and distinctive character for Roe Valley Park. As such, the Development will have **no effect** in on Roe Valley Park or its setting.

L-041 Dog Leap

- Dog Leap (L-041) is a supplementary historic garden which lies adjacent to Roe Valley Park (L-002) and encompassed the 64. gardens of Dog Leap House. This heritage asset lies 7 km to the west of T6, as shown in Figure 11.2. The setting of this historic garden is the surrounding woodland and the agricultural fields which lie to the north-east.
- The importance of this asset is defined by its designation boundary as it preserves the key relationship between Dog Leap 65. House and the gardens. The immediately adjacent agricultural fields to the north, contribute to the setting of the house and provide the historical rural character of the surrounding landscape. Roe Valley Park, to the south, provides a contrasting wooded landscape that leads to the lower elevations of River Roe. The Development is located over 7 km to the east and is not part of the setting that contributes to the understanding and distinctive character of Dog Leap. As such, the Development will have no effect in on Dog Leap or its setting.

11.5.2.2.2 Scheduled Monuments within 5 km Study Area

There are 13 Scheduled Monuments within the 5 km Study Area, eight of which are situated within the ZTV as shown on Figure 11.2. Where appropriate these have been assessed in groups, as detailed in the relevant sections below.

Drumachose Church LDY 010:001

This Scheduled Monument is a ruin of a 13th century church which lies within the Drenagh Estate and lies 6 km to the northwest of T7. This Scheduled Monument lies in the southern part of Drenagh Estate and is surrounded by agricultural fields, with the A37 running to the south, as shown in Figure 11.2.

The setting for this Scheduled Monument is provided by the historic Demesne, as summarised in Section 11.5.2.2.1, which provides the context for understanding the historic distinctive character of this Scheduled Monument. The Development, 6 km to the south-east, lies outwith the setting of this heritage assets and as mention in Section 11.5.2.2.1, there is only a negligible change in the landscape context as a result of the Development.

As a Scheduled Monument of high sensitivity with no change in setting and a change of negligible magnitude to the landscape context, the effect is assessed as minor. This is not significant in EIA Regulations.

Rath LDY 010:006

- This Scheduled Monument (LDY 010:006) is a Rath which consists of a platform set above field level with an eroded perimeter 67. bank. This Rath lies 5.5 km north-west of T7 on low lying ground and is not within the ZTV, as shown in Figure 11.2. Curley River runs to the north of the Scheduled Monument and the A37 to the south.
- The immediate setting of this Scheduled Monument is Curley River to the north and the surrounding agricultural fields. The 68. proximity of the Rath to Curley River indicates good intervisibility from the fort over this watercourse, and this relationship is important to the understanding of the Scheduled Monument and defines its setting. The immediately surrounding agricultural fields provide the enjoyment and experience for the rural setting of the heritage asset. Views from the Scheduled Monument are to the north over Curley River.
- The Development is not located within this setting and would not be visible from the setting as it lies to the south-east, not within the ZTV. The Development will not be visible in any key views to or from the Scheduled Monument, and as such, the Development will result in no effect to the Scheduled Monument.

Cairn and Enclosure LDY 010:007

- This Scheduled Monument (LDY 010:007) is a cairn which consists of a circular perimeter of boulders. This Cairn lies 4 km 70. north-west of T7 on the western slope of Keady Hill with the modern Keady Hill Quarry located immediately to the north-west, as shown in Figure 11.2.
- The setting of this Scheduled Monument is provided by the agricultural fields to the south, which this Scheduled Monument 71. overlooks due to its elevated position. The surrounding agricultural fields provide context for understanding the distinctive historic character of the monument. Views from this Scheduled Monument are to the south, west and east, providing a panoramic view which includes the uplands hills to the east. A large quarry is located immediately to the west of the asset which introduces a modern feature into the immediate setting. The Development is located 4 km to the south-east and would not affect the relationship between the cairn and the surrounding agricultural fields or infringe upon views towards or over the Scheduled Monument which contribute to the understanding of the distinctive character of the cairn. As such, there is no change to its setting.
- 72. over the surrounding agricultural fields. The Development lies beyond this in a separate upland landscape context that is characterised by wind turbines. This includes the existing Operational Rigged Hill Windfarm, 4 km to the south-east; and Dunbeg Windfarm and Dunmore Windfarm, both approximately 4 km to the north. These wind farms, including the Development, will be visible in long distance views when looking east. Additionally, there are two small scale turbines (34 Terrydoo Road) 3 km to the south-east, within the agricultural landscape that surrounds the cairn. As the Development would replace the Operational Rigged Hill Windfarm, there would be a slight change consisting of a small increase in the scale of turbines visible above a ridgeline in views to the south-east, which lies in a distant landscape context that does contribute to the experience or appreciation of this cairn, but at this distance the change would be slight. This slight change combined with the high turbine presence within the wider landscape context will result in negligible change.
- As a Scheduled Monument of high sensitivity with no change to its setting and a negligible magnitude of change to the 73 landscape context, the effect is assessed as negligible which is not significant in terms of the EIA Regulations.

Rath LDY 010:011

- 74. This Scheduled Monument (LDY 010:011) is a Rath which consist of a platform enclosed by a bank and wide outer ditch. This Rath lies 2.7 km north-west of T7 and is surrounded by commercial forestry, as shown in Figure 11.2. The B66 lies to the south of the Scheduled Monument.
- 75. by the modern commercial forestry. The surrounding forestry encompasses this Scheduled Monument and restricts any views

The wider landscape context contributes to the experience and enjoyment of the cairn as there is good views in all directions

The immediate setting of this Scheduled Monument was the surrounding agricultural fields which is currently encroached upon

to and from this Rath. If the forestry were felled views would open over the surrounding agricultural fields, which provide the setting for this Scheduled Monument. The Development is located 2.7 km to the south-east, and is located within an uplands landscape context that is not part of the setting for this Scheduled Monument. As such, the Development does not result in any change to this Scheduled Monument.

- The wider landscape context for this Scheduled Monument is the commercial forestry which restricts views towards the 76 Development. As such, there is no change to the Scheduled Monument, if views were opened up the Development would be visible in views to the south, and would be seen in the context of the existing wind farms and commercial forestry along the upland ridgeline. As the Development is replacing the Operational Rigged Hill Wind Farm, there would be a change in scale resulting in a low magnitude effect.
- As a Scheduled Monument of high sensitivity with no change in setting and a change of low magnitude to the landscape context, the effect is assessed as minor. This is not significant in terms of the EIA Regulations.

Sweat House LDY 010:014

- 78 Sweat House (LDY 010:014) is located on raised ground sloping southwest towards Curley River and dense deciduous woodland, 5.8 km north of T7, and does not lie within the ZTV, as shown in Figure 11.2.
- The setting of this Scheduled Monument is Curley River which runs north of the Sweat House. This provides the context for 79 the understanding of the distinctive historic character. Views are from the Scheduled Monument across the confluence of the river with a small stream, to the north-west. These areas also do not fall within the ZTV.
- The Development is not located within this setting and would not be visible from the Scheduled Monument as it lies to the 80. south, not within the ZTV. The Development will not be visible in any key views to or from the Scheduled Monument and as such, the Development will result in **no effect** on the Scheduled Monument.

Nicholl's Ground LDY 011:001

- Nicholl's Ground (LDY 011:001) is a Christian graveyard which is defined by a sub-rectangular platform 3.7 km north-east of T1, as shown in Figure 11.2. To the north of this Scheduled Monument lies the B66, and to the south is Aghadowey River. The Scheduled Monument is surrounded by grazing pasture with Cam Forest to the south-west.
- The setting of this Scheduled Monument is Aghadowey River to the south and the surrounding pasture and agricultural land 82. which provide an understanding of the historic context and distinctive character of the Scheduled Monument. Key views from the Scheduled Monument are east and west along the Aghadowey River, with views also available to the north and south over the surrounding agricultural fields, farmsteads and Craigmore Road (B66). Views towards Nicholl's Ground graveyard are from the B66 looking south. The Development is located 3.7 km to the south-west and will be visible, the upland hills in which it is located do not contribute to the distinctive historical character of the graveyard. The Development would not affect the relationship between the graveyard, the surrounding agricultural fields, farmsteads and Aghadowey River or infringe upon key views along the river. As such, there is no change to the context for understanding the setting of this Scheduled Monument as such, no change to the setting of Nicholl's Ground.
- The wider landscape context contributes to the experience and enjoyment of Nicholl's Ground and is provided by the rolling agricultural landscape surrounding this Scheduled Monument, and the Development lies within a separate upland landscape context to the south which also contains Cam Forest. This upland landscape currently includes the existing Operational Rigged Hill Wind Farm, 3.7 km to the south-west; and modern forestry operations including Cam Forest 600 m to the southwest and Springwell Forest 200 m to the north. As the Development would replace the operational scheme, and is situated behind the existing commercial forestry there would be a slight change consisting of a small increase in the scale of turbines visible above a ridgeline in views to the south-east, which contribute to the experience or appreciation of Nicholl's Ground. Even if the forestry were to be felled and these views opened up over time, the change in tip height would only result in a slight change to the turbines already visible from this Scheduled Monument. This slight change results in a negligible magnitude of change.
- As a Scheduled Monument of high sensitivity with no change in setting, and a change of negligible magnitude in terms of its wider landscape character, the effect is assessed as negligible which is not significant in terms of the EIA Regulations.

O'Cahan's Castle LDY 016:003

- This Scheduled Monument comprises the ruined foundations of one of O'Cahan castles, destroyed in the 1820s. This 85. Scheduled Monument lies within Roe Valley supplementary Historic Demesne on elevated ground and is surrounded by forestry, as shown in Figure 11.2. This Scheduled Monument lies within the ZTV.
- The setting for this Scheduled Monument is provided by the historic Demesne, as summarised in Section 5.2.2.1, which provides the context for understanding the historic distinctive character of this Scheduled Monument. The Development, 7 km to the east, lies outwith the setting of this heritage assets as mention in Section 5.2.2.1, and as such there is no change to setting. The remains of O'Chan's Castle are surrounded by deciduous woodland which will screen the Development. As mentioned in Section 5.2.2.1 there is only a negligible change in the landscape context as a result of the Development.
- 87. As a Scheduled Monument of high sensitivity with no change in setting and a change of negligible magnitude to the landscape context, the effect is assessed as minor. This is not significant in terms of the EIA Regulations.

Cashel LDY 017:001

- Cashel (LDY 017:001) is a rock outcrop on the edge of Sperrin Plateau 2.7 km south-east of T3, as shown in Figure 11.2. 88 This Scheduled Monument lies on the eastern slope of Donald's Hill with Belraugh Road to the east.
- The setting of this Scheduled Monument is the surrounding agricultural fields to the east which provides understanding of the 89 historic context and distinctive character of the Scheduled Monument. There are open panoramic views to the north and south along Belraugh Road, and to the east, over grazing pasture. Short distance views will also be available to the west, with the Development visible on the ridgeline. The Development lies 2.7 km to the north-west and does not lie within the setting of the Scheduled Monuments. As such, the Development will result in no change to the setting of this Scheduled Monument.
- 90 The wider landscape context contributes to the experience and enjoyment of Cashel and is provided by the rolling agricultural landscape surrounding this Scheduled Monument and the. upland landscape context that is characterised by wind turbines. This includes the existing Operational Rigged Hill Wind Farm, 2.7 km to the north-west; Dunbeg and Dunmore Wind Farms, approximately 9 km to the north-west; and Brockaghboy Wind Farm, approximately 8 km to the south-west; and modern forestry operations including Cam Forest 800 m to the north-west. An additional single turbine, 60 Kilhoyle Road, is visible approximately 3.5 km to the south-west, within the agricultural landscape that surrounds the Scheduled Monument. The Development will be visible in views to the west. The Development replaces the Operational Scheme and lies behind the existing commercial forestry at Cam Forest. If the forestry were to be felled and these views opened up over time, the change in tip height would result in a minor change to the turbines already visible from this Scheduled Monument. This slight change combined with the high turbine presence within the wider landscape context will result in minor change.
- As a Scheduled Monument of high sensitivity with no change in setting and a change of minor magnitude in landscape 91. character, the effect is assessed as minor which is not significant in terms of the EIA Regulations.

King's Fort LDY 017:004, Killeen LDY 017:016, and Wedge Tomb LDY 017:018

- Kings Fort (LDY 017:004) is a Rath 2.7 km south of T4, Killeen (LDY 017:016) is a burial ground 3.6 km south of T4, and Wedge Tomb (LDY 017:018) is a tomb 3.2 km south of T4, as shown in Figure 11.2. None of these Scheduled Monuments lie in the ZTV.
- The setting of these Scheduled Monuments is the surrounding agricultural fields which consist primarily of grazing pasture and which provide rural setting and context for understanding the historic context and distinctive character of the Scheduled Monuments. Views from these monuments are over the surrounding agricultural landscape and along the small Burn that runs to the south of Drumsurn. Views over these Scheduled Monuments are from Kilhoyle Road, Gortnarney Road and the B64 to the south. The Development is not visible from any of these Scheduled Monuments or views across them and as such, there is no change to the setting of these heritage assets.
- The wider landscape context contributes to the enjoyment and experience of these Scheduled Monuments is provided by 94. Donald's Hill, to the north and the surrounding agricultural fields. There are two single turbines within close proximity to these Scheduled Monuments; 28 Betts Road, to the west, and 60 Kilhoyle Road to the west.

The Development is not visible from these Scheduled Monuments or from the immediate surrounding landscape context and views across the monuments and as such, there is no effect to these Scheduled Monuments

Central Court Tomb LDY 017:010

- Central Court Tomb (LDY 017:010) is a Scheduled Monument which resembles a central court cairn, consisting of a central 96 irregular oval with opposing single chambers. This tomb is located 5 km south-west of T4, as shown in Figure 11.2. There are good views in all directions.
- The setting of this Scheduled Monument is the immediate surrounding rolling agricultural landscape, and expansive views to 97. the north, south, east and west, which provides an understanding of the historic significance and distinctive character of Central Court Tomb. The Development, 5 km to the north-east, is not within this setting and as such, there is no change to the setting of this Scheduled Monument.
- The wider landscape context contributes to the experience and enjoyment of Central Court Tomb, provided by the rolling agricultural landscape surrounding this Scheduled Monument. The Development lies beyond this in a separate upland landscape context that is characterised by wind turbines and will be visible in views to the east. This includes the existing Operational Rigged Hill Wind Farm, 5 km to the north-east; Dunbeg and Dunmore Wind Farms, approximately 10 to the north; and Altahullion I and II, and Glenconway Wind Farms, approximately 8 km to the south-west. There are also additional single turbines which include: 34 Terrydoo Road, 6 km to the north-west; 28 Betts Road, 1 km to the east; and 60 Kilhoyle Road, 5 km to the east, which lie within the agricultural landscape that surrounds the Scheduled Monument. As the Development would replace the Operational Scheme, there would be a change consisting of an increase in the scale of turbines visible above a ridgeline in views to the north-west, which lies in a distinct landscape context that does not majorly contribute to the experience or appreciation of this tomb. This slight change combined with the high turbine presence within the wider landscape context will result in negligible change.
- As a Scheduled Monument of high sensitivity with a negligible magnitude of change, the effect is assessed as negligible which is not significant in terms of the EIA Regulations.

The Fairy Bush Cairn LDY 017:058

- The Fairy Bush Cairn (LDY 017:058) is a Scheduled Monument which consists of two cairns on the north facing slope of Tassey's Hill. These cairns are located 2.7 km west of T6, as shown in Figure 11.2. There are good views in all directions.
- The setting of this Scheduled Monument is the immediately surrounding rolling agricultural landscape and views to the north, 101. east and west, which provides an understanding of the historic significance and distinctive character of the cairn. The Development, 2.7 km to the east, is located on the upland ridgeline and is not within this agricultural setting and as such, there is no change to the setting of this Scheduled Monument.
- The wider landscape context contributes to the experience and enjoyment of Fairy Bush Cairn is provided by the rolling agricultural landscape surrounding this Scheduled Monument. The Development lies beyond this, in a separate upland landscape context that is characterised by wind turbines and will be in views to the east. This includes the existing Operational Rigged Hill Wind Farm, 2.7 km to the east, and numerous small scale turbines including: 34 Terrydoo Road, 2.5 km to the north-west; 28 Betts Road, 3.3 km to the south-west; and 60 Kilhoyle Road, 4.5 km to the south-east, within the agricultural landscape that surrounds the Scheduled Monument. As the Development would replace the Operational Scheme, there would be a change in the scale of turbines visible in views to the east, which results in a minor change to the experience and enjoyment of this Scheduled Monument within its wider landscape. This minor change combined with the high turbine presence within the wider landscape context will result in a minor magnitude of change.

As a Scheduled Monument of high sensitivity with a minor magnitude of change in setting, the effect is assessed as negligible which is not significant in terms of the EIA Regulations.

11.5.2.2.3 Scheduled Monuments in State Care outwith 5 km Study Area

There is one Scheduled Monument in State Care outwith the initial 5 km assessment area. This has been included in the assessment of indirect effects on request of the Historic Environment Division of Department for Communities.

Church, Graveyard and Tomb LDY 024:011

- 103. This Scheduled Monument (LDY 024:011) is a post-medieval church, graveyard and tomb which has been afforded State Care protection. This Scheduled Monument lies 10 km south-west of T4 on raised ground overlooking Bovevagh River to the north, as shown in Figure 11.2. The setting of this Scheduled Monument is Bovevagh River, the banks of which are surrounded by trees, and the agricultural fields to the south, both which provide the context for understanding the historic context and distinctive character of the church, graveyard and tomb. Views are north over the river towards grazing pasture. Key views from the Development are over Bovevagh River and the convergence of a smaller watercourse. The Development, lies 10 km to the south-west, and is screened from this Scheduled Monument screened by the trees on the river bank. The Development, does not lie within the setting and as such, does not change the setting of this Scheduled Monument.
- The wider landscape context, which provides the enjoyment and experience of the Scheduled Monument is provided by the surrounding agricultural landscape. The Development lies beyond this in a separate upland landscape context, 10 km to the north-east and is screened by trees from this Scheduled Monument. There may be glimpsed views towards the Development, in long distance views. The Development will replace the existing Operational Rigged Hill Windfarm and will result in an increase in scale. At 10 km away this increase in scale would result in a slight change of negligible magnitude.
- 105. As a Scheduled Monument of high sensitivity with no change in setting and a negligible change to its wider landscape context, the change is assessed as negligible. This is not significant in terms of EIA Regulations.

11.5.2.2.4 Listed Buildings within 5 km Study Area South Watch Tower HB02/03/014 B

- South Watch Tower (HB02/03/014 B) is a B2 listed watch tower is located 6.6 km west of T6, as shown in Figure 11.2. This 106. Listed Building is located in the un-designated section of the Roe Valley Country Park, west of the River Roe. This Listed Building does not lie with the ZTV of the Development.
- the grazing pastures to the north and west, both of which aid to the understanding and distinctive character of the watch tower. Views are east towards the River Roe and north over grazing pasture. The Development is screened from this Listed Building by the woodland along the River Roe and does not lie in the ZTV, and as such has no effect on the setting of this Listed Building.
- The wider landscape context contributes to the enjoyment and experience of this Listed Building and is provided by the agricultural fields to the west and the woodland surrounding the River Roe to the east. The Development is screened by the woodland and as such, would pose no change to the landscape context.
- 109. As a B Listed Building of low sensitivity with no change in setting or landscape context, there is no effect on the Listed Building.

Weaving Shed Museum HB02/03/015

- **11.2**. This Listed Building lies in the un-designated portion of the Roe Valley Country Park, west of the River Roe.
- 111 the understanding and distinctive character of the museum building. Views are east towards the River Roe, over grazing pasture, the river bank is lined with woodland which restricts any distant views to the east towards the Development. The Development, 7 km to the east, does not lie within this setting or any views and as such, will have no effect on the setting of this Listed Building.
- The wider landscape context contributes to the enjoyment and experience of this Listed Building and is provided by the agricultural fields to the west and the woodland surrounding the River Roe to the east. The Development is screened by the woodland and as such, would pose no change to the landscape context.

The setting of this heritage asset is the woodland to the east and south which provides screening towards the River Roe and

This weaving Shed Museum (HB02/03/015) is a B2 listed museum building is located 7 km west of T6, as shown in Figure

The setting of this heritage asset is the grazing pastures which surround the Listed Building and contributes to the context for

113. As a B2 Listed Building of low sensitivity with a no change in setting or on its landscape context, there is **no effect** to this Listed Building.

St Matthew's Roman Catholic Church HB02/08/001

- 114. St Matthew's Roman Catholic Church (HB02/08/001) is a record only listed church 3.7 km south-south-west of T4, as shown in Figure 11.2. This church is located on the south-eastern edge of the village of Drumsurn.
- 115. The village of Drumsurn and the surrounding agricultural fields provides the setting, and context for understanding this asset, and its distinctive character. Views from the church are north over surrounding fields, and west and east along Drumsurn Road. The Development, lies 3.7 km to the north-north-east, is part of an upland ridgeline and does not lie within the setting of this Listed Building. As such, it will have no effect on the setting of this Listed Building.
- 116. The wider landscape context contributes to the experience and enjoyment of St Matthew's Roman Catholic Church and is provided by the surrounding agricultural landscape. The Development lies beyond this in a separate upland landscape context that is characterised by wind turbines and will be visible in views to the north, behind forestry, which lies between the Listed Building and the Development. The Development, which replaces the existing Operational Rigged Hill Windfarm will be visible and the increase in scale which result in a minor change to the wider landscape setting of this Listed Building
- As a record only Listed Building, of low sensitivity with no change in setting and a minor change to the wider landscape context, the effect is assessed as negligible, which is not significant in terms of EIA Regulations.

Cenotaph HB02/08/003

- 118. This B2 listed Cenotaph (HB02/08/003) is located 5.9 km south-west of T4, as shown in Figure 11.2. This heritage asset has an elevated view over the surrounding agricultural fields which surrounds its immediate setting. The expansive views to the north, south, east and west across rolling agricultural landscape contribute to the setting, adding to the understanding and distinctive character of this Cenotaph. The Development, is located on a distant upland ridgeline 5.9 km to the north-east, does not lie within this setting and as such, will have no change to the setting of this Listed Building.
- 119. The wider landscape context contributes to the experience and enjoyment of Cenotaph, provided by the surrounding agricultural landscape and the surrounding upland landscape context, that is currently characterised by wind turbines and will be visible in long distance views to the south, east, and west. The Development, which replaces the existing Operational Rigged Hill Windfarm, will be visible in views to the east, and the increase in scale will result in a minor change to the wider landscape context of this Listed Building and as such, twill have a slight impact on the experience and enjoyment of this Listed Building as part of its wider landscape. This results in a change of minor magnitude.
- As a B2 Listed Building of Medium sensitivity with no change in setting, and a medium change in its wider landscape context, 120. the effect is assed as minor which is not significant t in terms of EIA Regulations.

Church of Ireland Church HB02/08/004, Carrick Footbridge HB02/08/009, and Carrickmore House HB02/08/022

121. Church of Ireland Church (HB02/08/004) is a B1 listed church, Carrick Footbridge (HB02/08/009) is a B+ listed footbridge and Carrickmore House (HB02/08/022) is a B1 listed house, all located approximately 6.8 km west-south-west of T4, as shown in Figure 11.2. These Listed Buildings lie within 100m of each other with the River Roe to the 50 m south-west of HB02/08/004 and HB02/08/022.

The setting of these Listed Buildings is the River Roe, the woodland to the south and south-west, and the agricultural grazing pastures to the north, which provide the context for appreciating the distinctive historical context of these Listed Buildings. These Listed Buildings lie within an incised nature of the valley which substantially reduce any visibility and concentrates views along the River Roe. Views from the Listed Buildings are to the south towards the river and are restricted by the woodland surrounding the River Roe. The Carrick Footbridge (HB02/08/009) does not lie within the ZTV and the Development will not be visible in views across the listed bridge due to the steep banks up to Carrickmore House which restrict views towards the Development. As such, the Development will result in no change in the setting of this Listed Building. The Development, 6.8 km to the east, lies outwith the setting for the Church of Ireland Church (HB02/08/004) and Carrickmore House (HB02/08/022), and as such will result in no change to the setting of the Listed Buildings.

- ¹²² The wider landscape context contributes to the experience and enjoyment of these Listed Buildings and is provided by the surrounding rural agricultural landscape, visible in views to the west. The Development is screened by the woodland and as such, would pose no change to the landscape context.
- As Listed Buildings of medium and low sensitivity with no change in the setting or landscape context, there is no effect on these Listed Buildinas.

St Canice's Church of Ireland Church HB02/08/007

- 124. St Canice's Church of Ireland Church (HB02/08/007) is a record listed church located 4.2 km west of T6, as shown in Figure 11.2. This church lies on the crossroads of Drumsurn Road and Ballyavelin Road and is surrounded by agricultural fields and farm buildings which provides the setting, and context for understanding the distinctive character of the Listed Building. Views are south-west over fields and north-east towards the small hillock directly behind the church. The Development, 4.2 km to the east, is located on the upland ridgeline to the east and lies out of the setting of the Listed Building and as such, will constitute no change to the setting of this Listed Building.
- 125. The wider landscape context contributes to the experience and enjoyment of St Canice's Church of Ireland Church and is provided by the surrounding agricultural landscape and the upland ridgeline to the east which is currently characterised by wind turbines and will be visible in views to the east. The Development, which replaces the existing Operational Rigged Hill Windfarm will be visible in these views to the east, and the increase in scale will result in a minor change to the wider landscape context of this Listed Building and as such, the ability to experience and enjoy this listed Building as part of the wider landscape. This results in a change of minor magnitude.
- As a record only Listed Building of low sensitivity with no change in setting and a medium change in the wider landscape 126. context, the effect is assed as negligible which is not significant t in terms of EIA Regulations.

21 Lislane Road HB02/08/010

- is the surrounding agricultural fields to the west and the upland hills to the east which provides context for understanding the distinctive character of this Listed Building. Views from the front of the house are over the fields to the west and views from the back of the house are towards the upland ridgeline and the Development. The Development is located 2 km to the north-east of the Listed Building and does not form part of its setting.
- The wider landscape which provides the context for experiencing this Listed Building and is provided by the surrounding 128 agricultural landscape and the upland ridgeline to the east which is currently characterised by wind turbines and will be visible in views to the east. The Development, which replaces the existing Operational Rigged Hill Windfarm will be visible in these views to the east, and the increase in scale will result in a minor change to the wider landscape context of this Listed Building and as such, the ability to experience and enjoy this listed Building as part of the wider landscape.

As a B2 Listed Building of medium sensitivity with no change to setting and a minor change to the wider landscape context, there will be a minor change as result of the Development. This is assessed as not significant in terms of EIA Regulations.

Listed Buildings with Drenagh Estate (HB02/11/002 A, HB02/11/002 B, HB02/11/002 C, HB02/11/002 E, HB02/11/002 G, and HB02/11/002 I)

Drenagh House a grade A listed 19th century historic house (HB02/11/002 A), a grade B listed coach house (HB02/11/002 B), a grade B listed coach house (HB02/11/002 C), a grade B listed viewing platform (HB02/11/002 E), a grade B listed lodge (HB02/11/002 G), and a grade B listed gamekeepers house (HB02/11/002 I), all of which are assessed are located within Drenagh Historic Demesne in Section 11.5.2.2.1). This designated estate defines the setting for these Listed Buildings, and provides the context for understanding the distinctive character of the Listed Buildings. The Development, 6 km to the southeast, lies outwith the setting of these heritage assets and as discussed in Section 5.2.2.1, there is a negligible change in the landscape context as a result of the Development due to the insular setting of these assets and limited views towards the Development.

21 Lislane Road (HB02/08/010) is a B2 listed house is located 2.1 km south-west of T4, as shown in Figure 11.2. The setting

As Listed Buildings of high to medium sensitivity with no change in setting and a change of negligible magnitude to the landscape context, the effect is assessed as minor. This is not significant in EIA Regulations.

Appletree House HB02/11/005

- 129. Appletree House (HB02/11/005) is a listed house of Record only grading. This Listed Building is located 6.2 km north-west of T7 and lies along Drumsurn Road, as shown in Figure 11.2. This heritage asset has agricultural fields to the north and west which provide the setting and context for understanding the historic character of the house. Drumsurn Road running north of the Listed Building is lined with trees and as such, key views are limited to the south and east. The Development, 6.2 km south-east, lies beyond the setting and won't be visible from the house due to screening. As such, this results in no effect on the understanding of Appletree House.
- The wider landscape context contributes to the experience and enjoyment of Appletree House and this is provided by the surrounding agricultural landscape. The Development lies beyond this in a separate upland landscape context that is characterised by wind turbines and will be visible in distant views to the east. As such, there will be no change to the experience or enjoyment of this Listed Building. The Development results in no effect on this Listed Building or its wider landscape setting.

77 Bolea Road HB02/11/020

- 131. 77 Bolea Road (HB02/11/020) is a B2 listed house 6 km north-west of T7, and is not within the ZTV, as shown in Figure 11.2. The setting of this Listed Building is the surrounding agricultural fields, Curley River and Keady Hill to the south which provides the understanding and distinctive character of 77 Bolea Road. This Listed Building does not lie within the ZTV and as such, the Development will not be visible and will not change the setting of this Listed Building.
- The wider landscape context contributes to the experience and enjoyment of 77 Bolea Road and is provided by the 132. surrounding agricultural landscape. The Development lies beyond this in a separate upland landscape context that is does not lie within the ZTV. As such, the Development results in no effects on this Listed Building or its wider landscape setting.
- St. Mary's Roman Catholic Church HB03/04/010
- St. Mary's Roman Catholic Church (HB03/04/010) is a B2 listed church 5.2 km east of T3 and does not lie within the ZTV, as shown in Figure 11.2. This Listed Building lies on the edge of Boleran Village with Boleran Park Road to the east. The setting of this Listed Building is the surrounding agricultural fields and Boleran Village to the west, which contributes to the understanding and appreciation of this listed Church. Views are to the east and south over the village and west over the surrounding agricultural fields.
- This Listed Building and its setting do not lie within the ZTV and as such the Development will result in no effect on this Listed 135. Building or its setting.
- 21 Boleran Park HB03/04/025
- 137. 21 Boleran Park (HB03/04/025) is a B2 listed house 4.9 km east of T3, as shown in Figure 11.2. This Listed Building lies on the edge of Boleran Village with Boleran Park Road to the east. The setting of this Listed Building is the village of Boleran which aids the understanding and the distinctive character for this Listed Building. Views are north and south along Boleran Park Road, and to the west over fields. The Development, 4.9 km to the west, will not lie within the setting of 21 Boleran Park and as such, result in no change to the understanding of this Listed Building.
- The wider landscape context contributes to the experience and enjoyment of 21 Boleran Park and is provided by the surrounding agricultural landscape. The Development lies beyond this in a separate upland landscape context that is characterised by wind turbines and will be visible in long distance views to the west. As such, there will be no change to the experience or enjoyment of this Listed Building. The Development results in no effect on the listed building or its wider landscape context.

11.5.3 Potential Decommissioning Effects

Decommissioning of the windfarm will involve similar processes to the construction activities, but involve the dismantling and removal of all the above ground infrastructure of the Development, as mentioned in Chapter 3: Development Description. The decommissioning and construction phases have been treated in tandem, as mentioned in Section 11.1 As no direct effects upon any known features of cultural heritage interest are anticipated during construction, no direct effects are likely from the decommissioning phase of the Development. Subsequently, there will be no permanent indirect effects of the Development on features of cultural heritage interest after this phase. Any effects arising from these phases are therefore considered to be not significant in terms of the EIA Regulations.

11.6 Mitigation and Residual Effects

- Mitigation is recommended for the cropmark site (LDY017:030) during construction of the access track. Mitigation is proposed 140. in terms of a watching brief during construction to ensure that if this cropmark site is present it can be recorded and documented ensuring preservation by record. No further mitigation is required for known archaeology.
- The potential for unknown archaeological remains within the Core Study Area, and Development footprint is low. If direct effects were to occur, the effects would be of a potentially very large magnitude (damage or complete destruction). The Development has the potential therefore to cause an effect of large to very large magnitude on an asset of low sensitivity. The potential effect is therefore assessed as ranging from minor to moderate, and potentially significant in terms of the EIA Regulations.
- ¹⁴² Further mitigation to minimise the potential direct effects of the Development would comprise implementation of a programme of archaeological evaluation, likely to consist of a targeted watching brief in the undisturbed portions of the Development footprint, leading to preservation by record.
- 143. Indirect effects on heritage features are assessed in Section 11.5 as being of minor and negligible effects, and therefore not significant in terms of the EIA Regulations.

11.7 Cumulative Effect Assessment

This assessment considers the potential for significant cumulative effects to occur on the setting of cultural heritage features. This potential may arise from the addition of the Development to a landscape which includes other wind turbine developments which are under construction, consented or subject to a valid planning application.

11.7.1 Cumulative Baseline Description

- The Development would replace the existing Operational Rigged Hill Windfarm which sits within a landscape characterised by operational wind turbines along a north/south ridgeline. This includes:
 - Dunmore and Dunbeg wind farms lie to the north, 6.7 km and 5.6 km respectively;
 - Brockaghboy Windfarm 9.5 km to the south-east;
 - Single Turbine 28 Betts Road, 3.3 km to the south-west;
 - Single Turbine 60 Kilhoyle Road, 2.6 km to the south-east; •
 - Single Turbine 61 Ballyavelin Road, 2.5 km to the west; ٠
 - Single Turbine at 7 Belraugh Road, 5.5 km to the northwest; and
 - 34 Terrydoo Road, a two turbine operational scheme, adjacent to the Site on the northern boundary.
- These operational wind turbines and windfarms are shown on Figure 6.12. 146.
- 147. The Development, consisting of taller but fewer turbines than the Operational Rigged Hill Wind Farm, would be located in an area that is currently characterised by operational turbines, as shown in Figure 6.12, so that whilst the Development will be more prominent on the ridgeline, the effect on the cumulative baseline is minor as shown in landscape VPs (Figures 6.30c, 6.31c. 6.37c, and 6.41c). Due to the upland hill context in which the Development is sited being characterised by turbines in long distance views beyond 5 km, the likelihood of significant cumulative effects upon heritage assets is limited to those that fall within close proximity to the Development. As such a 5 km Study Area, has been utilised to assess single turbines, with a 10 km Study Area identified to assess wind farms.

11.7.2 Consented Single Turbines within 5 km Study Area

11.7.2.1 Single turbines to the east of the Site

There are three consented single turbines to the east of the Development. These include:

- 121 Craigmore, 4.5 km north-east of T1; ٠
- 146 Craigmore, 3.3 km north-east of T1; and •
- 25 Belraugh Road, 4.1 km east of T1.
- These are located at elevations of 200 m AOD along the lower eastern slope of the north/south ridgeline, as shown in Figure 6.12
- The addition of these consented turbines to the baseline will result in an increased turbine presence to the north-east of the 149. Development, throughout the foothills of the ridgeline which contains existing operational windfarms, as shown in Figure 6.12. The scale of these single turbines is such that they do not extend above the ridgeline, as shown in the cumulative wirelines from VP14 (Figure 6.41c) and VP15 (Figure 6.42c). As such, the potential for significant effects upon heritage assets as a result of the Development and the consented turbines, is restricted to those that lie between the Development and a consented turbine, i.e. on the slopes below the Development and above the lower elevations where the single turbines are sited.
- There are no designated assets in between 146 Craigmore, or 25 Belraugh Road and the Development. As such, there are no significant cumulative effects as a result of the addition of the Development to a baseline which includes these consented turbines. No cumulative effect to heritage assets.
- There is one Scheduled Monument: LDY 010:001, a graveyard, which lies along the B66 with 121 Craigmore Road to the north of the Scheduled Monument and the Development to the south, as shown on Figure 10.3. As such, there is the potential for turbines to be visible in two directions from this Scheduled Monument. As the Development is replacing the existing Operational Rigged Hill Wind Farm, turbines are already visible in both directions from this Scheduled Monument, and as such the addition of the Development to this baseline will not give rise to a cumulative effect on this heritage asset. This Scheduled Monument is also surrounded by commercial forestry, as shown on Figure 10.3, with Cam Forest 400 m to the south and Springwell Forest 250 m to the north. The consented single turbine 121 Craigmore Road and the Development are located behind these areas of commercial forestry, north and south respectively, as such the Scheduled Monument is already surrounded by modern developments including the commercial forestry and windfarms. Additionally, the Development is replacing the existing operational Rigged Hill Wind Farm, and as such, the addition of the Development to a baseline which contains the above mentioned consented single turbines will only result in a slight change of cumulative effect. As such, the cumulative effect heritage assets are minor which is assessed as not significant in terms of the EIA regulations.

11.7.2.2 Single turbines to the north of the Site

There are three consented single turbines to the north and east of the Development. These include:

- Cam Quarry, 4.3 km north-east;
- Dunbeg Quarry, 5 km to the north; and
- 84 Ringsend Road, 2.7 km to the north-west.
- These are located at elevations below 250 m AOD on the slopes of the north/south ridgeline, as shown in Figure 6.12.
- The addition of these consented turbines to the baseline will result in a slight increase in turbine presence to the north, 154 throughout the foothills of the ridgeline which contains numerous existing operational windfarms, as shown in Figure 6.12. The scale of these single turbines is such that they do not extend significantly above the ridgeline, as shown in the cumulative wirelines from VP14 (Figure 6.41c) and VP15 (Figure 6.42c). As such, the potential for significant effects upon heritage assets as a result of the Development and the consented turbines, is restricted to those that lie between the Development and a consented turbine, i.e. on the slopes below the Development and above the lower elevations where the single turbines are sited.
- There are no designated assets in between Cam Quarry or 84 Ringsend Road and the Development. A scheduled Rath (LDY 155. 010:011) is located between Dunbeg Quarry and the Development. As such, there is the potential for turbines to be visible in two directions from this Scheduled Monument. As the Development is replacing the existing Operational Rigged Hill Wind

Farm, turbines are already visible in two directions from this Rath, and as such the additional of the Development to the baseline will not create a cumulative effect for this heritage asset that does not already exist.

The addition of the Development to a baseline which contains Cam Quarry and 84 Ringsend Road results in no cumulative 156 effect. The addition of the Development to a baseline containing Dunbeg Quarry will only result in a slight change of cumulative effect, due to the enhanced scale of the proposed turbines. As such, the cumulative effect heritage assets are negligible which is assessed as not significant in terms of the EIA report.

11.7.2.3 Single turbines to the south-west of the Site

- There are four consented single turbines to the south-west of the Development. These include:
 - 37 Termain Road, 300 m south of the Development;
 - 16 Cloghan Road, 2.7 km south-west of the Development;
 - 26 Mill Road, 4.4 km south-west of the Development; and
 - 31 Drumhappy Road, 4.3 km south-west of the Development.
- These are located at elevations below 200 m AOD, with the exception of 27 Termain Road with lies at 300 m AOD. 158.
- The addition of these consented turbines to the baseline will result in an increase in turbine presence to the south-west of the Site. 37 Termian Road is for a single turbine of 58.5 m to tip, 16 Cloghan Road is a is for a single turbine of 55m to tip, 26 Mill Road is for a single turbine of 26 m to tip, and 31 Drumhappy Road is a single turbine to 59.5 m to tip. These consented turbines, with the exception of 37 Termain Road, are at elevations circa 50-100 m AOD. As such they will have a limited visual presence in the surrounding landscape and do not extend above the ridgeline as shown in cumulative wirelines from VPs 4 (Figure 6.31c).10 (Figure 6.37c) and 12 (Figure 6.39c). 37 Termain Road, is located 300 m southwest of T4, and as such will appear in conjunction with the Development. As such, the potential for significant effects upon heritage assets as a result of the Development and the consented turbines is restricted to those that lie between the Development and a consented turbine, i.e. on the slopes below the Development and above the lower elevations where the single turbines are sited.
- There are no designated assets in between 37 Termain Road and the Development. The addition of the Development to a baseline which contains 37 Termain Road will result in no cumulative effects to heritage assets. There is one Listed Building which lies between 16 Cloghan Road and 26 Mill Road and the Development; 21 Lislane Road, a Category B2 listed house. An additional Listed Building, St. Matthew's Roman Catholic Church lies between 31 Drumhappy Road and the Development. As such, there is the potential for turbines to be visible in two directions from 21 Lislane Road and St. Matthew's Roman Catholic Church. As the Development is replacing the existing Operational Rigged Hill Wind Farm, turbines are already visible in two directions from this Listed Building, and as such the additional of the Development to the baseline will not create a cumulative effect for this heritage asset that does not already exist.
- 161. only result in a slight change of cumulative effect, due to the enhanced scale of the proposed turbines. As such, the cumulative effect heritage assets are negligible which is assessed as not significant in terms of the EIA report.

11.7.3 Wind Farms Under Construction within 10 km Study Area 11.7.3.1 Smulgedon Wind Farm

Smulgedon Windfarm (Figure 6.20) is a Windfarm scheme under construction consisting of seven turbines of 120 m blade tip height and lies approximately 4.5 km south of the Development, as shown in Figure 6.12. Both the Development and Smulgedon Windfarm are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). As such, the greatest potential for a cumulative significant effect upon heritage assets would be upon those that lie between the Development and Smulgedon within a similar upland landscape context. As shown in Figure 10.3, three Scheduled Monuments; LDY107:004, LDY017:016, and LDY017:018 are located between the Development and Smulgedon, none of which lie within the ZTV of the Development and would receive no effect as a result of the Development in isolation, as detailed in Section 11.5.2. The addition of the Development to the baseline which contains Smulgedon Windfarm would result in no cumulative effect to heritage assets. Consented Wind Farms within 10 km Study Area

The addition of the Development to a baseline which contains 16 Cloghan Road, 26 Mill Road, and 31 Drumhappy Road will

11.7.3.2 Dunmore and Dunbeg Extension

Dunmore and Dunbeg Extension (Figure 6.13) is a consented extension to the operational Dunmore and Dunbeg Windfarm schemes. Dunmore Extension consisting of eight turbines of 126 m blade tip height and lies approximately 6.5 km north of the Development, and Dunbeg Extension consist of three turbines of 120 m blade tip height and lies approximately 5.5 km north of the Development as shown in Figure 6.12. Both the Development and Dunmore Extension are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects is most likely to occur between the Development and this consented wind farm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3, the only heritage asset which lies in between both windfarm developments is a scheduled cairn and enclosure (LDY010:007) which does not lie within the combined ZTV, and as such will receive no cumulative effect.

11.7.3.3 Craiggore Windfarm

Craiggore Windfarm (Figure 6.21) is a consented windfarm scheme consisting of ten turbines of 125 m blade tip height and lies approximately 2.2 km south of the Development, as shown in Figure 6.12. Both the Development and Craiggore are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects is most likely to occur between the Development and this consented wind farm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3, there are no designated heritage assets between the Development and Craiggore Wind Farm, and as such there will be no cumulative effect upon heritage assets.

11.7.3.4 Upper Ballyrogan Windfarm

Upper Ballyrogan Windfarm (Figure 6.22) is a consented windfarm scheme consisting of five turbines of 120 m blade tip height and lies approximately 4.3 km southeast of the Development, as shown in Figure 6.12. Both the Development and Upper Ballyrogan are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects are likely to occur between the Development and this consented windfarm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3, the only heritage asset which lies in between both windfarm developments is Scheduled Monument LDY017:001, Cashel. Upper Ballyrogan lies 1.7 km to the southeast of the Scheduled Monument and the Development lies 2.6 km to the northwest. As such, there is the potential for this Scheduled Monument, and its wider landscape setting, to have multiple views which /have visibility of wind turbines. As the Development is replacing the existing Operational Rigged Hill Wind Farm, turbines are already visible in multiple directions from this Scheduled Monument, and as such the addition of the Development to the baseline will only result in a slight change to this cumulative baseline scenario, due to the enhanced scale of the proposed turbines in an area where turbines are already sited. As such, the cumulative effect on heritage assets is negligible and not significant in terms of the EIA regulations.

11.7.3.5 Cam Burn Windfarm

Cam Burn Windfarm (Figure 6.23) is a consented windfarm scheme consisting of six turbines of 120 m blade tip height and lies approximately 7.3 km northwest of the Development, as shown in Figure 6.12. Both the Development and Cam Burn are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects is most likely to occur between the Development and this consented wind farm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3, there are no designated heritage assets between the development and Cam Burn Wind Farm, and as such, no heritage assets will receive no cumulative effects.

11.7.3.6 Evishagaran Windfarm

165. Evishagaran Windfarm (Figure 6.24) is a consented windfarm scheme consisting of 14 turbines of 125 m blade tip height and lies approximately 8.7 km south of the Development, as shown in Figure 6.12. Both the Development and Evishagaran are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects is most likely to occur between the Development and this consented wind farm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3, three schedule monuments; LDY107:004, LDY017:016, and LDY017:018 are located between the Development and Evishagaran, none of which lie within the ZTV of the Development and would receive no effect as a result of the Development in isolation, as detailed in Section 11.5.2, and as such will receive no cumulative effect.

11.7.4 Wind Farms Under Appeal within 10 km Study Area 11.7.4.1 Dunbeg South

Dunbeg South (Figure 6.13) is an application under appeal for the extension to the Operational Dunbeg Windfarm scheme consisting of nine turbines of 149.9 m blade tip height and lies approximately 4km north of the Development, as shown in Figure 6.12. Both the Development and Dunbeg Extension are located in the same upland landscape context, which consists of a north/south splay of turbines along the ridgeline, as shown in Figure 6.12. Visibility from distances greater than 5 km does not produce significant cumulative effects as turbines in the upland hills are in keeping with distant views from further afield as shown in VP14 near Coleraine (Figure 6.41b), VP15 near Seacon (Figure 6.42c), and VP18 at Quighley's Point (Figure 6.45d). The potential for significant cumulative effects is most likely to occur between the Development and this consented wind farm, due to the potential to enclose assets by views of turbines which could dominate sightlines. As shown in Figure 10.3. the only heritage asset which lies in between both windfarm developments is a scheduled cairn and enclosure (LDY010:007) which does not lie within the combined ZTV, and as such will receive no cumulative effect.

11.8 Summary of Effects

Table 11.11 provides a summary of the effects detailed within this chapter.

Table	11.11	Summary	of	Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Decommissioning / Cor	nstruction Phase			
Known archaeological remains	None as none are recorded within the Development footprint. Nearest known archaeological remain is 300 m north-west of T7.	Minor effect on cropmark site (LDY017:030) due to construction of the access track.	A watching brief is recommended during construction to ensure that if this cropmark site is present it can be recorded and documented ensuring preservation by record.	Minor and not significant
Unknown (buried) archaeological remains	Damage or destruction to unknown (buried) archaeology	Ranging from Minor to moderate. Archaeological potential is low due to the presence of the existing windfarm on the Core Study Area and the exposed upland moorland nature of the Core Study Area. However, if direct effects were to	The implementation of a programme of archaeological evaluation, likely to consist of a targeted watching brief in the undisturbed portions of the Development footprint if necessary, as archaeological potential is low.	Minor and not significant

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
		occur, the effects would be of a potentially very large magnitude		
Operational phase			•	•
Heritage Assets	Direct effects	Any direct effects will be on heritage assets of low sensitivity and therefore the effect is assessed as Minor which is not significant in term of EIA Regulations	None	None
Designated Heritage Assets	Indirect (settings) effects	No potential for significant effects (effects of 'moderate' or 'major' significance)	None	None
Cumulative Effect				
Designated Heritage Assets	Indirect (settings) effects	No potential for significant cumulative effects (i.e., Major or Moderate effects)	None	None

11.9 Statement of Significance

- ^{168.} 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.
- The Development has the potential to directly effect a non-designated heritage asset, a cropmark site, that lies within the Core Study Area (LDY017:003). Mitigation is recommended for the cropmark site (LDY017:030) during construction of the access track. Mitigation is proposed in terms of a watching brief during construction to ensure that if this cropmark site is present it can be recorded and documented ensuring preservation by record.
- There would be no additional direct effects likely upon known archaeological features within the Site, as none are recorded within the Development footprint. Due to the deliberate re-use of infrastructure associated with the Operational Rigged Hill Windfarm, combined with the exposed upland topography which limits land use to pastoral and transhumance activities, the potential for damage to or destruction of unknown buried archaeological remains is very low. However, should unknown archaeology survive within undisturbed portions of the Development footprint, that haven't already been impacted by ongoing agricultural activity, these would likely be damaged or destroyed resulting in a minor to moderate effect and a programme of archaeological works to secure preservation by record is recommended within these areas only.
- 171. There are considered to be no significant indirect (setting) effects upon heritage assets in the surrounding historic environment from the Development, in isolation or cumulatively with other windfarm developments. All effects are considered to be 'not significant' under the terms of the EIA regulations,

Term			
AOD			
Core Study Area	l		
Cumulative Stud	ly Area		
the Developmen	t		
the Site			
EIA			
ES			
ft			
ha			
НВ			
km			
m			
SMR			
1 km Study Area	l		
5 km Study Area	l		

Definition

Above Ordnance Datum.

Area contained within the Development Area, the area within which the Development may have direct effects upon known and unknown archaeological remains.

A 10 km area surrounding the Development. The area in which the potential significant cumulative effect is considered likely if cultural heritage assets within the area lie within the zone of theoretical visibility of more than one wind development.

the Corkey Windfarm Repowering Scheme

the area within which the Development will be located

Environmental Impact Assessment.

Environmental Statement.

feet

hectare

Historic Building

kilometres

metres

Sites and Monuments Record

A 1 km radius surrounding the Development Area. The area used to ensure a full understanding of the archaeological resource and so the potential for unknown archaeology to survive within the Core Study Area. See **Figure 11.2**.

A 5 km area surrounding the Development. Area within which it is considered the Development has potential to cause likely significant indirect (visual) effects upon the settings of heritage assets and hence requiring detailed assessment. See **Figure 11.2**.

Zone of Theoretical Visibility.

12 Access, Transport and Traffic

12.1 Introduction

This chapter of the Environmental Statement (ES) assesses the potential traffic and transport effects of the Development, describes the existing transport network within the vicinity of the Site, identifies whether there is any potential for significant effects to arise (both in isolation and in combination with other developments) and outlines any mitigation measures as required. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus). The assessment will consider the potential effects during the following phases of the Development:

- Decommissioning of the Operational Rigged Hill Windfarm (initial phase of the Development);
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development; and
- Decommissioning of the Development (Final Phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worst case scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- 3. This chapter of the ES is supported by the following Technical Appendix provided in **Volume 3 Technical Appendices**:
 - Appendix A12.1 Abnormal Load Route Assessment March 2019
- This chapter will include the following elements:
 - Legislation, Policy and Guidance;
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - Assessment of Potential Effects;
 - Mitigation and Residual Effects;
 - Cumulative Effect Assessment;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary.
- 5. Common acronyms used throughout this ES can be found in **Chapter 1: Introduction, Table 1.4**.

12.2 Legislation, Policy and Guidance

 Table 12.1 Legislation, Policy and Guidance details relevant legislation, policy and guidance documents considered during preparation of this assessment.

Table 12.1 - Legislation Policy and Guidance

Policy or Author	Title	Policy			
Government Policy	Government Policy				
Strategic Planning	NA	As noted in paragraph 60 in Chapter 3, Planning Policy Statement 3:			
Policy Statement		Access, Movement and Parking (PPS3), its clarification and Planning			
(SPPS, 2015)		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			

Policy or Author	Title	Policy
		Plan Stra no less w SPPS po consolida PPS13. The Minis PPS3 (as The princ since PP
Planning Policy Statement 3 (PPS 3, 2005)	Access, Movement and Parking	This polic policies for protection "Planning involving access, or Such acc the flow or Policy AM proposal well as the and any or
Planning Policy Statement 13	Transportation and Land Use	PPS 13 a Strategy and land Assessm impacts o General I develope Principle planning
Planning Policy Statement 18 (PPS 18, 2009)	Renewable Energy	PPS18 so generates traffic and assessed
NI Planning Service and Roads Service (DCAN 15, 1999)	Development Control Advice Note 15	This advi vehicular access to apply to o
Policy		
Department for Regional Development (2006)	Transport Assessment Guidelines for Development Proposals in Northern Ireland	The guida of Transp Ireland. If A detailed generate "100 or m - Significa or an imp - Significa - Traffic la significan

ategy, PPS3 and PPS13 will apply, together with the SPPS, with veight attached to the retained policy.

licy on transportation is set out on pages 106 to 110. It ates and restates policy set out in PPS3 (as clarified) and

ister did not identify any conflicts or clarifications in respect of s clarified) and PPS13 in his statement launching the SPPS. cipal planning policy focus of this Chapter is, therefore, on PPS3, 2S13 is widely accepted not to represent operational policy.

icy sets out the Department of the Environment's planning for vehicular and pedestrian access, transport assessment, the on of transport routes and parking. Policy AMP 2 states: g permission will only be granted for a development proposal

direct access, or the intensification of the use of an existing onto a public road where:

cess will not prejudice road safety or significantly inconvenience of traffic."

MP 2 considers a number of aspects of each development including the number of access points onto a public road, as he speed and volume of traffic using the adjacent public road expected increase.

assists with the implementation of the Regional Development for Northern Ireland, by guiding the integration of transportation l use. General Principle 3 states that the process of Transport nent should be used when considering the potential traffic of a development.

Principle 11 states that "innovative measures should be ed for the safe and effective management of traffic." General a 12 states that "the integration of transport and land use should seek to create a more accessible environment for all."

sets out the Department's planning policy for development that es energy from renewable resources. It identifies the general nd transport elements of wind development that may require to be red as part of a planning application.

ice note provides general guidance on the standards for access when an access road from a development requires b a public road. It sets out the requirements for visibility which developments which access the public road network.

ance document has been prepared to assist in the preparation port Assessments for development proposals in Northern t is based on the policies set out in PPS 13.

d Transport Assessment is required when the development will :

nore vehicle movements in the peak hour;

ant traffic at peak times in a congested area, a sensitive location portant traffic route or junction;

ant freight movements;

ate at night in a residential area, particularly lorries; and Raise at concerns over road safety.

Policy or Author	Title	Policy
Institute of Environmental Management and Assessment (IEMA, 1993)	Guidelines for the Environmental Assessment of Road Traffic	Sets out guidelines for determining the appropriate and significance of traffic effects as a result of a proposed development. The document focuses on the assessment of potential environmental effects associated with road traffic.
Institution of Highways and Transportation. (IHT, 1994)	Guidelines for Traffic Impact Assessment	The guidance document sets out a process for determining the need to carry out a Traffic Impact Assessment (TIA). The process involves three key steps: - Determining whether a TIA is necessary; - If so, what the scope of the TIA should include; and - How to prepare the TIA.

12.3 Assessment Methodology and Significance Criteria

12.3.1 Scoping Responses and Consultation

Consultation for this ES topic was undertaken with the organisations shown in Table 12.2 Consultation Responses.

Table 12.2 - Consultation Responses

7.

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Department for Infrastructure (DfI) – Roads	Scoping Response – 20 th September 2017	DfI will require a Traffic and Transportation Chapter to be included within the ES. This Chapter should include a Transportation Assessment of Haul Routes.	Addressed by Chapter.
Department for Infrastructure – Roads	Formal Scoping Opinion – 6 th December 2017	"The Guidelines for the Environmental Impact of Road traffic* do not apply in Northern Ireland. The Transport Assessment Guidelines for Development Proposals in Northern Ireland (November 2006) apply in this jurisdiction." "IEMA Guidelines "Dfl Roads is content with the proposed methodology and scope of the traffic and transportation assessment." "Operational traffic effects can be scoped out of the assessment." "We are not aware of an specific restrictions or limitations in the vicinity of the site, however the developer should assess this as part of the Abnormal Load Route Assessment"	The Scoping Request stated that the proposed methodology is based upon the IEMA Guidelines. As the suggested Transport Assessment Guidelines (Northern Ireland) do not contain any methodology for the environmental assessment of road traffic this Environmental Statement has used the methodology contained in the IEMA Guidelines. As requested, as far as they are applicable, the N.I. guidelines have been taken into account. Operational traffic effects have been scoped out of this assessment. An Abnormal Load Route Assessment has been undertaken and is included in Appendix A12.1 . It should also be noted that the Development will not generate:



12.3.2 Scope of Assessment 12.3.2.1 Study Area

- The assessment Study Area extends to the haul routes between the possible ports of delivery (Belfast, Larne or Foyle Port) 8. and the Site entrance. The routes considered for abnormal load vehicles (ALVs), used for the delivery of turbine components, routes for heavy goods vehicles (HGVs) and used for the delivery of construction materials, are defined in Figure 12.1.
- The ALV routes were defined following the Abnormal Load Route Assessment (ALRA) (included in Appendix A12.1). Routes 9. which approach the Site from east and west have been assessed, which allows for the use of either Larne/Belfast ports or Foyle Port. All wind turbine components will be delivered via one of the assessed abnormal load routes, this primarily concerns delivery of turbine blades, tower sections and nacelle.
- Currently the source of other materials required for initial decommissioning / construction phases of the Development is not 10. known, however it is anticipated that the majority of these deliveries will approach the Site via one of the abnormal load routes.

12.3.2.2 Scoped in Effects

- This assessment considers the following access, traffic and transportation effects of the Development during the initial 11. decommissioning / construction phases and operation:
 - Traffic Generation;
 - Accidents and Safety;
 - Driver Delay;
 - Pedestrian Amenity;
 - Severance;
 - Noise and Vibration;
 - Hazardous Loads; •
 - Pedestrian Delay; •
 - Visual Effects; and •
 - Air Quality.

12.3.2.3 Scoped Out Effects

- Operational traffic during the life of the Development is expected to be negligible and therefore, is scoped out of the 12. assessment. This approach was proposed during Scoping and the methodology was supported by Dfl Roads in their formal Scoping Opinion.
- The vehicles servicing the Operational Rigged Hill Windfarm have been doing so since 1994, as such they form part of the 13. existing baseline. Since the number of vehicles required to operate and maintain the Development following its construction will be similar to those currently accessing the Site, no significant change is predicted, and therefore consideration of these has been scoped out of the assessment.

12.3.3 Assessment Methodology 12.3.3.1 Baseline Conditions

Baseline traffic flow conditions were established on key routes within the vicinity of the Site to enable comparison with the 14

Consultation	Response to Consultee
	 "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 traffic. Partial information was acquired from the Department for Infrastructure (DfI) public traffic counts, which
included four traffic count locations which are detailed in Figure 12.2. Automatic traffic counts (ATCs) were undertaken in January 2018 at a further three locations on the proposed ALV and HGV haul routes, these counts recorded vehicle types, numbers and speeds.

Baseline road conditions, including an estimate of traffic flow capacity, were established using information gathered during a route drive over survey and subsequent desk study. Traffic flow capacity was estimated using information contained within DMRB – Volume 15¹, it is acknowledged that this document does not apply in Northern Ireland, however in the absence of a method of estimating capacity within the Northern Ireland Development Control Advice Notes (DCAN) this method has been considered appropriate.

12.3.3.2 Assessment of Effects

12.3.3.2.1 Receptor Sensitivity

The sensitivity of receptors has been determined based upon the value of the affected resource as detailed in Table 12.3 -Receptor Sensitivity

Table 12.3 - Receptor Sensitivity

Sensitivity	Description
High	Receptors of greatest sensitivity to changes in traffic flow, would include: People whose livelihood depends upon unrestricted movement within their environment including commercial drivers and companies who employ them, local residents, schools and colleges. Accident hotspots would also be considered.
Medium	Traffic flow sensitive receptors, would include: People who pass through the area habitually, but whose livelihood is not wholly dependent on free access. Would also typically include: congested junctions, community services, parks, businesses with roadside frontage, and recreation facilities.
Low	Receptors with some sensitivity to changes in traffic flow: People who occasionally use the road network. Would also typically include: public open spaces, nature conservation areas, listed buildings, tourist attractions, residential roads with adequate footway provision and places of worship.
Negligible	Receptors with very low sensitivity to traffic flows: People not sensitive to transport effects. Would also refer to receptors that are sufficiently distant from the affected roads and junctions.

12.3.3.2.2 Magnitude of Effect

- 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.
- The Department for Regional Development's Guidance² suggests that assessment is required for any development which generates 30 or more two-way vehicle movements in any hour.
- The Institute of Environmental Management and Assessment (IEMA) Guidelines³ suggest two broad principles, to be used as 19 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.
- Where the predicted increase in traffic flow is lower than these thresholds then the significance of the effects can be 20. 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.

- These guidelines are intended for the assessment of environmental effects of road traffic associated with major new 21. 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 shortterm initial decommissioning / construction phases of the Development.
- It is worth noting that on roads where existing traffic levels are generally low (e.g., rural roads and some unclassified roads), 22. any increase in traffic flow may result in a predicted increase that would be higher than the IEMA (1993) 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.
- 23. 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 (1993) 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.
- 24. The criteria used to assess the magnitude of change are presented in Table 12.4 - Magnitude of Change

1	Table 12.4 - Magnitude of Change			
	Sensitivity	Description		
	Major	The proposals could result in an appreciable routes or schedules or activities, change to p community, which may result in hardship.		
	Moderate	The proposals could result in changes to the rescheduling could be required, or change to a community, which cause inconvenience.		
	Minor	The proposals could occasionally cause a maschedules, or on activities, to pedestrian among the short-term.		
	Negligible	No effect on movement of road traffic above		

12.3.3.2.3 Significance of Effects

- Two broad principles outlined within the IEMA guidelines are advised for use as a screening process to limit the scale and 25. extent of the assessment as detailed in Section 12.3.3.2.2.
- For the purposes of this assessment and in accordance with the criteria set out within the IEMA guidelines, the scale 26. (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.
- An assessment has been made of the significance of further effects taking into account the importance / sensitivity of the 27. receptor, the magnitude of effect, the duration/ persistence of the effect and the likelihood of the effect occurring. The criteria used to make judgements on the importance/sensitivity of the receptor(s) is presented in Table 12.3. The criteria used to determine the significance of effects is detailed in Table 2.2.

³ The Institute of Environmental Management and Assessment (1993), Guidelines for the Environmental Assessment of Road Traffic

Any change in traffic flow which is greater than the thresholds set out in the IEMA (1993) guidelines would be subject to further

e change in terms of length and/or duration to the present traffic pedestrian amenity, safe operation of routes or severance of a

existing traffic routes or activities such that some delays or o pedestrian amenity, safe operation of routes or severance of

ninor modification to routes, or a very slight delay in present enity, safe operation of routes or severance of a community in

normal level.

¹ Department for Transport, (2013) Design Manual for Roads and Bridges, Volume 15.

² Department for Regional Development (2006), Transport Assessment Guidelines for Development Proposals in Northern Ireland

For the purposes of this assessment, the significance of effects was also assessed on the basis of the specific local 28. characteristics of the road network using professional judgement and experience of similar developments.

12.3.4 Embedded Mitigation

- The proposed haul routes have been selected as far as possible to utilise routes which are proven as suitable for the delivery 29 of turbine components. The routes will use major trunk roads for as much of its length as possible.
- A detailed traffic management plan (TMP) would be submitted to relevant consultees, should the Development receive 30. consent, prior to any work commencing. The TMP will contain detailed information on the expected delivery vehicles, routes, improvement works required, timings and details of the escort and management procedures to be implemented for the duration of the initial decommissioning/construction phases.

12.4 **Baseline Conditions**

12.4.1 Access Routes

- The proposed abnormal load routes to the Site, indicated on Figure 12.1, have been assessed from the potential ports of delivery, Foyle Port, Larne and Belfast. Turbine components are likely to be transported to one of these ports, and will approach the Site via one of the indicated routes.
- An ALRA was undertaken and is included as Appendix A12.1. This assessment considered transportation of wind turbine 32. components from each of the potential ports of delivery via the Abnormal Load Route to the Site, and included a drive over survey of the delivery routes by an Arcus traffic engineer in October 2017. The ALRA identified a number of areas where road modifications will be required in order to enable delivery of the specified turbine components, these are detailed in the ALRA Report.

12.4.2 Baseline Traffic Flow Data

- Baseline traffic flow data was obtained from the Dfl at four locations. A seven day ATC was undertaken by Tracsis Traffic and 33 Data Systems plc from the 8th to the 14th of January 2018 at a further three locations. The location of each ATC and Dfl count point is indicated on Figure 12.2.
- Results of the traffic counts, including the Average Daily Traffic (ADT), and of the Dfl data is provided in Table 12.5. 34.

Table 12.5 - Existing ADT

Ref	Source	Coordinates (Irish Grid – Easting, Northin)	Road	Location	Total ADT	HGV ADT	%HGV
1	Dfl	714132, 901223	A36	Moorfields Road, Ballymena	7,701	762	9.9
2	Dfl	708155, 907729	A26	North of Junction with M2	18,972	1,764	9.3
3	Dfl	683315, 929653	A37	Immediately east of Drumcroon Rd Roundabout	10,466	743	7.1
4	ATC	672146, 923029	Ringsend Rd	Between A37 and Terrydoo Rd	2,636	161	6.1
5	Dfl	668325, 923337	A37	Between Killane Roundabout and junction with A371	12,566	917	7.3
6	ATC	681307, 921768	Craigmore Rd	Between A29 and Ringsend	1,196	123	10.3
7	ATC	673468, 922377	Terrydoo Rd	South of Ringsend Rd	323	13	4.1

⁴ Department for Transport – National Road Traffic Forecasts by Vehicle Type

12.4.3 Traffic Growth

- 35. Background traffic growth 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 construction (anticipated to be 2023) have been calculated by applying growth factors.
- Traffic growth factors have been derived from the National Road Traffic Forecasts⁴. Specific growth factors have been derived 36. for HGV and overall vehicle flow, and to account separately for the 2016 and 2018 traffic survey data. Table 12.6 details the traffic growth factors, and the forecast baseline traffic flow data in the anticipated year of construction (2023).

Table 40.0 Projected Pasaline Treffic in Autisia stad Version 6 Operative (0000)

Ref	Road	Year of Survey Data	Overall Traffic Growth Factor	Projected ADT	HGV Traffic Growth Factor	Projected HGV ADT	%HGV
1	A36	2016	1.080	8317	1.269	967	11.6
2	A26	2016	1.080	20,490	1.269	2,239	10.9
3	A37	2016	1.080	11,303	1.269	943	8.3
4	Ringsend Rd	2018	1.055	2,781	1.178	189	6.8
5	A37	2016	1.080	13,571	1.269	1,164	8.6
6	Craigmore Rd	2018	1.055	1,262	1.178	145	11.5
7	Terrydoo Rd	2018	1.055	341	1.178	16	4.6

12.4.4 Road Capacity

- 37. 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 12.7 gives the estimated capacity of each of the roads within the Study Area.
- Where a particular road has multiple sections with different characteristics the section with the lowest capacity has been 38. detailed.

Ref	Road	Туре	Speed Limit (kph)	Capacity (veh/hour/direc tion)	Two Way Hourly Traffic	Two Way Daily Traffic
1	A36	Rural – Typical Single 7.3	96	1,200	2,400	57,600
2	A26	Rural – Dual 2 Lanes	113	3,400	6,800	163,200
3	A37	Rural – Typical Single 7.3m	96	1,200	2,400	57,600
4	Ringsend Rd	Rural – Typical Single 6m	96	900	1,800	43,200
5	A37	Rural – Typical Single 7.3m	96	1,200	2,400	57,600
6	Craigmore Rd	Rural – Typical Single 6m	96	900	1,800	43,200
7	Terrydoo Rd	Rural – Poor Single 5.5m	96	800	1,600	38,400

Typical capacity values for a variety of road types are provided within the Design Manual for Roads and Bridges⁵ (DMRB), in

12.4.5 Road Traffic Collision Assessment

- Analysis of all 'serious' and 'fatal' road traffic collisions (RTCs) within the last five years for the routes within the Study Area was undertaken⁶. '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.
- Sixteen 'serious' RTCs were identified in the Study Area. One further fatal RTC was recorded, on the A26/Belfast Rd, near 40 George Best Belfast City Airport. The RTCs appear to be distributed throughout routes within the Study with no particular clusters or hotspots identifiable. Figure 12.3 indicates the location of each of the identified RTCs within the Study Area.
- Of those RTCs identified, consideration is given to those RTCs which involved a heavy goods vehicle (HGV). Three 'serious' 41 accidents occurred within the Study Area, all on the M2. No 'fatal' RTCs involving HGVs occurred within the Study Area.

12.4.6 Sensitive Receptors

A desk-based study of receptors within the Study Area was undertaken. A number of sensitive receptors were identified as 42. detailed in Table 12.8.

Table 12.8 - Sensitive Receptors

Receptor	Sensitivity	Reason for Inclusion
Residential properties fronting directly onto haul routes.	High	There are a number of residential properties which front directly on to the proposed ALV and 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 etc.
Broadbridge Primary School	High	This school, located within the settlement of Eglinton, is a short distance from the proposed haul route on the A2 at Broadbridge Roundabout. Students are highly likely to use the A2 during their journey to and from school and are likely to be sensitive to the effect of increased traffic flow particularly with regard to severance, pedestrian delay, fear and intimidation and air quality.
Faughanvale Primary School	High	This school, located within the settlement of Tullyvery, is a short distance from the proposed haul route on the A2/Clooney Rd, east of the settlement of Greysteel. Students are highly likely to use the A2/Clooney Rd during their journey to and from school and are likely to be sensitive to the effect of increased traffic flow particularly with regard to severance, pedestrian delay, fear and intimidation and air quality.
Ballykelly Primary School	High	This school, located within the settlement of Ballykelly, is a short distance from the proposed haul route on the A2/Moorfields Rd. Students are highly likely to use the A2/Main Street during their journey to and from school and are likely to be sensitive to the effect of increased traffic flow particularly with regard to severance, pedestrian delay, fear and intimidation and air quality.
Moorfields Primary School	High	This school, located within the settlement of Moorfields, is a short distance from the proposed haul route on the A36/Main Street. Students are highly likely to use the A36/Moorfields Rd during their journey to and from school and are likely to be sensitive to the effect of increased traffic flow particularly with regard to severance, pedestrian delay, fear and intimidation and air quality.
The settlement of Moorfields	Medium	Included due to the presence of residential and commercial premises which front directly onto the haul route on the A36/Moorfields Road. This receptor is likely to be sensitive to the effect of increased traffic, and HGV composition with potential effects including severance, pedestrian delay, fear and intimidation, noise and vibration and air quality.

⁶ Data was compiled from publicly available police reports released by the Department for Transport via www.crashmap.co.uk [Accessed 28/03/19]

12.5 Site Access Junction

- A new site access junction is proposed to be formed on to Terrydoo Road, Appendix A12.2 shows the proposed layout of this 43. junction. An assessment of the achievable visibility splays from this junction was undertaken, and the details of this are indicated on Figure 12.4.
- Visibility at the site entrance junction is assessed against the standard detailed in DCAN 15. A week-long speed survey was 44. undertaken in January 2018 which recorded the 85th percentile speed within the vicinity of the junction as 52.4 mph and 48.9 mph northbound and southbound respectively. To comply with DCAN 15 this would require a minimum visibility splay of 160 m.
- 45. As indicated on Figure 12.4 a visibility splay of 160 m in either direction with a 2.4 m setback is achievable from the Site entrance if the existing hedge and fence are cleared behind the visibility splay. The hedge and fence will be cleared from the splay and therefore the proposed site access junction will comply with the DCAN 15 requirements.

12.6 Anticipated Decommissioning / Construction Development Programme

A detailed programme of traffic anticipated throughout the initial decommissioning/construction phases of the Development is 46 provided in Figure 12.5. The following subsections provide details of the type and number of deliveries anticipated for each element of work. A summary of all predicted traffic during these phases is provided at the end of this section.

12.6.1 Site Mobilisation

47. delivery of site vehicles and importation of plant and equipment. The majority of these movements will be as HGVs and low loaders which will deliver and then depart the Site empty. Table 12.9 indicates the anticipated number of vehicle movements associated with site mobilisation.

Table 12.0 - Anticipated Vehicle Meyoments - Site Mehilisation

Operation	Vehicle Type	Operational Months	Total	Max Monthly
On-site vehicles	Car/LGV	1	14	14**
Construction compound	HGV Low Loader	1	30	30*
Subtotal	44	44*		

*Includes transporter vehicle leaving.

**Self-propelled vehicles.

12.6.2 Turbine Decommissioning

- The ten wind turbines which comprise the Operational Rigged Hill Wind Farm are to be removed as part of the Development. 48. These turbines will be dismantled and removed from the Site during a two-month period (months 2 and 3).
- All components from the existing turbines will be removed from the Site by HGV. It is anticipated that five HGVs will be 49. required per turbine. Each of the three blades will require one HGV load with an additional load for the tower section (which may be broken up) and the nacelle. This will result in a total of 100 vehicle movements through the duration of this phase of works.
- A further two HGV loads per turbine are anticipated for the removal of ancillary equipment, resulting in a total of 40 HGV 50. movements during this phase of works.
- Additional traffic will be generated by the removal of other items such as turbine transformers, the substation and control 51. building equipment. These items are expected to result in 50 additional HGV traffic movements over the duration of this phase of works. Table 12.10 details the anticipated vehicle movements associated with turbine decommissioning.

HGV and other vehicle movements will be required during site mobilisation. This will comprise the erection of welfare facilities,

Table 12.10 - Anticipated Vehicle Movements – Turbine Decommissioning

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Turbine and Ancillary	HGV (Turbines)	2-3	100	50
Equipment Removal	HGV (Ancillary Equipment)	2-3	40	20
Removal of Other Items	HGV	2-3	50	25
Subtotal		190	95	

12.6.3 Access Road and Hardstanding Construction

- It has been assumed that all of the stone required for construction of the access tracks and hardstandings will be imported to the Site. As the existing infrastructure is being decommissioned there may be opportunity for the re-use of materials, however in order to assess the worst-case scenario 100% material import has been assumed for the purposes of this assessment. Where materials are re-used the amount of traffic associated with material delivery will be reduced.
- One team is expected to operate on track and hardstanding construction and may utilise an excavator and roller with imported material being delivered directly to the construction area. It is estimated that the total volume of stone required to be imported to the Site is 34,787 cubic metres (m³). Assuming each load will be transported by aggregate tipper truck with a volumetric capacity of 13 m³ this will result in approximately 2,676 loads, or 5,352 total vehicle movements through the duration of this element of works.
- It is assumed that the excavators and rollers will be delivered to the Site via low loaders at the commencement of this 54. operation and will generate two vehicle trips each for delivery and another two trips during removal.
- Other materials will require to be imported regularly throughout construction of the access tracks such as geo-membrane, 55. drainage pipes and culvert sections.
- Table 12.11 indicates the anticipated number of vehicle movements associated with access track and hardstanding 56. construction.

Table 12.11 - Anticipated Vehicle Movements – Access Tracks and Hardstanding Construction

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Equipment	HGV Low Loader (Excavators/Rollers)	2-4	8	4*
Stone Import	HGV Tipper Truck	2-4	5,352	1,784
Other Materials	HGV	2-4	18	6
Subtotal			5,378	1,794

*Includes transporter vehicle leaving and then returning to Site following completion of track construction

12.6.4 Turbine Foundation Construction

- The concrete for each turbine foundation will be formed from ready-mix concrete imported to the Site. Each turbine foundation will be poured in one continuous session over a single day, with seven non-consecutive days required in total over the eight week duration of this element of works.
- Each foundation will comprise 500 m³ of concrete, which will require 56 ready-mix vehicle loads, assuming a capacity of 9 m³ 58 per vehicle. This will result in a total of 392 loads of concrete or 784 vehicle movements over the eight weeks of this phase of works.
- Additionally, 424 tonnes of steel reinforcement (rebar) will be required. This will result in 24 HGV loads or 48 vehicle movements over this period. Table 12.12 indicates the anticipated number of vehicle movements associated with turbine foundation construction.

Table 12.12 - Anticipated Vehicle Movements – Turbine Foundation Construction

Operation	Vehicle Type	Operational Months	Total	Max (Daily/Monthly)
Concrete Delivery	Ready Mix HGV	3-4 (7 days)	784	56 (daily)
Rebar Delivery	HGV	3-4	48	24 (monthly)
Subtotal	832	-		

12.6.5 Control Building, Substation and Energy Storage Construction Material for construction of the substation compound hardstanding is included in the access track and hardstanding 60 movements, detailed in Section 12.7.3. Electrical components and switchgear will require to be imported and is predicted to total 20 HGV movements over the five month phase of this element.

- Concrete for the formation of the control building foundations will require to be imported at the commencement of this phase of works, this is assumed to be ready-mix concrete and will total four concrete wagons, resulting in eight vehicle movements. Other materials for the construction of the control buildings, which includes the Energy Storage Unit, will require to be imported throughout this phase and is assumed to require five deliveries, resulting in a total of ten HGV movements.
- 62 in 20 total HGV trips over the course of this phase of works.
- Individual substation transformers will be delivered by abnormal load vehicle due to the weight of the units, this will result in two vehicle movements. Two escort vehicles are assumed to accompany the abnormal load vehicle resulting in four vehicle movements. Table 12.13 indicates the number of vehicles associated with substation construction.

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Operation	Vehicle Type	Operational Months	Total	Max Monthly
Electrical Components and Switchgear	HGV	3-7	20	4
	ALV	3-7	2	2
	Escort Car/Van	3-7	4	4
Energy Storage Units	HGV	3-7	20	4
Control Building Materials	Concrete Wagon	3-7	8	8
	HGV	3-7	10	2
Subtotal			64	18*

*Total in peak month for this element of work

12.6.6 Electrical Cable Delivery

Electrical cabling required for the internal windfarm power distribution has been estimated based on the length of access track 64 and number of turbines, and will constitute 30 HGV movements over the period of delivery. Table 12.14 indicates the number of vehicle movements associated with electrical cabling delivery.

Table 12.14 - Anticipated Vehicle Movements – Electrical Cabling Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Electrical Cabling Delivery	HGV Low Loader	4-5	30	15

12.6.7 Crane Delivery

A large mobile or crawler crane of approximately 1,000 tonne capacity will be required for turbine erection along with an additional 160 tonne pilot crane. The crawler crane will be transported in component form and assembled on the Site; this will require approximately 52 HGV movements to be undertaken prior to the commencement of turbine delivery. The pilot crane will be self-propelled although will constitute an abnormal load vehicle due to its weight.

The Energy Storage Units themselves will be delivered by standard HGV and are expected to require ten deliveries, resulting

- Turbine delivery will also require the use of two 160 tonne cranes for unloading turbine components from ALVs. These cranes will be self-propelled although will constitute abnormal loads due to their weight.
- Cranes will remain on site for the duration of the turbine assembly phase. Table 12.1 indicates the number of vehicle 67. movements associated with crane delivery.

Table 12.1 - Anticipated Vehicle Movements - Crane Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Crawler Crane	HGV	4, 7	52	26
Pilot Crane	ALV	4, 7	2	1*
Turbine Delivery Cranes	ALV	4,7	4	2*
Subtotal	·	•	58	29

*Self-propelled vehicle which arrives in one month and departs in another

12.6.8 Turbine Delivery

- Turbines will be delivered as separate components, the majority of which will require to be transported by ALV. The towers will be transported in three separate sections and each of the three blades will be transported individually. Two further abnormal load vehicles will be required to transport the nacelle and hub. For the seven turbines, 56 ALV deliveries will be required equalling 112 vehicle movements. Following delivery of components, the abnormal load vehicles are able to retract to the size of a standard HGV vehicle for the return journey.
- Two escort vehicles are likely to be required to accompany each abnormal load which will result in a worst case of 224 69. additional vehicle movements. In practice, this figure may be reduced where abnormal load vehicles approach the Site in convoy and fewer than two escort vehicles per abnormal load are required.
- Additionally, 16 HGV vehicle movements will be required for the delivery of turbine accessories and ancillary equipment. Table **12.16** indicates the number of vehicle movements that are expected for turbine delivery.

Table 12.16 – Anticipated Vehicle Movements – Turbine Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Turbine Components	ALV/HGV	5-6	112	56
	Escort Car/Van	5-6	224	112
Ancillary Equipment	HGV	5-6	16	8
Subtotal	352	176		

12.6.9 Site Restoration and Demobilisation

During site restoration and demobilisation, the principle vehicle movements will be generated from the removal of plant and equipment from the Site. This is anticipated to result in the same number of vehicle movements as for mobilisation, however will be distributed over a two-month period. Table 12.17 details the anticipated vehicle movements during this phase of works.

Table 12.17 – Anticipated Vehicle Movements – Site Restoration and Demobilisation

Operation	Vehicle Type	Operational Months	Total	Max Monthly
On-site vehicles	Car/LGV	1	14	7**
Construction compound	HGV Low Loader	1	30	15*
Subtotal			44	22*

*Includes transporter vehicle leaving.

*Self-propelled vehicles.

12.6.10 Fuel Delivery

Fuel will require regular delivery to the Site regularly throughout the construction period and is expected to total two HGV fuel tanker deliveries per week from the Site mobilisation, totalling 208 vehicle movements over the duration of construction. Table 12.18 indicates the number of vehicle movements associated with fuel delivery.

Table 12.18 – Anticipated Vehicle Movements – Fuel Delivery				
Operation	Vehicle Type	Operational Months	Total	Max Monthly
Fuel Delivery	HGV Fuel Tanker	1-8	208	26

12.6.11 Construction Personnel and Staff

- It is anticipated that an average of 60 staff will be required onsite per day throughout the construction phase, months 1-8. For 73. the purposes of this assessment, a worst-case scenario in which all cars are single-occupancy has been assumed. This will result in 120 vehicle movements associated with staff per day.
- Assuming a 26 day working month, this is expected to result in a total of 24,960 vehicle trips for staff over the course of 74 construction of the Development. Table 12.19 indicates the number of vehicle movements associated with staff.

Table 12.19 – Anticipated Vehicle Movements – Construction Personnel and Staff				
Operation	Vehicle Type	Operational Months	Total	Max Monthly
Staff	Car	1-8	24,960	3,120

12.7 Assessment of Effects 12.7.1 Traffic Generation

- A detailed breakdown of the distribution of vehicle movements in each month, and for each element of work, throughout the initial decommissioning/construction phases of the Development is included in Appendix A12.2. 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.
- From inspection of the predicted traffic movements, the peak month for vehicle flows is expected to be month three where there will be a maximum of 5,049 vehicle movements in total. This would be comprised of 1,929 HGV movements (excluding concrete delivery) and 3,120 car or van movements.
- In addition, concrete deliveries are scheduled to be undertaken during this month and will comprise 112 HGV movements per 77. day over a maximum of 7 non-consecutive days (assuming a 26 day working month). This would result in a total for the month of 448 HGV movements associated with concrete delivery. In practice the number of concrete deliveries during this month can be expected to be less as in total there will be only seven non-consecutive days of concrete delivery distributed over a two month period.
- 78. Table 12.20 details the anticipated vehicle flow in the peak month on days with no concrete deliveries and the percentage increase above the predicted baseline at each point within the study.

		Total Vehicles			HGV Only		
Ref	Road	2023 Baseline	Peak Month	%Increase	2023 Baseline	Peak Month	% Increase
1	A36	8,317	8512	2	967	1042	8
2	A26	20,490	20685	1	2,239	2314	3
3	A37	11,303	11498	2	943	1018	8
4	Ringsend Rd	2,781	2976	7	189	264	40
5	A37	1,3571	13766	1	1,164	1239	6
6	Craigmore Rd	1,262	1457	15	145	220	52
7	Terrydoo Rd	341	536	57	16	90	480

Table 12.20 – Predicted Peak Month Average Daily Traffic – No Concrete Delivery

Table 12.21 details the anticipated vehicle flow in the peak month on days where concrete deliveries will take place, this will 79. occur on a maximum of seven non-consecutive days although is expected to be significantly less than this.

Table 12.21 – Predicted Peak Month Average Daily Traffic – During Concrete Delivery

		Total Vehicles			HGV Only		
Ref	Road	2023 Baseline	Peak Month	%Increase	2023 Baseline	Peak Month	% Increase
1	A36	8,317	8568	3	967	1090	13
2	A26	20,490	20741	1	2,239	2362	5
3	A37	11,303	3332	8	943	333	59
4	Ringsend Rd	2,781	11554	2	189	1066	13
5	A37	13,571	3032	9	1,164	312	65
6	Craigmore Rd	1,262	13822	2	145	1287	11
7	Terrydoo Rd	341	1513	20	16	268	85

- As detailed in Section 12.3.3.2.2 a screening exercise was undertaken in order to determine which routes warrant detailed assessment. Given that each route within the Study Area contains a number of high sensitivity receptors (as summarised in Section 12.3.3.2.1) the lower threshold of significance (10%) was used. Using this criteria and considering the percentage increases presented in Table 12.20 and Table 12.21, it can be seen that there is a potential for traffic increase above the threshold of significance in the following cases:
 - Due to overall traffic increase throughout the peak month of decommissioning/construction activity on Craigmore Road (Location 6) and on Terrydoo Road (Location 7);
 - Due to HGV traffic increase throughout the peak month of decommissioning/construction activity on the A37 (Location 3 and Location 5) Ringsend Road (Location 4), Craigmore Road (Location 6) and Terrydoo Road (Location 7); and
 - Due to HGV traffic increase on the seven non-consecutive days of concrete delivery on the A36 (Location 1) ٠
- When considered the effect of traffic generation on routes which have a low baseline traffic flow, it is important to consider the 81. capacity of the routes in question. Table 12.22 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 12.22 – Residual Capacity

Ref	Road	Theoretical 24hr Capacity	Peak Month Flow – Non Concrete Days	Peak Month Flow – During Concrete Delivery
1	A36	57,600	8512	8568
2	A26	163,200	20685	20741
3	A37	43,200	11498	3332
4	Ringsend Rd	57,600	2976	11554
5	A37	43,200	13766	3032
6	Craigmore Rd	43,200	1457	13822
7	Terrydoo Rd	38,400	536	1513

As demonstrated from inspection of Table 12.22 sufficient residual capacity is available on each route within the Study Area to 82. 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 and not significant in terms of the EIA Regulations.

12.7.2 Accidents and Safety

- 83 All of the serious RTCs involving HGVs occurred on the M2. 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.
- It is therefore considered that the temporary increase in overall traffic, and HGVs, for the duration of the initial 84. decommissioning and construction phases of the Development is not likely to result in an effect on accidents and safety. The effect on accidents and safety is considered to be negligible and not significant in terms of the EIA regulations.

12.7.3 Pedestrian Amenity

the Study Area do not have pedestrian footways, except where they pass through settlements, and it is considered unlikely that significant pedestrian traffic is present outside of settlements. The effect of increased traffic on pedestrian amenity on routes outside of settlements is therefore considered to be low and not significant in terms of the EIA regulations.

12.7.4 Driver Delay

- 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 in terms of the EIA regulations.
- Some driver delay is expected to occur on routes due to the slow movement of abnormal load vehicles between the port and the Site entrance. Abnormal load deliveries will be timed to avoid peak 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 and not significant in terms of the EIA regulations.

12.7.5 Severance

The proposed ALV route passes through a number of settlements, notably Moorfields, which has the potential to be affected by severance. Isolated properties, including for the Sensitive Receptors referred to in **Table 12.8**, along a road do not form part of a community that could be separated by increased traffic, and therefore do not have the potential to receive severance effects, it should also be noted that any traffic effects during the initial decommissioning and construction phases will be temporary in nature. Moorfields is located on the A36, which is a trunk road. Overall traffic is predicted to increase here by a

A road traffic collision (RTC) assessment identified a number of collisions within the Study Area, as detailed in Section 12.4.5.

Pedestrian amenity, fear and intimidation can be affected by changes to traffic flow and composition. Many of the routes within

All routes within the Study Area are operating significantly below their theoretical capacity, and are predicted to continue to do

Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery.

maximum of 3% on concrete delivery days and 2% on non-concrete days during construction of the Development as detailed in Table 12.21 and Table 12.22.

It is therefore considered that the effect of severance is negligible and **not significant** in terms of the EIA Regulations. 89.

12.7.6 Noise and Vibration

- Ground-borne vibration resulting from heavy goods vehicle and turbine delivery vehicle movements is generally only likely to be significant where vehicles traverse discontinuities, such as rough surfaces (including pot-holes) or speed-humps. There is no evidence that suggests traffic induced vibrations are a source of significant damage to buildings.
- Airborne vibrations resulting from low frequency sound emitted by vehicle engines and exhausts can result in detectable 91. vibrations in building elements such as windows and doors and cause disturbance to local people. However due to the shortterm temporary nature of the increase in traffic movements, it is considered that the effect of vibration upon receptors along the route would be low and not significant in terms of the EIA Regulations.

12.7.7 Hazardous Loads

- 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.
- It is therefore considered that the effect of the transportation of hazardous substances is negligible and not significant in 93. terms of the EIA Regulations.

12.7.8 Visual Effects

The movements of ALVs could be considered visually intrusive. This effect would be short-term and would only occur during the movement of abnormal loads. It is therefore considered the visual effect as a result of the ALVs upon receptors along the routes would be negligible and not significant in terms of the EIA Regulations.

12.7.9 Air Quality

- Maintaining good local air quality is essential for the human health and overall quality of life for people living in the area. Road transport accounts for a significant proportion of emissions of a number of pollutants including carbon dioxide (CO₂), nitrogen dioxide (NO₂) and particulate matter (PM₁₀). Nitrogen oxide emissions are also of concern for nearby vegetation and ecosystems.
- This assessment considers that as the increase in traffic on haul routes is temporary and reversible that the impact on air 96. quality is negligible and not significant in terms of the EIA Regulations.

12.8 Assessment of Cumulative Effects

- 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, where identified from the list of cumulative sites identified in Technical Appendix A2.3 Cumulative List are:
 - Corkey Repowering (5 turbines)⁷;
 - Cam Burn (6 turbines);
 - Upper Ballyrogan (5 turbines);
 - Belraugh Road (1 turbine);
 - Cam Quarry (1 turbine); ٠
 - Cloghan Road (1 turbine);
 - Craig 1 (1 turbine); ٠
 - Craig 2 (1 turbine);
 - Craigmore Road (121) (1 turbine);
 - Drumhappy Road (1 turbine);
 - Islandranny Road (1 turbine);

⁷ Corkey Repowering is not included within TA A2.3, however due to potential overlap in the construction period with the potential to use the same ALV route it has been included within the cumulative assessment for completeness.

- Temain Road (1 turbine);
- Craigmore Road (1 turbine);
- Mill Road (1 turbine); and
- Ringsend Road (1 turbine);
- Table 12.23 provides daily traffic generation figures that have been assumed for each of the identified developments. Exact 98 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).
- 99. relative impacts, these events will be timed to ensure they do not coincide. It is unlikely that the local capacity for concrete production could accommodate several pours coinciding in any case.

Table 12.23 – Extrapolated Cumulative Daily Traffic Movements from Identified Developments (Peak Month – Non-**Concrete Pour Days)**

Development	No. Turbines	Total Traffic	HGV
Corkey Repowering	5	179	53
Cam Burn	6	215	64
Upper Ballyrogan	5	179	53
Belraugh Road	1	36	11
Cam Quarry	1	36	11
Cloghan Road	1	36	11
Craig 1	1	36	11
Craig 2	1	36	11
Craigmore Road (121)	1	36	11
Drumhappy Road	1	36	11
Islandranny Road	1	36	11
Temain Road	1	36	11
Craigmore Road (146)	1	36	11
Mill Road (26)	1	36	11
Ringsend Road (84)	1	36	11
Total	28	1004	300

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, as a number of the identified developments are located in various locations within the vicinity of the Development the traffic using each road will be less than stated.

Table 12.24 indicates the anticipated total traffic (including baseline) and the percentage increase above baseline in the worst-101 case cumulative scenario.

Traffic relating to the delivery of concrete during foundation pours has not been included as it is assumed that, given the

		Total Vehicle	es		HGV Only		
Ref	Road	2023 Baseline	Peak Month	%Increase	2023 Baseline	Peak Month	% Increase
1	A36	8,317	9321	12	967	1267	31
2	A26	20,490	21493	5	2,239	2539	13
3	A37	11,303	12307	9	943	1243	32
4	Ringsend Rd	2,781	3785	36	189	489	158
5	A37	13,571	14575	7	1,164	1464	26
6	Craigmore Rd	1,262	2265	80	145	445	206
7	Terrydoo Rd	341	1344	294	16	315	1920

Table 12.24 – Cumulative Daily Traffic Increase (Peak Month – Non-Concrete Pour Days)

- ^{102.} As indicated in **Table 12.24** the addition of all construction traffic from all identified cumulative developments results in a worst case increase of 294% at location reference 7 on Terrydoo Road over baseline flow.
- ^{103.} 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 TMPs would be agreed in consultation to minimise disruption. For these reasons the likely impact is expected to be significantly lower than stated in **Table 12.24**.
- ^{104.} The impact on traffic and transport due to cumulative effects is therefore considered to be low and **not significant** in terms of the EIA Regulations.

12.9 Mitigation Measures

^{105.} No significant effects were identified during the assessment, therefore no specific mitigation measures are proposed.

12.10 Summary

An assessment of the potential effects on traffic and transport during the initial decommissioning and construction phases of the Development has been undertaken. This assessment concluded that no significant effects will occur as a result of the temporary increase in traffic associated with the initial decommissioning and construction phases of the Development, nor in combination with other developments. Traffic effects during the operational phase will not be significant in terms of the EIA regulations.

13 Tourism, Recreation, Land-Use and **Socio-Economics**

13.1 Introduction

This Chapter of the ES assesses the potential effects of the Development on the tourism and recreation, land-use and socioeconomic resources, identifies whether there is any potential for significant effects to arise (both in isolation and in combination with other developments), and outlines any mitigation measures as required. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus) and BIGGAR Economics Limited. The assessment considers the potential effects during the following phases of the Development:

- Decommissioning of the Operational Rigged Hill Windfarm (Initial phase of the Development); ٠
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development; and
- Decommissioning of the Development (Final Phase).
- The initial decommissioning phase of the Operational Rigged Hill Windfarm and the construction phase is likely to occur partly 2. in tandem and would have a greater effect than if the two processes were to arise at different times. This represents the worstcase assessment parameters, when compared with the decommissioning of the proposed seven wind turbines and associated infrastructure alone. Therefore, effects during this later decommissioning phase are not considered further in this chapter.
- This Chapter of the ES is supported by the following Technical Appendix document provided in Volume 3 Technical 3. Appendices:
 - Technical Appendix A13.1: Rigged Hill Wind Farm: Socio-Economic Assessment.
- This Chapter includes the following elements:
 - Legislation Policy and Guidance; •
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - Assessment of Potential Effects; ٠
 - Mitigation and Residual Effects; ٠
 - Cumulative Effect Assessment;
 - Summary of Effects;
 - Statement of Significance; and
 - Glossary.
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

13.1.1 Study Areas

13.1.1.1 Tourism and Recreation Study Area

- For the tourism and recreation receptors, the study area is defined as land within the Site Boundary at the time of Scoping in considering direct effects, and within 10 kilometres (km) of the Site Boundary at the time of Scoping in considering indirect effects ('the Tourism and Recreation Study Area'). Cumulative effects (that may arise as a result of adding the Development to a baseline that includes other, proposed developments that are yet to be constructed and those currently operational) are considered within the same area, noting that the proposed developments with the potential to contribute to such effects may be up to 20 km from the Site Boundary at the time of Scoping.
- These Study Areas are shown in Figure 13.1. 7

13.1.1.2 Land Use Study Area

The Land-Use Study Area is defined as the footprint of the Development, either temporarily during the initial decommissioning/construction phases or permanently during the operational phase, but reversible if the Development is decommissioned in the future, as shown in Figure 3.2 and described within Chapter 3 Section 3.3.

13.1.1.3 Socio-Economics Study Area

Local Study Area') and Northern Ireland ('the Regional Study Area').

13.1.2 Design Parameters

The details of the Development are set out in Chapter 3: Development Description and shown on Figure 3.2. No further design parameters were considered as part of this assessment.

13.1.3 Elements Assessed in Full

13.1.3.1 Tourism and Recreation Considerations

- The key issues for the assessment of potential tourism and recreation effects relating to the Development are: 11
 - Direct effects upon the Ulster Way;
 - Indirect effects, including reduction in amenity or intrusion, changes in the setting and context of the recreational resource of Cam Forest, Gortnamoyagh Forest, Springwell Forest, The Views self-catering cottage and the Ulster Way; and
 - The potential for cumulative effects of the same types as set out above in combination with other developments.

13.1.3.2 Land Use Considerations

- The key issues for the assessment of potential land use effects relating to the Development are:
 - Both temporary and permanent, yet reversible effects associated with the use of the land for Development infrastructure, which would be removed in the event that the infrastructure in the future is decommissioned.

13.1.3.3 Socio-Economic Considerations

- The key issues for the assessment of potential socio-economic effects relating to the Development are:
 - · Direct effects, both temporary and permanent, arising from the employment opportunities generated during the initial area: and
 - The potential for cumulative effects of the same type as set out above were also assessed.

13.1.4 Elements Scoped out of Assessment

13.1.4.1 Tourism and Recreation Considerations

- Where appropriate, other potential effects that could have an indirect effect on tourism and recreational receptors have been assessed in the following chapters:
 - Potential landscape and visual effects, have been considered in Chapter 6: Landscape and Visual Amenity; •
 - Potential noise effects, have been considered in **Chapter 10: Noise**;
 - Potential effects upon the setting of cultural heritage assets, have been considered in Chapter 11: Archaeology and Cultural Heritage; and
 - Potential traffic effects, which are assessed in Chapter 12: Access, Traffic and Transport.
- Where relevant and as set out in Section 13.1.3.1, the effects assessed for the above topics, are also considered and form 15. part of the assessment set out in this chapter, particularly with regards to assessing the effects on the tourism and recreation resource.
- In addition, and as agreed in the Scoping Request (Technical Appendix A2.1), due to the lack of visibility of the Development 16. (as shown in Figure 6.6) from the following tourism and recreational receptors, and distance between these and the Site, they will not be further assessed in this chapter:

For the socio-economic assessment, the Study Area comprises the Causeway Coast and Glens Borough Council area ('the

decommissioning/construction and operational phases of the Development and the associated indirect economic effects (both temporary and permanent) to the wider area, such as the impact of employees spending their salaries in the local

- Garvagh Forest (8 km south-east of the Site Boundary);
- Roe Country Park (6.3 km west of the Site Boundary);
- Causeway Coast and Glens (including the Giant's Causeway (c. 30 km), Carrick-a-Rede Rope Bridge (c. 40 km), Dunluce Castle (c. 25 km), Old Bushmills Distillery (c. 30 km), Mussenden Temple (c.15 km) and Downhill Demesne (c.15 km);
- Highway to Health Walking Route (5.2 km north-west of the Site Boundary);
- Boyd's Riverside Walk (6.8 km south-west of the Site Boundary);
- Tannyranny Walking Route (6 km south of the Site Boundary); and
- National Cycle Route 93 (6.2 km west of the Site Boundary).
- No further comments were made with regards to this approach to the Scoping Request on this matter, so the approach is 17 taken as having been agreed.

13.1.4.2 Land Use Considerations

No aspect of the land use assessment was scoped out.

13.1.4.3 Socio-Economic Considerations

No aspect of the socio-economic assessment was scoped out.

13.2 Assessment Methodology

13.2.1 Legislation, Policy and Guidance

The following guidance, legislation and information sources have been considered in carrying out this assessment:

- Energy, A Strategic Framework for Northern Ireland (2010), Department for Enterprise, Trade and Investment (DETI)¹;
- Onshore Wind: The UK's Next Generation. 2019. Renewable UK (REUK)²
- Building a Better Future, Regional Development Strategy for Northern Ireland 2035, Department for Regional Development³;
- Everyone's Involved Sustainable Development Strategy (Northern Ireland Executive)⁴;
- Sustainable Development Implementation Plan 2011 2014: Focus on the Future (Northern Ireland Executive)⁵:
- Strategic Planning Policy Statement for Northern Ireland (SPPS): Planning for Sustainable Development (DoE)⁶;
- Planning Policy Statement (PPS) 16: Tourism (2013) (Do E)⁷;
- PPS 18: Renewable Energy (2009) (DoE)⁸; ٠
- PPS 21: Sustainable Development in the Countryside (2010)⁹;
- The Northern Area Plan (2016) (DoE)¹⁰;
- Causeway Coast and Glens Borough Local Development Plan 2030 Tourism Topic Paper 14 [Draft] (Causeway Coasts and Glens Borough Council)¹¹;
- Causeway Coast and Glens Borough Council Economic Strategy and Action Plan 2015 to 2018¹²; and
- Causeway Coast and Glens Borough Council Drumsurn Village Plan (2018)¹³

13.2.1.1 Strategic Energy Framework (DETI)

The 2010 Strategic Energy Framework (SEF)¹ details Northern Ireland's energy future over the next ten years and illustrates the key energy goals in terms of building competitive markets, enhancing sustainability, ensuring security of supply and

⁴ Northern Ireland Executive, 27 May 2010, Everyone's Involved Sustainable Development Strategy [Online]. Available at https://www.nienvironmentlink.org/cmsfiles/policy-hub/files/documentation/Waste/Sustainable-Development-Strategy.pdf

⁵ Northern Ireland Executive, 2010, Sustainable Development Implementation Plan 2011 – 2014: Focus on the Future [Online]. Available at: https://www.daera-ni.gov.uk/sites/default/files/publications/ofmdfm_dev/focus_on_the_future.pdf

The Department of the Environment, September 2015. Strategic Planning Policy Statement for Northern Ireland (SPPS) [Online]. Available at: http://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf

⁷ The Department for the Environment, June 2013, Planning Policy Statement 16: Tourism [Online]. Available at:

https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/final_pps16_tourism_june_2013_p df.pdf

https://www.planningni.gov.uk/index/policy/planning statements and supplementary planning guidance/planning policy statement 18 ren ewable energy.pdf

developing energy infrastructure. The SEF also confirms new and ambitious electricity and renewable targets including a 40% renewable electricity goal for 2020. Two key actions listed under the enhancing sustainability goal include:

- further afield
- field."

13.2.1.1.1 DETI – Envisioning the Future

- In 2013, the Department for Enterprise, Trade and Investment (now replaced by the Department of the Economy) published a 22. report¹⁴ outlining different scenarios for Northern Ireland's energy system up to 2050 and how early decisions can affect its development.
- The main conclusions of the report are that an ambitious reduction in greenhouse gas emissions would require: 23.
 - Renewable electricity as the main form of electricity generation;
 - A higher uptake of renewable heat;
 - Improved energy efficiency; and
 - Higher uptake of electric vehicles.
- If these aims were to be achieved, this would reduce greenhouse gas emissions by 55% to 80%, while reducing fossil fuel 24. 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.

13.2.1.2 Shaping our Future Regional Development Strategy for Northern Ireland 2035

- The Regional Development Strategy³ (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;
 - Quality: and
 - RG11: Conserve, Protect and, where possible, Enhance Our Built Heritage and our Natural Environment.

13.2.1.3 Strategic Planning Policy for Northern Ireland (SPPS):

- The SPPS for Northern Ireland⁴ was published in September 2015 and contains 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.
- 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

⁹ The Department for the Environment, 2010, Planning Policy Statement 21: Sustainable Development in the countryside [Online]. Available

https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/planning_policy_statement_21_pp <u>s21</u> sustainable development in the countryside-3.pdf ¹⁰ The Department for the Environment, 2015, The Northern Area Plan 2016 [Online]. Available at:

https://www.planningni.gov.uk/northern_2016.htm

Causeway Coast and Glens Borough Council, December 2016, Local Development Plan 2030 - Tourism Topic Paper 14 [Draft] [Online]. Available at: https://www.causewaycoastandglens.gov.uk/uploads/minutes/Item 6 Discussion Paper 14 - Tourism.pdf ¹² Causeway Coat and Glens Borough Council, April 2015. Economic Strategy and Action Plan 2015 to 2018 [online] Available at https://www.causewaycoastandglens.gov.uk/uploads/general/CCG Economic Dev Strategy and Action Plan - final.pdf ³ Causeway Coast and Glens Borough Council Drumsurn Village Plan, June 2018. [Online] available at https://www.causewaycoastandglens.gov.uk/work/regeneration/village-renewal [accessed 15/04/2019] ¹⁴ DETI (2013), Envisioning the Future: Considering Energy in Northern Ireland to 2050

• "SEF 30: Promote and raise awareness of supply chain opportunities in sustainable energy technologies both locally and

SEF 31: Support the growth of suitable manufacturing or tradeable service companies operating in the sustainable energy

RG9: Deliver our Carbon Footprint and Facilitate Mitigation and Adaptation to Climate Change Whilst Improving Air

¹ Department for Enterprise, Trade and Investment (DETI), 2010, Energy, A Strategic Framework for Northern Ireland, [Online]. Available at: https://www.economy-ni.gov.uk/sites/default/files/publications/deti/sef%202010.pdf

² RenewableUK (2019), Onshore Wind: The UK's Next Generation

³ Department for Regional Development, 2010, Building a Better Future, Regional Development Strategy for Northern Ireland 2035, [Online] Available at https://www.planningni.gov.uk/index/policy/rds2035.pdf

⁸ The Department for the Environment, August 2009, Planning Policy Statement 18: Renewable Energy [Online]. Available at:

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.

13.2.1.4 The Northern Area Plan 2016

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 Northern Area Plan 2016¹⁰ is currently the Local Development Plan (LDP) for the four legacy council areas until the council adopts its own LDP. This plan 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.

13.2.1.5 Causeway Coasts and Glens Local Development Plan 2030

- As detailed in Section 13.2.1.5, the current LDP is the Northern Area Plan 2016, however the Council is currently in the preparatory stages of producing the LDP 2030¹¹ with the preferred options paper¹⁵ published in June 2018. This includes preferred options for wind energy development and engagement in this process is recommended. The plan strategy is currently timetabled to be issued in autumn/winter 2019 for consultation and it is anticipated these will be adopted in autumn 2021 after independent examination.
- As part of the Preferred Options Report, a policy review was undertaken by the Council. From the review process, it was 30. concluded that PPS 16: Tourism does not require any substantial change.
- The Draft Local Policies Plan will be published for consultation in autumn 2022 and it is anticipated to be adopted in winter 31. 2022. To date the following relevant Topic Papers have been presented to the Committee¹⁶:
 - Population and Growth; •
 - Environment:
 - Employment and Town Centres;
 - Open Space, Sport and Outdoor Recreation;
 - Housing;
 - Countryside Pressure Analysis; and
 - Tourism.

13.2.1.6 Causeway Coast and Glens Borough Council Economic Strategy and Action Plan 2015 to 2018

- The Council's Economic Strategy Error! Bookmark not defined. was published in April 2015 and discusses how it aims to build a strong economy. The report highlights a number of priorities including:
 - Becoming more competitive and innovative; ٠
 - Expanding and developing the tourism sector;
 - Developing business opportunities in growing areas such as the renewable energy sector, digital causeway, the knowledge industry and the agri-food sector; and
 - Ensuring that local infrastructure meets business needs, including the development to reduce high electricity costs.

13.2.1.7 Causeway Coasts and Glens Borough Council Drumsurn Village Plan

- Drumsurn is the closest village to the Site. The Village Plan was published in June 2018 and four themes were identified to develop the village:
 - Providing additional facilities at the community centre to support its necessary refurbishment; ٠
 - Improving the village signage including directional signage to the community centre;
 - Developing a natural pathway between the playgroup and the primary school which would be available for the whole community; and
 - Developing community allotments and the community garden and improve green spaces.

13.2.2 Scoping Responses and Consultations

Consultation for this ES topic was undertaken with the organisations shown in Table 13.1.

Table 13.1: Consultatio	on Responses		
Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Tourism NI	Scoping Response, 14/09/2017	Tourism NI does not provide comments on Scoping Requests or participate in pre-application discussions.	Noted.
Bannside Rambling Club	Scoping Response, 20/09/2017	Bannside Rambling Club frequently utilise the tracks within Cam Forest and the Operational Rigged Hill Windfarm. The Club has no objection to the Ulster Way being temporarily diverted during the construction of the Development.	Comments are noted. Please see Section 13.5.1 .
The Honourable The Irish Society	Scoping Response, 21/09/2017	 The Society owns rights on townlands surrounding the Development for: Timber trees; Sporting and access rights; Fishing rights to the River Bann, River Foyle and River Roe; River beds; and Quarrying and mineral rights. 	The Applicant is aware of these rights and have liaised directly with The Honourable The Irish Society The Development replaces an existing scheme and has sought to minimise any effects on water courses as outlined in Chapter 7: Hydrology, Hydrogeology, Geology, Soils and Peat .

13.2.3 Methodology for the Assessment of Effects

- The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect. The methodology for the assessment of effects for this chapter follows that detailed in Chapter 2: EIA Methodology of this ES. The potential types of effects, sensitivity, magnitude and significance criteria for the assessment of socio-economics, tourism and recreation and land use are provided below.
- in Table 13.2. In addition, they are described as beneficial or adverse.

Table 13.2: Type of Effect

Type of Effect	Description
Direct Effect	For example: Jobs created during the decommission Development; Physical disturbance to the land-use r phases, such as the footprint of the De impacting on any rights of access.
Indirect Effect	For example:

¹⁶ Causeway Coast and Glens Borough Council (2019). Development Plan (web page). Available at: https://www.causewaycoastandglens.gov.uk/live/planning/development-plan [accessed on 11/04/2019]

Effects on the tourism, recreation and socio-economic resource can be described as direct, indirect or cumulative as outlined

ning/construction, and operational phases of the

esource within the initial decommissioning/construction evelopment or decommissioning/construction activities

¹⁵ Causeway Coast and Glens Borough Council, 2018. Local Development Plan Preferred Options Paper. [Online] Available at https://www.causewaycoastandglens.gov.uk/uploads/general/CCGBC Local Development Plan 2030 - POP.pdf [accessed 15/04/2019]

Type of Effect	Description
	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 Effect	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.

13.2.3.1 Sensitivity of Receptors

- The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site, or the 37. sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.
- Table 13.3 details the framework for determining the sensitivity of receptors. 38.

Table 13.3: Framework for Determining 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).

13.2.3.2 Magnitude of Effect

- The magnitude of potential effects will be identified through consideration of the Development, the degree of change to 39 baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.
- The criteria for assessing the magnitude of an effect are presented in Table 13.4. 40.

Table 13.4: Framework for Determining 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.

¹⁷ Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment.

13.2.3.3 Significance of Effect

The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional 41. judgement, to predict the significance of the likely effects. Table 13.5 summarises guideline criteria for assessing the significance of effects.

Table 13.5: Framework for Assessment of the 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		

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA 42. Regulations, and are shaded in light green in the above table.

13.2.3.4 Assessment Limitations

Whilst efforts have been made to ensure that the key tourism and recreation facilities in the area have been identified through a combination of desk studies, site visits and consultation with key stakeholders including the Council and The Honourable The Irish Society, it is possible that there are a number of small attractions that will not have been identified through the data collection process.

13.3 Baseline Survey Methodology

- 13.3.1 Tourism and Recreation Baseline Methodology Tourism and recreation effects will be considered based on the guidance from Guidelines for Environmental Impact
- Assessment¹⁷ and a Handbook for EIA¹⁸ and consider:
 - Tourism; and
 - Public attitudes to windfarms.
- The following sources of information have been used to inform the tourism and recreation baseline description set out in this 44. Chapter:
 - Causeway Coast and Glens Borough Council (<u>www.causewaycoastandglens.gov.uk);and</u> in particular:
 - Discussion Paper 14: Tourism¹⁹; and
 - Discussion Paper 7: Open Space, Sport and Outdoor Recreation²⁰;
 - Tourism NI (www.tourismni.com); •
 - Walk NI (<u>www.walkni.com</u>); and •
 - Sustrans (Northern Ireland) (www.sustrans.org.uk/northern-ireland).
- Information concerning the public's perception of windfarms has been gathered from studies undertaken across the UK and 45. the Republic of Ireland.

13.3.2 Land Use Baseline Methodology

Baseline conditions have been established through desktop studies, including mapping and aerial imagery, and site visits (August 2017).

²⁰ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper, Discussion Paper 7: Open Space, Sport and Outdoor Recreation. Available at: https://www.causewaycoastandglens.gov.uk/uploads/general/Discussion_Paper_7_-_Open_Space,_Sport_and_Outdoor_Recreation.pdf [accessed on 15/02/2019].

¹⁸ SNH (2003) A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment.

¹⁹ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper, Discussion Paper 14: Tourism. Available at: https://www.causewaycoastandglens.gov.uk/uploads/general/Discussion_Paper_14_- Tourism.pdf [accessed on 15/02/2019].

13.3.3 Socio-Economic Baseline Methodology

The following sources of information have been used to inform the socio-economic baseline description set out in this chapter: 47

- Northern Ireland Statistics and Research Agency (www.nisra.gov.uk); ٠
- Department for the Economy Northern Ireland (www.economy-ni.gov.uk); and
- Office for National Statistics (www.ons.gov.uk).
- Additionally, Technical Appendix A13.1 Socio-Economic Assessment has been used.

13.4 Baseline Description

This section details information relating to tourism and recreation within the tourism and recreational study area, the current land use of the Site, and the current socio-economic conditions within the socio-economic study areas.

13.4.1 Tourism and Recreation Baseline

- The Causeway Coast and Glens area is the second most visited area after Belfast with almost 1.1 million overnight trips in 2017 which is equivalent to 21% of the total overnight trips made to Northern Ireland that year. Since 2011, the number of visitors to Causeway Coast and Glens has increased by 33%, compared to 23% growth in Northern Ireland as a whole.
- The Limavady Borough has a varied landscape that stretches from the Sperrin Mountains in the south to Benone beach to the north along the Atlantic coast. The region offers a range of scenic, historic, family and leisure attractions including the Roe Valley Country Park, Dungiven Castle and the Sperrin Mountains.
- 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 1983²¹, 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.
- In addition, in some areas of Northern Ireland, there is de facto access to open land. This means that the landowners tolerate 53. access but, irrespective of the historic use of the land, there is no legal basis to the situation²².
- Many walking routes in the Causeway Coast and Glens are not formally designated public rights of way and access depends 54. on the goodwill and tolerance of local landowners. The Ulster Way passes through the Site and currently utilises the existing tracks associated with the Operational Rigged Hill Windfarm. The Ulster Way is a 1,000 km long circular walking route in Northern Ireland. When Rigged Hill Windfarm became operational in 1994, a section of the Ulster Way between Dungiven and Castlerock was diverted to make use of the tracks associated with the windfarm (see Figure 13.2). As a long-distance footpath, it is of regional importance (at the Northern Ireland level), and of medium sensitivity (see Table 13.3).
- In addition, the Ulster Way also utilises tracks within Cam Forest which is located immediately adjacent to the northern and 55. eastern boundaries of the Site, and is managed by the Northern Ireland Forest Service (NIFS) (see Figure 13.2). Cam Forest covers an area of 1,300 hectares (ha) and contains approximately 35 km of tracks which are frequently used by walkers, runners, mountain bikers and horse riders²³. The Forest is important at the scale of Causeway Coast and Glens, and is therefore assessed as being of low sensitivity (see Table 13.3).

- Gortnamoyagh Forest, 3 km south-east of the Site Boundary, 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 13.3).
- Springwell Forest, 3 km north of the Site Boundary has no formal recreational facilities, but has a small car park with picnic tables. The Forest is used for walking, with the Ulster Way passing through the Forest²⁴. The Forest is important at the scale of Causeway Coast and Glens, and is therefore assessed as being of low sensitivity (see Table 13.3).
- Highway to Health is a 3-mile circular walking route located 5.2 km north-west of the Site. Boyd's Riverside Walk is a 2-mile 58 riverside walk located 6.8 km south-west of the Site Boundary. Given the distance between the Site and the walking routes, and as agreed within the Scoping Report, these have been scoped out from this chapter.
- Garvagh Forest, 8 km south-east of the Site Boundary is used for outdoor activities including walking and mountain biking. 59. Given the distance between Garvagh Forest and the Site, and as part of the Scoping process, this receptor has been scoped out from further assessment.
- 60 The Roe Valley Country Park, located approximately 6 km west of the Site Boundary, is a forested area containing part of the River Roe, south-west of Limavady. The park offers a variety of walking routes along the riverside and through wooded areas as well as offering other activities including rock climbing, canoeing and fishing. Given the distance between the receptor and the Site, and as agreed as part of the Scoping process, the Roe Valley Country Park has been scoped out from further assessment.
- National Cycle Route (NCR) 93, a 265-km cycle route which connects Derry/Londonderry and Belfast passes through Limavady and is located approximately 6 km west of the Site at its nearest point. In addition. Sperrin Route 11 (or the Eagle Glens Cycle Route) is located approximately 3 km south-east of the Site and is a circular cycling route which connects Gortnamoyagh Forest and Garvagh Forest. The route utilises the B190 and B64 roads, the latter of which forms part of the North Sperrins Scenic Driving Route from Swatragh and Dungiven²⁵. Given the distance between the cycle route and the Site, and as agreed as part of the Scoping process, the NCR 93 has been scoped out from further assessment.
- The Council's Discussion Paper 7: Open Space, Sport and Outdoor Recreation²⁶ focuses on children's play areas and sports 62 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.
- filming locations within the Causeway Coast and Glens region that have been featured in the fantasy TV series 'Game of Thrones' including the Dark Hedges near Armoy, Cushendun and Ballintoy Harbour. The majority of the filming locations are located on the eastern and northern coastlines of Northern Ireland, at c. 30 km from the Site. The Dark Hedges, a tunnel-like avenue of intertwined beech trees, is located more inland, approximately 30 km north-east of the Site. Two of Northern Ireland's top 10 tourist attractions²⁷ are in Causeway Coast and Glens Borough: The Giants Causeway and Carrick-a-Rede Rope Bridge. These are both c. 40 km from the Site with no visibility of the Development. As a result of being outside the Study Area, and therefore too distant to receive significant effects, these are not considered further in the assessment.
- 64 this visitor accommodation is considered further within this assessment. The Weefield B&B and Rockhill B&B are located to the east of the Site on the other side of Cam Forest, and due to the screening provided by Cam Forest, it's unlikely that there will be any visibility of the Development. Carrick Lodge and Roe River Cottage lie on the B68 to the west of the Site, with the Roe Park Resort and Drenagh Country Estate located approximately 7 km from the Site. The remainder of visitor accommodation is concentrated within the town of Limavady, approximately 6 km north-west of the Site. Given the separation distances involved, visitors to these properties are highly unlikely to be substantially affected by a slight change in view, where

There are notable tourist attractions in the region, but outside the Tourism and Recreation Study Area. These include several

The closest visitor accommodation is The Views, a self-catering cottage adjacent to the Site. Due to its proximity to the Site,

²¹ The Access to the Countryside (Northern Ireland) Order 1983. Available online at: <u>https://www.legislation.gov.uk/nisi/1983/1895</u> [Accessed on 22/09/2017]

²² NIEA (Undated) Access to the Countryside – The Legal Position in Northern Ireland – Preliminary Note. Available online at: http://www.outdoorrecreationni.com/wp-content/uploads/2015/11/Access-to-the-Countryside_The-Legal-Position-in-Northern-Ireland_NIEA.docx+&cd=1&hl=en&ct=clnk&gl=uk [Accessed on 22/09/2017]

¹³ Cam Forest. Available online at http://www.outdoorni.com/local-outdoors/venues/cam-forest/ [Accessed 29/04/2019].

²⁴ Springwell Forest. Available online at <u>https://www.nidirect.gov.uk/articles/springwell-forest</u> [Accessed 29/04/2019].

²⁵ Discover Tyrone and Sperrins. Sperrins Scenic Driving Routes. Available online at: http://www.discovertyroneandsperrins.com/attraction/sperrins-scenic-driving-routes/ [Accessed on 26/09/2017] ²⁶ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper, Discussion Paper 7: Open Space, Sport and Outdoor Recreation. Available at: https://www.causewaycoastandglens.gov.uk/uploads/general/Discussion_Paper_7_-_Open_Space,_Sport_and_Outdoor_Recreation.pdf [accessed on 15/02/2019]. ²⁷ Causeway Coast and Glens Borough Council (2018). Local Development Plan 2030: Preferred Options Paper, Discussion Paper 14: Tourism. Available at: https://www.causewaycoastandglens.gov.uk/uploads/general/Discussion Paper 14 - Tourism.pdf [accessed on 15/02/2019].

such views are available, and effects on visitors at these visitor accommodations would not be significant, and are not considered further in this chapter.

13.4.1.1 Public Attitudes towards Windfarm Development

- Existing studies into the attitudes of visitors, tourists and tourism organisations towards windfarms in the UK suggests that renewable energy schemes have their own tourism pull. Independent UK studies have shown that the adverse effects of windfarms on tourism are negligible, and there is a growing body of evidence to suggest that windfarms can become tourist attractions in their own right.
- The most recent studies²⁸ regarding public attitudes to renewable energy has shown that support for renewable energy has 66. remained high with 79% expressing support for the use of renewables. Opposition to renewables was very low at 4%, with only 1% strongly opposed. 77% of respondents felt that renewable energy projects should provide direct benefits to the communities in which they are located, whilst 70% agreed that renewable industries and developments provide economic benefits to the UK. 58% said they would be happy to have a large-scale renewable development in their own area.
- Interactions conducted omnibus research for The Irish Wind Energy Association²⁹ in 2017 as well as online research in November 2018 in order to measure and track perception and attitudes around wind power amongst Irish adults. 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'. There was weaker recognition of employment benefits in 2018 versus 2017.
- 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 windfarm development, and less than 5% of domestic (Northern Irish) tourists said they would be discouraged from returning to an area that had windfarms³⁰. Research by VisitScotland in April 2012 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 windfarm³¹. In addition, 52% of all respondents disagreed that windfarms spoil the look of the UK/Scottish countryside, with a further 29% neither agreeing nor disagreeing.
- This survey backs up a previous study commissioned by the Scottish Government in 2008 to investigate the economic effects of wind farms on Scottish tourism³². This study found that three quarters of all respondents felt that windfarms 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 windfarm during their visit to Scotland stated that this would not impact their intentions to return to Scotland for future holidays³².
- Likewise, research of visitor attitudes to windfarms in the Republic of Ireland observed that 47% of tourists consider that windfarms actually have a positive effect, and only 10% think they have very negative effects³³.
- A study by BiGGAR Economics³⁴ examined data to test if there was a correlation between the presence of windfarms 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."

- 72. In a Public Local Inquiry for a Section 36 windfarm application at Harburnhead (reported in July 2014), West Lothian in Scotland, the reporter concluded the following in relation to potential effects on tourism: "If windfarms had a significant adverse impact on the number or experience of visitors, we would expect clear evidence of this by now."35
- Windfarms 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.
- Rigged Hill Windfarm, located within the Causeway Coast and Glens Council area and operated by ScottishPower 74. Renewables, has incorporated the Ulster Way walking route onto its access tracks. Educational visits have been actively encouraged and hosted at the operational Rigged Hill Windfarm, over a number of years. RES has collated visitor numbers from these organised educational visits in relation to windfarm sites from 1995-2012 as part of the 2013 Meenamullen Windfarm ES³⁶. During this period there were 5,303 visitors visiting the operational Rigged Hill Windfarm, compared with 924 to Corkey Windfarm (also operated by ScottishPower Renewables), 7344 to Elliot's Hill and 440 to Gruig. All visitors to the Operational Rigged Hill Windfarm were recorded from 1995 – 2006 with the highest number of visitors occurring in 1995 and 1997. There has been no formal recording of visitors since 2006. The Operational Rigged Hill windfarm is also referred to in promotional material encouraging use of the Ulster Way³⁷.
- The Altahullion Windfarm, located c. 25 km west of the Site has a dedicated tourist turbine, which is signposted from the main A6 Dungiven to Derry Road on brown tourist signage, and which has received positive comments from walkers in the area³⁸. It is included on the Park to Limvady Cycle Route, an 18-mile section of the NCN 93. The route passes the operational windfarm, and route guidance actively encourages users to "get up close and personal with a turbine³⁹".
- 76. the windfarm, and this aims to improve awareness of renewable energy and sustainable energy.
- Elsewhere, in Scotland, Whitelee Windfarm (operated by ScottishPower Renewables) regularly attracts walkers, runners, cyclists and horse riders to use it's 130 km of trails on a daily basis. The windfarm also hosts an annual trail running event ('Run the Blades') which offers three distances (10 km, half marathon and 50 km ultramarathon) and attracts over 500 participants⁴¹. There are also a wide range of other ranger-led events taking place on a regular basis within the windfarm, from children's summer clubs to weekly stroller walks⁴².
- The above evidence and studies highlight the varying opinions of visitors regarding wind energy development; however, they suggest that the majority of those surveyed do not have negative attitudes towards windfarms and that windfarm sites and the Operational Rigged Hill windfarm are and have been tourist destinations in their own right.

13.4.2 Land-Use Baseline

- 79. ridge set between Temain Hill to the south of the Site (376 m AOD) and Boyd's Mountain (329 m AOD). Information on the habitats enclosed within the Site Boundary is set out in Chapter 8: Ecology and Fisheries, Section 8.5.6.
- The land use at the Site is upland agriculture (moorland and sheep grazing), which is of relatively low economic value and is 80. commonplace in Northern Ireland. Environmental benefits are associated with areas of active bog within the Site, and effects on this as a receptor are assessed in Chapter 8: Ecology. The value of the land use at the Site is increased as a result of the Operational Rigged Hill Windfarm, which, with a small land footprint, adds substantial economic and environmental value to

Altaveedan Windfarm regularly attracts interest from locals and visitors⁴⁰. Educational visits are encouraged by the operator of

The Site occupies the summit of Rigged Hill (377 m above ordnance datum (AOD)) which takes the form a north-south running

²⁸ Department for Business, Energy and Industrial Strategy, May2017, Energy and Climate Change Public Attitude Tracker, Wave 21 [Online]. Available at: https://www.gov.uk/government/statistics/energy-and-climate-change-public-attitude-tracking-survey-wave-21 ²⁹ Interactions, IWEA Public Attitude Monitor 2018., Available Online at https://www.iwea.com/images/files/iwea-report-2018.pdf

[[]access18/2/19]

³⁰ NITB (2011). Windfarms

³¹ VisitScotland (2012) Wind Farm Consumer Research. Available online at:

http://www.visitscotland.org/pdf/Windfarm%20Consumer%20Research%20final_docUpdatedx.pdf [Accessed on 26/09/2017]

³² Glasgow Caledonian University, Moffat Centre and CogentSi (2008). The Economic Impacts of Wind Farms on Scottish Tourism. Available online at: http://www.gov.scot/Resource/Doc/214910/0057316.pdf [Accessed on 26/09/2017]

³³ Fáilte Ireland and Millward Brown Lansdowne (2012). Attitudes to Wind Farms in the Republic of Ireland. Available online at:

http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf [Accessed on 15/09/2017]

³⁴ BiGGAR Economics (2016). Wind Farms and Tourism Trends in Scotland. Available at: <u>http://www.biggareconomics.co.uk/wp-</u> content/uploads/2016/07/Research-Report-on-Wind-Farms-and-Tourism-in-Scotland-July-16.pdf [accessed on 16/02/2019]. The Scottish Government, (2014), Harburnhead Wind Farm Decision Notice. Available online at: http://www.dpea.scotland.gov.uk/Document.aspx?id=206011 [Accessed on 15/09/2017] ³⁶ RES Group (2013). Chapter 19: Socio Economic and Tourism Assessment. ³⁷ WalkNI.com (2019). Dungiven to Castlerock incorporating the North Sperrins way/directions. Available at: http://www.walkni.com/ulsterway/sections/dungiven-to-castlerock-incorporating-the-north-sperrins-way/directions/ [accessed on 08/07/2019]. ³⁸ WalkNI.com (2019). Benbradagh. Available at: http://www.walkni.com/walks/172/benbradagh/ [accessed on 16/02/2019]. ³⁹ Cycle N (2015) Park to Limvady. Available online at http://www.cycleni.com/61/park-to-limavady/

⁴⁰ RES (2019). Altaveedan Wind Farm Local Benefits. Available online at http://www.altaveedan-windfarm.co.uk/benefits/#

⁴¹ <u>http://www.breakingstrain.co.uk/run-the-blades/</u>

⁴² East Renfrewshire Council, Events Programme (Whitelee Ranger Service). Available online at: http://www.eastrenfrewshire.gov.uk/whitelee-events

the Site. In combination, these three factors are assessed as leading to the land use at the Site being of importance at the Causeway Coast and Glens level, and hence of low sensitivity (see Table 13.3).

13.4.3 Regional Socio-Economic Baseline

- The Site is located approximately 6.2 km south-east of Limavady in Derry/Londonderry, within the Causeway Coast and Glens Borough Council area (the Council). The Borough Council area was established on the 1st April 2015 and encompasses most of the northern coast of Northern Ireland 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. Socio-economic and 82. census data from 2014 indicates that there is a resident population of 142,303 in the Causeway Coast and Glens area⁴³. Recent population growth in this area has been significantly lower than the Northern Ireland average, with an increase of 1.9% compared to 6.6%⁴⁴. Currently, there is a 66% employment rate in the Causeway Coast and Glens area with 27% economically inactive. The largest employment sectors for the region includes distribution services, production and other services, with 12% of the population employed within the tourism trade⁴⁵. In 2013, the energy sector in Northern Ireland employed 2,200 people, and the number of energy sector enterprises has increased by 86% between 2010 and 2014⁴⁶.
- Wholesale and retail sectors employ the highest proportion of the Causeway Coast and Glens population at 20.6%, with the 83. human health and social services sector employing 17.9%. Construction, which is associated with some windfarm contracts, employs 6.6% of the population in Causeway Coast and Glens compared to 4.6% nationally (see Technical Appendix A13.1).

13.4.4 Economic Value of the UK Renewable Industry

In 2017, businesses activity in the UK low carbon and renewable energy (LCRE) economy generated £44.5 billion in turnover and employed an estimated 209,500 full-time equivalent (FTE) employees. This was an increase of 6.8% and 0.6% respectively when compared with 2016⁴⁷. The LCRE economy accounted for around 1% of total UK non-financial turnover and employment in 2017, similar to 2016 and 2015 (Table 1). This figure is slightly higher for Wales, Scotland and Northern Ireland than England and the UK as a whole, suggesting that the LCRE economy is relatively more important in those regions.

Table 13.6 Low carbon and renewable energy economy, turnover and employment, UK and constituent countries, 2015 to 2017

		Low carbon and renewable energy economy			Percentage of total non-financial business economy activity		
	2015	2016	2017	2015	2016	2017	
Turnover (£ billions)							
UK	40.4	41.7	44.5	1.3	1.3	1.2	
England	32.4	32.6	35.6	1.2	1.1	1.1	
Scotland	5.3	5.5	5.9	2.4	2.6	2.4	
Wales	1.8	2.4	1.8	1.8	2.4	1.7	
Northern Ireland	0.9	1.1	1.2	1.3	1.5	1.4	
Employees UK (FTE)							
UK	202,200	208,300	209,500	0.9	0.9	0.9	

⁴³ Invest Northern Ireland (2016) Causeway Coast & Glens Council Area Profile. Available online at:

		Low carbon and renewable energy economy			centage of total business eco	non-financial nomy activity
England	165,300	165,100	173,000	0.8	0.8	0.8
Scotland	22,100	23,900	21,400	1.2	1.2	1.1
Wales	10,400	12,800	9,300	1.1	1.3	0.8
Northern Ireland	4,400	6,500	5,900	0.9	1.3	1.1

Source: Office for National Statistics - Low Carbon and Renewable Energy Economy Survey Notes:

- Figures may not sum due to rounding. Regional estimates may not sum 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.
- nearest £0.1 billion.
- Turnover within the renewable energy sector grew by over 10% from £13.8 billion in 2016 to £15.3 billion in 2017. The onshore wind sector accounted for £2.8 billion (6.3% of UK LCRE) turnover and employed 5,300 (2.5% of UK LCRE) FTEs in 2017.
- 86. are key themes that occur in the strategic economic, environmental and energy policy context documents for Northern Ireland. The drive towards generating more energy from renewable sources is a key policy theme which is supported within the wider planning policy guidance.
- The Northern Ireland Economic Strategy⁴⁸ sets out Northern Irelands priorities for sustainable growth and prosperity up to the vear 2030. Energy infrastructure is one of the types of economic infrastructure highlighted as helping to achieve this. A Revised Economic Strategy was published in 2016 and draws attention to the need for green sustainable growth to ensure that resources are available for future generations.
- The Strategic Energy Framework⁴⁹ outlines Northern Ireland's direction for energy policy. Onshore wind is recognised as the 88 most established source of renewable energy in Northern Ireland. It recognises Northern Ireland's dependence on imported fossil fuels to meet energy needs which impacts the security of the supply. The Department of Enterprise, Trade and Investment (DETI) has established the aim of developing a more secure and sustainable energy system where:
 - 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.
- To achieve this a target of 40% of electricity from renewable sources by 2020 has been set, but it is clear that an updated Energy Strategy is required to look beyond 2020.
- The UK Climate Change Act⁵⁰ sets a target for the year 2050 for a reduction in greenhouse gas emissions by 80% lower than 90. the 1990 baseline year. A recent amendment to the act (dated 26th June 2019), to be introduced from July 2019 onwards, commits the UK to a reduction in greenhouse gases by 100% lower than the 1990 baseline, following the declaration of a

Number of full-time equivalent (FTE) employees is rounded to the nearest 100, all other variables are rounded to the

Investment in energy infrastructure and an aim to meet the renewable energy target of 40% from renewable sources by 2020

https://secure.investni.com/static/library/invest-ni/documents/a-desktop/council-area-profile-causeway-coast-and-glens.pdf [Accessed on 05/07/2017]

⁴⁴Causeway Coasts and Glens Borough Council (2015) Discussion Paper 1: Population and Growth. Available online at: https://www.causewaycoastandglens.gov.uk/uploads/general/Topic_Paper_1_-_Population_and_Growth.pdf [Accessed on 05/07/2017] ⁴⁵ Invest Northern Ireland (2016) Causeway Coast & Glens Council Area Profile. Available online at:

https://secure.investni.com/static/library/invest-ni/documents/a-desktop/council-area-profile-causeway-coast-and-glens.pdf [Accessed on 05/07/2017]

⁴⁶ Department of Enterprise, Trade and Investment (2016) Energy in Northern Ireland 2016. Available online at: https://www.economyni.gov.uk/sites/default/files/publications/deti/energy-northern-ireland-2016.pdf [Accessed on 05/07/2017] Office for National Statistics, Jan 2019, Low Carbon and Renewable Energy Economy, UK: 2017, Available at https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2017, [accessed 02/04/19] ⁴⁸ Northern Ireland Executive (2012), Economic Strategy: Priorities for sustainable growth and prosperity [online] available at https://www.northernireland.gov.uk/sites/default/files/publications/nigov/ni-economic-strategy-revised-130312_0.pdf ⁴⁹ Department of Enterprise, Trade and Investment (2010), Strategic Energy Framework for Northern Ireland. [online] available at https://www.economy-ni.gov.uk/publications/energy-strategic-framework-northern-ireland

"Climate Emergency" by the UK Government. The amendment to this act will have direct implications on Northern Irish Energy Policy in the future.

- DETI produced a report in 2013 titled Envisioning the Future: Considering Energy in Northern Ireland⁵¹ to 2050 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.
- NIRIG, the industry body for the renewables sector in Northern Ireland, published its energy strategy in 2018⁵², setting out a 92. vision for Northern Ireland's continued economic growth utilising sustainable, low carbon, low-cost electricity generation from resources such as onshore wind, solar and storage.
- NIRIG have also published a vision for energy in 2050⁵³, which sets targets for energy generation: 93.
 - 40x20 40% of electricity from renewable sources by 2020, increasing from 35% currently;
 - 70x30 renewable sources provide 70% of electricity. This would include 2.2GW of onshore wind, 400 MW of solar • generation, 200,00 electric vehicles, 117,00 heat pumps and 340 MW of battery storage; and
 - 100x50 a fully decarbonised energy sector by 2050, with a diverse energy mix, competitive markets, maximised lowcarbon generation and energy efficiency measures.
- A report by Baringa, which considered the costs and benefits to consumers of wind energy in Northern Ireland⁵⁴, found that 94. there was a net benefit to consumers between 2000 and 2020 as a result of increased deployment of wind energy. The report concluded that the deployment of 1.4 GW of wind generation capacity in Northern Ireland between 2000 and 2020 will result in a total net benefit to consumers, over 20 years, of £0.1bn (£135 million to be exact), which equates to a net benefit of about £4 per person per year.
- To date in Northern Ireland, SPR operates 5 onshore windfarms and 1 offshore windfarm within the Irish Sea. The West Duddon Sand Offshore Windfarm enabled the construction of a £50 million bespoke wind installation and pre-assembly facility at Belfast Harbour, supporting hundreds of jobs. Similarly, Lamprell based Harland and Wolff facility were able to secure a foundations contract worth £30 million as part of the East Anglia One Offshore Windfarm, demonstrating that SPR and renewable deployment has made a positive impact on the Northern Irish economy to date.
- SPR aims to ensure that local communities benefit from their windfarm developments. Through its presence in Northern Ireland, and partly through Operational Rigged Hill Windfarm, SPR has provided £239,357 of funding to local primary schools and other organisations. This has supported a range of projects such as improving community centre accessibility, sponsoring local youth group activities and creating a sensory garden for a playgroup.
- Currently the Operational Rigged Hill Windfarm makes lease payments to the landowner for the land. This local financial input may be spent locally or otherwise.
- The Operational Rigged Hill Windfarm also pays business rates. In Northern Ireland, business rates consist of two elements⁵⁵. The regional rate is typically set by the Northern Ireland Executive, and these payments are received by the Executive. The district rate is set by the Causeway Coast and Glens Borough Council, and these payments are received by the Council.

13.5 Embedded Mitigation

Embedded mitigation includes measures embodied in the design of the Development to eliminate or reduce adverse effects that would otherwise occur. These are set out in Chapter 4: Site Selection and Design.

13.5.1 Tourism and Recreation Mitigation

The Ulster Way passes through the Site and would be directly affected during the initial decommissioning/construction phases. During these phases there will be a requirement for the temporary diversion of the footpath to comply with

construction site regulations. Consultation with the Planning Officer and Access Officer at the CCGBC have taken place to determine the best diversion route. The Ulster Way will be diverted through forestry to the east, on what was the historical routing of the Ulster Way. The exact timescales of the decommissioning and construction phases are unknown, but it is likely that this will be for approximately twelve months. Once the Development is operational, the Ulster Way will be redirected back onto windfarm tracks. As noted in Table 13.1, in response to Scoping the Bannside Rambling Club had no objections to this temporary diversion.

- Through discussion with consultees, and looking for the Development to build on improvements to the path network made previously, it is anticipated that the diverted route through the forestry would also be retained during the operational phase, creating a circular route and improving access. Dialogue is ongoing and any agreed plans will be implemented in conjunction with the Council who will retain responsibility for managing the route, and the wider access plans within the forest. The Applicant will continue to work with the Council to establish and agree the development of these plans.
- Potential indirect effects on tourism and recreation from the Development are as a result of changes to the visual environment. A coherent design has sought to minimise such effects, as set out in Chapter 4: Site Selection and Design and Chapter 6: Landscape and Visual.

13.5.2 Land Use Mitigation

Potential effects on land use arise as a result of the footprint of the Development. As set out in Chapter 4, the infrastructure of the Operational Rigged Hill Windfarm has been proposed to be re-used wherever possible, to minimise additional land-take from the Development. In addition, the Draft Habitat Management Plan (Technical Appendix 3.2) sets out how the restoration of habitats will be carried out for land used by the Operational Rigged Hill Windfarm that cannot be re-used for the Development.

13.5.3 Socio-Economic Mitigation

Potential economic effects of the Development are beneficial, and arise as a result of decommissioning/construction and operational phase employment, and direct contributions to the local economy in the form of business rates and land lease payments, contributing towards lowering the levelised cost of electricity to the consumer and contributing to low carbon economy policy goals. Embedded mitigation (enhancement) of these effects arises as a direct result of the Development itself through increasing the installed capacity of the Site from 5 MW to c. 28-29 MW and maximising the Site's generation capacity. The design process outlined in Chapter 4 sought to balance environmental effects and generation capacity, to maximise generation capacity and associated economic benefits, where this would not lead to unacceptable adverse environmental effects.

13.6 Assessment of Potential Effects

The effects from the Development have been considered during its initial decommissioning/construction and operational phases. Effects occurring during the initial decommissioning/construction phases would-be short-term effects, and those occurring as a result of the operational phase of the Development would be permanent effects that would be reversible should the Development be decommissioned in the future.

13.6.1 Potential Decommissioning and Construction Effects 13.6.1.1 Tourism and Recreation Effects

- This assessment investigates potential decommissioning and construction effects of the Development on tourism and recreational receptors. Recreational amenity encompasses a range of experiential factors, including visual pleasure, a sense of space, exercise, fresh air, light, company or solitude, tranquillity, appreciating wildlife and other factors, which may include subjective factors. It is not necessarily the case that a significant visual effect (or other type of effect) leads to a significant recreational amenity effect, although it may, and this is considered in the assessments.
- The Ulster Way passes through the Site and, as noted in **Section 13.5.1**, would be temporarily diverted through forestry to the 107. east, on what was the historical routing of the Ulster Way. This change (following consideration of the embedded mitigation) is assessed as a temporary change of medium magnitude (see Table 13.4) on the experience of users of the Ulster Way, for the length of the diversion. Overall, for the length and duration of the diversion, the potential effects on recreational amenity are

⁵¹ DETI (2013) Envisioning the Future: Considering Energy in Northern Ireland Available at https://www.nienvironmentlink.org/cmsfiles/policyhub/files/documentation/Energy/2050 main report - final version.pdf [Accessed 09/05/2019] ⁵² NIRIG (2018), Energy Strategy for Northern Ireland.

⁵³ NIRIG (2018), Energy Vision

⁵⁴ Baringa (2019), The Wind Dividend: How wind energy pays back to Northern Ireland. ⁵⁵ Northern Ireland Assembly Commission (2019). What are rates and why do we pay them? Available at: https://www.assemblyresearchmatters.org/2018/03/22/what-are-rates-and-why-do-we-pay-them/ [accessed on 16/02/2019].

assessed as medium, which, when combined with the medium sensitivity, leads to a temporary, moderate effect (see Table 13.5) that is significant but temporary in terms of EIA Regulations. For the remainder of the Ulster Way, there would be no direct effects.

- Visual effects of the proposed turbines, as they are erected, on the diverted footpath are fully assessed in Chapter 6: Landscape and Visual, section 6.7.5.36, which concludes the effects are of medium magnitude. In addition, it would be expected that decommissioning/construction noise would be audible from the path, given its proximity to this activity, during the periods of agreed construction hours. The change in recreational amenity is assessed as being of medium magnitude for up to 1 km of the footpath either side of the Site, and of being low or negligible for the remainder of the route (see Table 13.4). As such, temporary decommissioning/construction effects on this receptor would be moderate, and significant, albeit temporary, for up to 1 km either side of the Site, and minor or negligible, and not significant, for the remainder of the route (see Table 13.5).
- Cam Forest is located adjacent to the north and east of the Site, and tracks within it are mostly used for walking and horse riding. There will be no direct effects on Cam Forest during the construction/decommissioning phases. The existing site access road from Ringsend Road will not be utilised. Instead, it is proposed that a new site access road will be constructed from the west. It is possible that when there are light winds, decommissioning/construction noise may be audible at times, though this would be restricted to the construction working hours (i.e., not after 19:00 on weekdays, and excluding weekends from 13:00 Saturday). This is a local recreational resource, assessed as being of low sensitivity (see Table 13.3). The forest is not continuous, and tree cover will vary over time as a result of forest management practices. From locations within the forest, within 1 km of the Site, and from where clear views of construction activity are available (noting that these will be limited), the overall change in recreational experience is assessed as being of medium magnitude (see Table 13.4). At distances greater than 1 km, the effect would be of minor or low magnitude. As such, temporary decommissioning/construction effects on this receptor would be minor or negligible (see Table 13.5), and not significant in terms of the EIA Regulations.
- Gortnamoyagh Forest is mostly made up of coniferous forestry, has no formal recreational facilities and is mostly used for walking. The forest is located 3 km south-east of the Site Boundary, so would not receive any direct effects from the decommissioning/construction of the Development. Given the intervening distance between the Development and the receptors, construction noise is unlikely to be audible. Indirect effects would be associated principally with the changes to views as the turbines from the Operational Rigged Hill Windfarm are removed and the new turbines are erected, however these would be almost entirely screened by vegetation and trees. The change in recreational amenity is assessed as being negligible (see Table 13.4). As such, decommissioning/construction effects on this receptor would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations.
- Springwell Forest is mostly made up of coniferous forestry, has no formal recreational facilities and is mostly used for walking, with the Ulster Way passing through the forest. The forest is located 3 km north of the Site Boundary, so would not receive any direct effects from the decommissioning/construction of the Development. Given the intervening distance between the Development and the receptor, construction noise is unlikely to be audible. Indirect effects would be associated principally with the changes to views as the Operational Rigged Hill Windfarm turbines are removed and the new turbines are erected, however these would be almost entirely screened by vegetation and trees. The change in recreational amenity is assessed as being negligible (see Table 13.4). As such, decommissioning/construction effects on this receptor would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations.
- The closest visitor accommodation is The Views, at 52 Terrydoo Road, is a self-catering cottage adjacent to the Site, assessed as being of low sensitivity. Whilst this is not explicitly assessed within Chapter 6: Landscape and Visual Impact Assessment, operational-phase effects are considered in the Residential Visual Amenity Assessment (which accompanies the application but does not form part of the ES). The close proximity of the receptor to the Site is likely to give rise to visual effects of the turbines as they are erected, and of the intermittent and temporary construction activity. In addition, it would be expected that construction noise would be audible, but fall within recommended noise limits, at the cottage, given its proximity to decommissioning/construction activity, during agreed working hours. Noise effects are assessed in Chapter 10: Noise, which concludes that decommissioning/construction noise will be limited in duration and confined to working hours, and can be adequately controlled through good practice measures. The change in recreational amenity is assessed as being for a

temporary period, of high magnitude, which when combined with its low sensitivity, the decommissioning/construction effects on this receptor would be moderate, and significant albeit temporary.

13.6.1.2 Land-Use Effects

- During the decommissioning/construction phases, the principal land use at the Site would change to be a construction site. Actual decommissioning/construction work would be localised to the existing and proposed infrastructure, with the majority of the Land-Use Study Area remaining as upland agriculture (moorland). It is expected that sheep would cease to be grazed within the more immediate confines surrounds of the Land-Use Study Area, for health and safety reasons. The Operational Rigged Hill Windfarm would be removed, and replaced with the new Development infrastructure and turbines. The footprint of the infrastructure would increase temporarily, before the habitat management provisions outlined in Technical Appendix A3.2 Draft Habitat Management Plan were implemented and became effective in restoring to vegetated habitat those aspects of former infrastructure not required for the Development and its future operation and maintenance.
- Changes to land use within the Site during the decommissioning/construction phases would be of medium magnitude (see Table 13.4), albeit temporary. Combined with a low sensitivity receptor, the land use effects would be minor (see Table 13.5) and not significant in terms of the EIA Regulations.

13.6.1.3 Economic Benefits 13.6.1.3.1 Direct Benefits

- SPR will hold a series of meet-the-buyer events as early as possible, allowing local contractors to learn more about opportunities to bid for contracts, and time to upskill prior to any tender process. SPR has significant experience in organising these types of events and has a good understanding of the local area's capacity, given that it currently operates the existing Rigged Hill Windfarm.
- Where possible, training and support for local businesses can be organised to increase their capacity to bid. SPR can work, 116. and encourage the main infrastructure contractor to work with partners such as the Department for Energy and the Northern Regional College, which has branches in Ballymoney, Coleraine and Ballymena.
- In addition, SPR can via their technical evaluation during a tender process, give additional weight to primary contractors that show a commitment to increasing local content in their supply chains. An auditing process could also be undertaken so that the amount of local content sourced during the initial decommissioning/construction phases is recorded.
- As described in Technical Appendix A13.1 Socio Economic Assessment, the economic impact assessment has been undertaken on the basis of 7 turbines with an illustrative generating capacity of 4 MW each, with total generating capacity of c. 28-29 MW. The average expenditure on the construction and development of windfarms can be estimated based on the average spend per MW, the average spend per turbine, or a combination of the two, as appropriate.
- 119. include:
 - Development and Planning;
 - Balance of plant;
 - Turbines; and
 - Grid connection.
- 120. economic Study Areas. In order to do this, it was necessary to estimate the proportion of each type of contract that might be secured in each of these two Study Areas. Research by BiGGAR Economics⁵⁶ into windfarms that are currently operating found that the largest proportion of capital expenditure was on turbine related contracts (64%), followed by balance of plant (16%), grid connection (12%) and development and planning (8%). To estimate the expenditure for each contract in each of the study areas these percentages were applied to the estimated size of each component contract. The assumptions were based on the average from the NIRIG research⁵⁶, analysis of the industries and professions in each of the Study Areas, BiGGAR Economics previous experience and information provided by the developer.

Employment opportunities that may be available during the decommissioning and construction phases for local contractors

The economic effect of the development and initial decommissioning/construction phases was estimated for each of the socio-

⁵⁶ BiGGAR Economics (2015), Onshore Wind: Economic Benefits in Northern Ireland

- It was estimated that Causeway Coast and Glens could secure contracts worth £2.1 million which is equivalent to 7% of capital expenditure. It is considered that this represents a temporary effect of minor positive significance to the Local Study Area.
- It was estimated that Northern Ireland as a whole could secure contracts worth £8.9 million which is equivalent to 29% of capital expenditure. It is considered that this represents a temporary effect of minor positive significance to the Regional Study Area.
- The employment effects during the initial development and initial decommissioning/construction phases are reported in job 123. years rather than Full-time Equivalents (FTE's) because the contracts would be short term. It is anticipated that the initial development and decommissioning/construction phases would support 15 job years, of which 10 would be provided on the basis of the balance of plant/main infrastructure contract, in the Local Study Area, and 63 job years within the Regional Study Area. Given the high levels of unemployment at the Borough level and in Northern Ireland, this represents a temporary, beneficial effect of minor significance to the Local and Regional Study Areas.

13.6.1.3.2 Indirect Benefits

- 124. 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. Research undertaken by RenewableUK in 2012⁵⁷ found that the average salary for employees in the onshore wind sector is £34,600. It was therefore estimated that £2.2 million would be paid to staff directly employed during the development and initial decommissioning/construction phases of the Development. Assumptions were made regarding the location of employee expenditure. It was assumed that employees that live in Causeway Coast and Glens would spend 40% of their salaries in that area, and workers living in the rest of Northern Ireland would spend 74% of their salaries in Northern Ireland.
- The economic effect of this increase in expenditure was estimated using the average Gross Value Added (GVA) /turnover and 125 turnover/employee for the whole economy as reported in the Annual Business Survey⁵⁸. In this way it was possible to estimate the induced effect direct employees would create during the development and initial decommissioning/construction phases. It was estimated that direct employees would spend £0.2 million in Causeway Coast and Glens, supporting around £0.1 million GVA and 1 job. In Northern Ireland, direct employees could spend £1.6 million, supporting £0.5 million GVA and 10 jobs. It is considered that this represents a temporary, beneficial effect of minor significance to the Local and Regional Study Areas.
- The total effect during the development and initial decommissioning/construction phases is the sum of direct effects and indirect effects from expenditure of direct employees. The total combined effect is estimated to be £2.1 million and 16 jobyears in Causeway Coast and Glens, and £9.4 million and 73 job years in Northern Ireland. It is considered that this represents a temporary effect of minor positive significance to the Local and Regional Study Areas.

13.6.2 Potential Operational Effects

13.6.2.1 Tourism and Recreation Effects

- There would be no adverse direct effects on the Ulster Way during the operational phase, although the additional route 127. through Cam Forest (described in Section 13.5.1) would create an alternative route or a circular loop, which would improve recreational facilities locally. This would be a change of low magnitude (see Table 13.4) on a receptor of medium sensitivity, leading to a beneficial direct effect on recreational amenity assessed as minor, which is not significant in terms of the EIA Regulations.
- The Ulster Way will be subject to indirect effects during the operational phase. An operational noise assessment has been undertaken in Chapter 10: Noise, which concluded that operational noise limits will be met, and the baseline situation includes noise from the Operational Rigged Hill Windfarm turbines, so the change will be negligible. Visual effects of the proposed turbines on the footpath are fully assessed in Chapter 6: Landscape and Visual, section 6.7.5.36, which concludes that the effects are of medium to high magnitude in proximity to the new turbines, although the baseline situation also includes turbines in close proximity to the path, and low to negligible elsewhere. 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. Given the visual and noise effects on parts of this recreational receptor will be a change of scale only, rather than a new effect, and that no other aspects of the recreational experience would be affected, the change in recreational amenity is assessed as being of low magnitude (see

Table 13.4). As such, operational effects on recreational amenity would be minor (locally) or negligible (further away) (see Table 13.5) which is not significant in terms of EIA Regulations. As outlined in Section 13.4.1.1, windfarms can provide useful destinations for educational visits, as the Operational Rigged Hill Windfarm has been. As such the Development has the potential to provide beneficial effects to local tourism and recreational facilities.

- The Cam Forest is a local recreational resource, assessed as being of low sensitivity (see **Table 13.3**). There would be no 129 direct effects on Cam Forest during the operational phase of the Development. An operational noise assessment has been undertaken in Chapter 10: Noise, which concluded that operational noise limits will be met. The forest is not continuous, and tree cover will vary over time as a result of forest management practices. The recreational amenity of users of these receptor locations is influenced by many factors in addition to visual amenity, however, including fresh air, a feeling of space, exercise, company, etc., and none of these factors would be affected in any way by the Development. Given the visual effects on parts of this recreational receptor, taking into account the baseline situation that includes views of turbines from open areas, and that no other aspects of the recreational experience would be affected, the change in recreational amenity is assessed as being of low or negligible magnitude (see Table 13.4). As such, operational effects on recreational amenity would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations. As outlined in Section 13.4.1.1, windfarms can provide useful destinations for educational visits, as the operational Rigged Hill Windfarm currently is. As such the Development has the potential to provide beneficial effects to local tourism and recreational facilities.
- Gortnamoyagh Forest is located 3 km from the Site, so there would be no direct effects from the operational phase of the Development. Given the intervening distance between the Development and the receptor, wind turbine noise is unlikely to be audible. Visual effects of the proposed turbines from Gortnamoyagh Forest would be almost entirely screened by vegetation and trees. 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 change in recreational amenity is assessed as being of negligible magnitude (see Table 13.4). As such, operational effects on this receptor would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations.
- Springwell Forest is located 3 km from the Site, so there would be no direct effects from the operational phase of the Development. Given the intervening distance between the Development and the receptor, wind turbine noise is unlikely to be audible. Visual effects of the proposed turbines from Springwell Forest would be almost entirely screened by vegetation and trees. 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 change in recreational amenity is assessed as being of negligible magnitude (see Table 13.4). As such, operational effects on this receptor would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations.
- The Views self-catering cottage will be subject to indirect effects during the operational phase of the Development. An operational noise assessment has been undertaken in Chapter 10: Noise, which concluded that operational noise limits will be met, and the baseline situation includes noise from the Operational Rigged Hill Windfarm turbines, so the change will be negligible. The receptor will also experience visual effects from the operational Rigged Hill Windfarm. Taking into account the baseline situation that includes views of the Operational Rigged Hill Windfarm turbines and other single turbines, and that no other aspects of the recreational experience would be affected, the change in recreational amenity is assessed as being of low magnitude (see Table 13.4). As such, operational effects on this receptor would be negligible (see Table 13.5) which is not significant in terms of EIA Regulations.

13.6.2.2 Land Use Effects

During the operational phase, the land use at the Site would change, relative to the baseline, which currently contains the 133 Operational Rigged Hill Windfarm. This will involve a change from 10 smaller turbines and associated infrastructure, to 7 larger turbines and associated infrastructure. The footprint of the Development will increase overall by approximately 8.53 ha including earthworks and temporary construction compounds, which will in fact be re-instated (where these are not requited for future operational maintenance purposes) following the initial decommissioning/construction phases. The uses of the Site apart from renewable energy generation, for active bog and upland agriculture, will continue essentially as per the baseline scenario, with improvements to the Ulster Way within the Site to create a new circular walking loop to join up to walking routes within Cam Forest. This would be a beneficial change of minor magnitude (see Table 13.4). The value of the land would

⁵⁷ Department of Energy and Climate Change, RenewableUK (2012), Onshore Wind: Direct and Wider Economic Impacts

increase substantially relative to the baseline, as a result of the increased capacity of the repowered windfarm. This would be a beneficial change of medium magnitude (see Table 13.4).

Overall changes to land use within the Site during the operational phase would be beneficial and of medium magnitude, permanent and reversible if the Development were to be decommissioned in the future. Combined with a low sensitivity receptor, the land use effects would be beneficial and minor (see Table 13.5) and not significant in terms of the EIA Regulations.

13.6.2.3 Economic Benefits

13.6.2.3.1 Direct Benefits

- Once operational, the Development will require routine maintenance and servicing. Expenditure on operations and maintenance was estimated based on analysis undertaken in the NIRIG report⁵⁹. Overall taking account of both direct and indirect effects, it was estimated that the annual operations and maintenance expenditure associated with the Development could be up to £0.9 million per annum. As an illustration of the effect over time, after 30 years this could amount to £28.8 million.
- To estimate the economic effect of the operation and maintenance it was first necessary to estimate the proportion of contracts that could be secured in each of the two Study Areas. These assumptions were based on the contract proportions reported in the NIRIG, analysis of the industries present in each of the Study Areas and existing arrangements. It is estimated that the Causeway Coast and Glens area (Local Study Area) could secure 38% of the operation and maintenance contracts worth £0.4 million annually, and £10.3 million over an illustrative period of 30 years. In Northern Ireland (Regional Study Area) as a whole, it was estimated that it could secure 53% of contracts, worth £0.5 million annually and £14.1 million over an illustrative period of 30 years. It is considered that this represents a permanent, but reversible effect of minor positive significance to the Local and Regional Study Areas.
- As with the development and initial decommissioning/construction phases, the contract values awarded in each of the defined 137. Study Areas represents an increase in turnover in those areas. It is estimated that turnover generated by the operation and maintenance could support 2 jobs in Causeway Coast and Glens, and 3 jobs in Northern Ireland. It is considered that this represents a permanent but reversible effect of minor positive significance to the Local and Regional Study Areas.

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. It is estimated that the Development could contribute £0.3 million annually to public finances. Over a 30 year period this would be expected to contribute £9.4 million, although the actual contribution would depend on variables such as the actual load factor.

13.6.2.3.2 Indirect Benefits

- As with the initial decommissioning/construction expenditure, those directly employed during the operation and maintenance phase will have a wider benefit on the economy by spending their salary. This was estimated in the same way as the initial decommissioning/construction phases. It is estimated that effects on the wider economy during the operation and maintenance phase would be £0.4 million per annum and 3 jobs in Causeway Coast and Glens, and £0.5 million per annum and 4 jobs in Northern Ireland. It is considered that this represents a permanent but reversible effect of minor positive significance to the Local and Regional Study Areas.
- Adding together the direct and induced impacts from the spending of direct employees during the operation and maintenance it was estimated that the total impact would be £0.4 million and 3 jobs in Causeway Coast and Glens, equal to £10.6 million over an illustrative period of 30 years, and £0.5 million and 4 jobs in Northern Ireland, equal to £14.9 million over an illustrative period of 30 years.
- SPR intends to provide benefits to the community which will be in line with industry best practice for community benefits funds. For the purpose of the assessment, it has been assumed that the value of the community benefit package will equate to £1,000 per MW of installed capacity per year (index linked). As the Development is expected to have a capacity of c. 28-29 MW, the annual contribution to the fund will be up to £28,000 which equates to £0.8 million over an illustrative period of 30 years. The actual value of the community package, its shape, and means of administration of the community fund will be

discussed and agreed with the local community, dialogue is ongoing. Subject to an administrative community function being in place, this will be formalised nearer to the time of decommissioning/construction commencing.

- 141. In June 2018, the Drumsurn Village Plan was drafted which identified key issues in the community. A detailed Action Plan has been drawn up to take these themes forward that identifies priorities, timeframes, indicative costs and potential partners. Initially, four actions have been prioritised:
 - Providing additional facilities at the community centre to support its necessary refurbishment;
 - Improving the village signage including directional signage to the community centre;
 - Develop a natural pathway between the playgroup and the primary school which would be available for the whole community; and
 - Develop community allotments and the community garden to improve green spaces.
- These projects each require various levels of initial or ongoing funding. The community benefit funding could be used to 142. support these projects.

13.7 Mitigation and Residual Effects

- Mitigation for direct effects on the Ulster Way has been embedded into the Development design by necessity, to address construction site regulations during the initial decommissioning/construction phases of the Development. Following the initial decommissioning/construction phases, the Ulster Way will be reopened and a new circular walking route will join up to the footpaths within Cam Forest to create a new circular walking route with the Development being part of this experience.
- No mitigation (other than that embedded into the design of the Development) for the indirect effects on tourism and recreational receptors is proposed.
- Mitigation (including for ecological net gain) for land use effects has been embedded into the scheme, including the draft 145. habitat management provisions outlines within Technical Appendix 3.2 Draft Habitat Management Plan, as set out in Section 13.5, and no further mitigation is proposed.
- No mitigation or further enhancement is proposed for the beneficial economic effects associated with the Development.
- Given that no mitigation is proposed beyond that embedded into the Development design, as set out in Chapter 3 & 4 and 147. section 13.5 of this chapter, the residual effects are the same as described in section 13.6, above.

13.8 Cumulative Effect Assessment

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, windfarm development, and windfarm developments for which a valid planning application has been submitted.

13.8.1 Tourism and Recreation Cumulative Effect

Table 13.7 details the windfarms included within the tourism and recreational cumulative assessment. As the wider Tourism and Recreational Study Area extends to 10 km from the Site, those windfarms within 20 km were included as part of the cumulative search area. Single turbines were excluded as they are unlikely to have a cumulative effect on tourism and recreational receptors.

Windfarm	Status	No of Turbines	Distance from the Closest Development Turbine (km)
Dunbeg	Operational	14	5.69
Dunmore	Operational	7	6.95
Brockaghboy	Operational	15	9.87
Brockaghboy Extension	Operational	4	11.38

⁵⁹ Biggar Economics (2015). The impact of the onshore wind sector in Northern Ireland on behalf on NI-RIG.

Windfarm	Status	No of Turbines	Distance from the Closest Development Turbine (km)
Glenconway	Operational	20	12.91
Altahullion I	Operational	20	13.76
Altahullion II	Operational	9	13.58
Monnaboy	Operational	4	18.00
Smulgedon	Under Construction	7	4.44
Craiggore	Consented	10	2.22
Upper Ballyrogan	Consented	5	4.24
Dunmore Extension	Consented	8	7.02
Cam Burn	Consented	6	7.29
Evishagaran	Consented	14	8.64
Dunberg Extension	Consented	3	5.52
Ballyhanedin	Consented	8	18.29
Dubeg South	Application	9	4.01
Corlacky Hill	Application	11	11.59

- All effects on tourism and recreational receptors beyond 1 km from the Site 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 windfarm sites to the baseline is not expected to alter this position. Smulgedon, Craiggore, Dunmore Extension and Evishagaran are all proposed to be located close to the route of the Ulster Way. The effects of adding the Development to the cumulative baseline would be similar to the effects of the Development in isolation, and hence additional cumulative effects are assessed as minor or negligible, and not significant in terms of the EIA Regulations.
- ^{151.} Therefore, all cumulative effects of the Development on tourism and recreational receptors would be negligible.

13.8.2 Land Use Cumulative Effect

152. The additional effect of the Development to the cumulative baseline on land use is assessed as being negligible given the comparative size of the wider 10 km Study Area, and the common occurrence of such land within this Study Area (noting the effects on active peat are assessed in **Chapter 8: Ecology**) compared to the actual land take of the Development.

13.8.3 Socio-Economic Cumulative Effect

^{153.} This section considers the cumulative effects on direct employment opportunities and economic benefits, which would arise from the initial decommissioning/construction and operation phases of the Development in conjunction with windfarms within 30 km of the Site Boundary (as identified in **Chapter 6**) of which there are 55 at the cumulative 'cut-off' date of May 2019. The status of these schemes at the time of the assessment is shown in **Table 13.8** below.

Windfarm	Status	No. of Turbines	Distance from Closest Development Turbine (km)
Terrydoo Road (34/)1	Operational	1	0.9
Terrydoo Road (34)/2	Operational	1	1.03
Kilhoyle Road (60)	Operational	1	2.83
Ballyavelin Road (61)	Operational	1	4.43
Belraugh Road (7)/1	Operational	1	4.52
Betts Road (28)	Operational	1	4.57
Craigmore Road	Operational	1	5.12

Windfarm	Status	No. of Turbines	Distance from Closest Development Turbine (km)
Edenmore Road (67)	Operational	1	5.53
Dunbeg	Operational	14	5.69
Dunmore	Operational	7	6.95
Legavallon Road (132)	Operational	1	8.73
Tirkeeran Road	Operational	1	8.75
Seacoast Road (16)	Operational	1	9.22
Brockaghboy	Operational	15	9.87
Brockaghboy Extension	Operational	4	11.38
Glenconway	Operational	20	12.91
Churchland Lane (20)	Operational	1	12.92
Greenhill Highway (60)/2	Operational	1	13.51
Altahullion II	Operational	9	13.58
Altahullion I	Operational	20	13.76
Greenhall Highway (60)/1	Operational	1	13.84
Monnaboy	Operational	4	18.00
Magherafelt	Operational	1	23.41
Garves	Operational	5	23.67
Long Mountain	Operational	12	24.19
Glenbuck II	Operational	3	24.98
Glenbuck	Operational	1	25.54
Cloonty	Operational	4	25.60
Eglish Mountain	Operational	6	28.47
Slieve Kirk	Operational	12	28.79
Draperstown (Brackagh)	Operational	3	29.36
Smulgedon	Under Construction	7	4.44
Temain Road (37)	Consented	1	0.37
Craiggore	Consented	10	2.22
Cloghan Road (16)	Consented	1	2.71
Belraugh Road (25)	Consented	1	4.07
Upper Ballyrogan	Consented	5	4.24
Cam Quarry	Consented	1	4.30
Drumhappy Road (31)	Consented	1	4.32
Dunbeg Extension	Consented	3	5.52
Dunmore Extension	Consented	8	7.02
Cam Burn	Consented	6	7.29
Evishagaran	Consented	14	8.64
Craig 1	Consented	1	27.05
Craig 2	Consented	1	27.33
Three Trees	Consented	2	29.50
Ringsend Road (84)	Consented	1	3.23
Craigmore Road (146)	Consented	1	3.29

Windfarm	Status	No. of Turbines	Distance from Closest Development Turbine (km)
Mill Road (26)	Consented	1	4.45
Craigmore Road (121)	Consented	1	4.45
Dunbeg South	Application	9	4.01
Corlacky Hill	Application	11	11.59
Ballyhanedin	Application	8	18.25
Barr Cregg	Application	7	21.21
Islandranny Road	Application	1	29.76

^{154.} Windfarms that are operational or under construction are considered as 'baseline' windfarms. There is less certainty that consented and application stage windfarms will be constructed. 23 windfarms within 30 km of the Development are consented and are application stage windfarms, and as such, the economic benefits arising from these schemes are yet to be realised.

13.8.3.1 Direct Employment Opportunities

Should all of the schemes identified above be constructed and operated it is considered that the cumulative effect on direct 155. employment will be positive for the Local and Regional Study Areas. The contribution of the Development to this positive effect is assessed as being a beneficial effect of minor magnitude. This is on the basis that the 7 turbines of the Development equate to approximately 7.8% of the 89 turbines (including the Development turbines) either consented or the subject of a planning application.

13.8.3.2 Indirect Employment Opportunities

If all the schemes identified within 30 km of the windfarm are constructed and operated it is considered that there will be a 156. positive cumulative effect on indirect economic benefits for those living and working within the Local and Regional Study Areas. The contribution of the Development to this positive effect will be minor.

13.9 Summary of Effects

157. Table 13.9 provides a summary of the effects assessed in this chapter.

Table 13.9: Summary of Effects. All effects are adverse, unless otherwise stated.

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect	Cumulative Effect
Decommissioning /					
Tourism and Recrea	tion				
Ulster Way	Direct, temporarily diverting footpath, Indirect, from visual changes	Moderate Moderate for 1 km either side of the Site and minor/negligible for the remainder of the route	None None	Moderate (temporary) Moderate (temporary)	Negligible (temporary) Negligible (temporary)
Cam Forest	Indirect from visual changes	Minor/Negligible	None	Negligible (temporary)	Negligible (temporary)
Gortnamoyagh Forest	Indirect, from visual changes	Negligible	None	Negligible (temporary)	Negligible (temporary)
Springwell Forest	Indirect, from visual changes	Negligible	None	Negligible (temporary)	Negligible (temporary)

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect	Cumulative Effect
The Views Self Catering Cottage	Indirect, from visual changes	Moderate	None	Moderate (temporary)	Negligible (temporary)
Land Use					
Land Use	Direct, temporarily increased footprint and cessation of agriculture within the construction site.	Minor	None	Minor (temporary)	Negligible
Socio-Economic					
Economic	Direct, job creation (beneficial) Indirect, expenditure (beneficial)	Minor	None	Minor (temporary beneficial)	Minor (beneficial)
Operational Phase					
Tourism and Recrea	ition				
Ulster Way	Direct, new circular route Indirect, from	Minor	None	Minor (beneficial/permanent)	Negligible (permanent)
	visual changes	Negligible	None	Negligible (permanent/reversible)	Negligible (permanent)
Cam Forest	Indirect from visual changes	Negligible	None	Negligible (permanent/reversible)	Negligible (permanent)
Gortnamoyagh Forest	Indirect from visual changes	Negligible	None	Negligible (permanent/reversible)	Negligible (permanent)
Springwell Forest	Indirect from visual	Negligible	None	Negligible (permanent/reversible)	Negligible (permanent)
The Views Self Catering Cottage	Indirect, from visual changes	Minor	None	Minor (permanent/reversible)	Negligible (permanent)
Land Use					
Land Use	Direct, beneficial, altered footprint and increase in site value as a result of a larger capacity windfarm	Minor	None	Minor (beneficial/permanent/ reversible)	Negligible
Socio-Economic					
Economic	Direct, job creation (beneficial) Indirect, expenditure (beneficial)	Minor	None	Minor (beneficial/permanent/ reversible)	Minor (beneficial)

13.10 Statement of Significance

Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of 158. 'major' or 'moderate' significance.

- ^{159.} Moderate effects have been identified during the decommissioning/construction phases of the Development on the Ulster Way. These effects were found to be significant for 1 km either side of the Site and of minor significance for the remainder of the footpath. Additionally, moderate effects were found at The Views self-catering cottage, caused by views of the initial decommissioning and construction phases of the Development. This would be significant for an approximate period of 8 months when the decommissioning/construction activity occurs. The effects of the Development on all other tourism and recreation receptors during the decommissioning/construction phases, including cumulative effects are assessed as negligible, which is not significant in terms of EIA Regulations.
- ^{160.} The effects of the Development on tourism and recreation receptors during the operational phases, including cumulative effects, are assessed as negligible, which is not significant in terms of the EIA Regulations.
- ^{161.} No significant residual effects are predicted on land use as a result of the initial decommissioning/construction or operational phases of the Development. No significant cumulative effects are predicted on the land use.
- Positive and beneficial effects on local employment and the Local (Causeway Coast and Glens) Study Area and Regional (Northern Ireland) Study Area are predicted during the initial decommissioning/construction and operational phases of the Development. These effects are minor and not significant. Minor beneficial cumulative effects are also predicted on the Local and Regional Study Areas identified.

Term	Definition
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
DOE	Department of the Environment
ES	Environmental Statement
Km	Kilometre
LDP	Local Development Plan
NCR	National Cycle Route
NITB	Northern Irish Tourism Board
Operational Rigged Hill Windfarm	The existing Rigged Hill Windfarm
RDS	Regional Development Strategy
SEF	Strategic Energy Framework
SPPS	Strategic Planning Policy Statement
The Development	Rigged Hill Windfarm Repowering
The Site All land that falls within the site boundary shown on Figure 13.2	
The Site Boundary	Refers to the red line boundary

13.11 Glossary of Terminology

14 Other Issues

14.1 Introduction

This chapter of the Environmental Statement (ES) evaluates the effects of the Development on issues not covered elsewhere in the ES, which include:

- Telecommunications and Utilities; •
- Shadow Flicker;
- Aviation and Radar;
- Human Health:
- Climate Change (including a carbon balance assessment); and
- In-combination effects associated with the interrelationships between ES chapters.
- This assessment was undertaken by Arcus Consultancy Services Limited (Arcus) with aviation provided by ScottishPower Renewables (the Applicant). The assessment will consider the potential significant effects of the Development during the following phases of the Development:
 - Decommissioning of the Operational Rigged Hill Windfarm (initial phase of the Development); •
 - Construction of the Development (likely to occur in tandem with the above phase);
 - Operation of the Development: and
 - Decommissioning of the Development (final phase).
- The decommissioning of the Operational Rigged Hill Windfarm and the construction of the Development is likely to occur partly in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worstcase scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development are considered to be no greater than the effects arising when these first two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.
- This Chapter of the ES is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:
 - A14.1: Carbon Calculator inputs and results.
- This Chapter includes the following elements:
 - ٠ Introduction:
 - Individual assessments of each the topics listed above; and
 - Statement of Significance.
- Common acronyms used throughout this ES can be found in Chapter 1: Introduction, Table 1.4.

14.2 Telecommunications and Utilities 14.2.1 Scope

Due to the size and nature of wind turbines, they have the potential to interfere with electromagnetic signals passing above ground during operation, or existing infrastructure buried below ground during any decommissioning/construction activity.

Infrastructure affected can include telecommunication links, microwave links, television reception and overhead and underground utility cables.

- The switchover from analogue to digital television signals was completed in Northern Ireland in October 2012. The potential 8 for negative effects on domestic television reception are greatly diminished post digital switchover. The existing and proposed Development turbines do not lie in a direct line of sight between a television transmitter and receptor locations, and hence the only potential for effects would be reflection of transmitted signals. As noted by EMC Consultants Ltd¹: "Unlike analogue television, digital television does not tend to suffer as badly from reflections (multi-path transmissions) causing delayed images and, has much greater immunity to this type of interference. Even the weakest received primary signals (up to a certain point) are recognised and can then be fully reconstituted, but secondary delayed signals are rejected...In fact, received reflected signals can actually increase received signal strength/quality." Since digital switchover there have been very few known cases of wind turbine interference with domestic analogue reception. Therefore, potential effects on television signal from the Development will be negligible and are not considered further. Additionally, the Development will involve the replacement of the ten turbines that form the operational Rigged Hill Windfarm, which have been successfully operating for the last 25 years, with seven turbines.
- Microwave links can be affected by reflection, diffraction, blocking and radio frequency interference caused by wind turbines in their line of sight or in close proximity to the paths of the links. In general, the directional nature of telecommunications and microwave links means that interference can be avoided by defining clearance zones beyond which any degradation of the links will be insignificant.

14.2.2 Assessment Methodology

- The potential effects assessed in this Chapter have been identified through consultation and desk based technical assessments. Effects during the initial decommissioning/construction phases are classed as temporary, short term effects. Potential effects which are associated with the operational phase of the Development are classified as permeant, but reversible should the Development be decommissioned.
- It is industry practice not to assess the effects on telecommunications and utilities links from wind farms during the construction and decommissioning phases because effects are similar to, but less than those encountered during the operational phase which is significantly longer in duration. Consequently, this assessment does not further consider effects associated with decommissioning/construction activities on these receptors, rather operational effects should be considered to form a robust worst-case assessment which also covers these activities.
- Effects on these receptors are of a technical nature, and where unacceptable effects are predicted to occur, a technical 12. solution may be sought with the owner/operator of the infrastructure to ensure the continued acceptable technical operation of the infrastructure. Following this approach, it is inappropriate to assess the significance of these effects in relation to the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 in the same way as for other receptors presented in this ES.

14.2.3 Guidance

- developments. The guidance documents considered in this assessment are:
 - Department for the Environment (2009), Planning Policy Statement 18: Renewable Energy²;
 - British Wind Energy Association (BWEA), (1994) Best Practice Guidelines for Wind Energy³:
 - Ofcom (2003) Guidelines for Improving Digital Television and Radio Reception⁴:
 - Ofcom (2009) Tall Structures and Their Impact on Broadcast and Other Wireless Services⁵; and •
 - Department of the Environment (DoE) (2009) Planning Policy Statement 18: Renewable Energy⁶. •

⁴ OFCOM, (2003), Guidelines for Improving Digital Television and Radio Reception, OFCOM, United Kingdom. Available online at: http://ofcom.org.uk/static/archive/ra/publication/ra_info/ra415/ra415.htm [Accessed 14/12/2015] ⁵ OFCOM, (2009), Tall Structures and Their Impact on Broadcast and Other Wireless Services, OFCOM, United Kingdom. Available online at: http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/wind-farms/tall_structures.pdf [Accessed 14/09/2017] ⁶ Department of the Environment (DoE) (2009). Planning Policy Statement 18: Renewable Energy. Available online at: https://www.planningni.gov.uk/index/policy/planning_statements/planning_policy_statement_18_renewable_energy_best_practice_guidanc e.pdf [Accessed 14/09/2017]

There are a number of documents which provide guidance on telecommunications and utilities considerations for wind energy

¹ Austin, S. (EMC Consultants Ltd) (2018). Canada Water Masterplan: Radio and Television Interference Assessment. Available at: http://planbuild.southwark.gov.uk/documents/?GetDocument=%7B%7B%7B!mkjYAPIA%2FgZgn6QRYqB2Zg%3D%3D!%7D%7D%7D [accessed on 17/4/2019].

² Department of the Environment (2009). Planning Policy Statement 18: Renewable Energy. Available online at:

https://www.planningni.gov.uk/index/policy/planning_statements/planning_policy_statement_18_renewable_energy-2.htm [Accessed on 27/09/2017]

³ British Wind Energy Association, (1994), Best Practice Guidelines for Wind Energy Development British Wind Energy Association, United Kingdom. Available online at: http://www.energy.ca.gov/windguidelines/documents/other_guidelines/BWEA-BPG.PDF [Accessed 14/09/2017]

- The potential effects as a result of the Development have been assessed with reference to the above documents. 14.
- Best Practice Guidance to Planning Policy Statement 18: Renewable Energy Error! Bookmark not defined. makes reference to the potential of wind turbines to affect electromagnetic signals. Paragraph 1.3.59 states 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".
- This document also provides guidance on how turbine siting can mitigate potential impacts. Paragraph 1.3.61 states that "specialist organisations for the operation of the electromagnetic links typically require a 100 m clearance either side of a link of sight link from the swept area of turbine blades, although some operators are willing to accept Fresnel zones of avoidance". Fresnel zones surround telecommunication links, which, if impinged upon, can degrade the quality of the telecommunication link; the size of the Fresnel zone is dependent on the frequency and length of the link.

14.2.4 Consultation

Consultation with the relevant organisations was initiated during the initial stages of the EIA to identify any potential microwave or telecommunication links that could be affected by the Development. An area of search was specified as a 2 km radius of the approximate centre point of the turbine envelope. Ofcom monitors the fixed microwave links throughout the UK, whereas JRC manages the radio spectrum used by the UK Fuel and Power Industry. Atkins undertakes a similar role for the water industry (although does not manage links operated by NI Water). The findings are summarised in Table 14.1.

Table 14.1: Summary of Consultation Responses on Telecoms

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Ofcom Spectrum Licencing	Email dated 21/03/17	Based on initial search area of 2 km around the centre of the Site provided a list of known telecommunication links with potential to be affected. This provided the basis for the consultation exercise to the below organisations.	Relevant organisations have been consulted with respect to potential effects on telecommunication links.
Joint Radio Company (JRC) on behalf of Northern Ireland Electricity	Email dated 27/02/2019	JRC objects to the proposal on the basis that some or all of the turbines breach the 1,000 m buffer distance from their links. JRC states that the objection shall be withdrawn after simple analysis shows no issues; when a satisfactory coordination has been achieved and the zone of protection is implemented; or when an appropriate mitigation agreement is in place.	Subsequent consultation undertaken with JRC, whereby JRC undertook a co-ordination assessment. The assessment concluded that, whilst the link which currently serves the substation at the Operational Rigged Hill Wind Farm will be affected, the operation of the all other links would not be affected. As the link serving the existing substation is owned by the Applicant, and would be decommissioned as part of the Development, this is a non-issue, as no links, as a result, will be affected.
Police Service of Northern Ireland (PSNI)	07/08/2017	PSNI stated that the Development is unlikely to affect the operation of their links within the vicinity. The layout has since slightly changed and PSNI reconsulted however to date have not responded.	None required

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
British Telecommunications (BT)	Email dated 27/02/2019	BT stated that the project should not cause interference to their links.	None required
Airspeed Telecom	Email dated 27/02/2019	One link was identified, which runs to the substation associated with the Operational Rigged Hill Windfarm.	The substation and associated link will be decommissioned as part of the Development, and a result no links will be affected.
Northern Ireland Water Ltd	Email dated 03/04/2019	Operate a number of links in the area, initially objected due to potential interference; however the objection was removed following further analysis.	None required
EE Ltd and Mobile Broadband Network Limited	Email dated 06/03/2019	No objection.	None required
Arqiva Ltd	Email dated 28/02/2019	Arqiva propose to install a link which if installed would pass close to the proposed turbines. Further consultation undertaken with Arqiva to ascertain required set back distances from proposed link.	Turbines have been positioned to maintain required set back distances stipulated by Arqiva to avoid the proposed link being affected should it become operational.

14.2.5 Assessment of Effects

14.2.5.1 Telecommunications and Television Reception

- Details of the Development have been shared with the known link operators, in the first instance this consisted of a request to Ofcom to provide a list of known telecommunication links within 2 km of the centre of the Site. Ofcom identified a number of telecommunication link operators with links in the area, as identified in Table 14.1.
- Northern Ireland Water Ltd, EE Ltd and Mobile Broadband Network Ltd, PSNI and BT do not object to the Development. 19.
- Airspeed Telecom identified one link within the search area, associated with the Operational Rigged Hill Windfarm, which will 20. no longer be used following the decommissioning of the current substation.
- JRC initially objected to the Development on the basis that turbines were located within 1,000 m of a number of links which 21. they manage on behalf of Northern Ireland Electricity Networks (NIE). JRC provided details of the links within 1,000 m of the proposed turbines all of which originate from the masts at Temain Hill, 1.25 km south of the proposed turbines. The links are all beyond 500 m of the proposed turbines, with the exception of a single link which runs to the substation within the Operational Rigged Hill Wind Farm which will be decommissioned as part of the Development.
- 22. analysed the likelihood of interference to the telecommunication links as a result of the Development. The report concluded that all links beyond 500 m would not incur a material adverse effect which would warrant an objection. The link which runs to the Operational Rigged Hill Wind Farm substation would be significantly degraded, and would warrant an objection, however on the basis that the link will be decommissioned should the Development proceed there would ultimately be no link affected.

As links were located within 1,000 m of proposed turbines, JRC undertook a further detailed co-ordination assessment which

- Argiva Ltd proposes to route a link close to the Development, specifically passing close to T4 and T5. Argiva initially stated that they would object to the locations of T4 and T5 within Layout 3, as described in Chapter 3: Site Selection and Alternative Layouts. Further consultation was undertaken to accurately plot the proposed link route with respect to the turbines and to understand the set back distances required by Argiva Ltd. The positions of Turbines T4 and T5 were revised to avoid any adverse effect on the proposed link, should it become operational, Argiva Ltd were advised of the new positions for their records.
- Broadcast radio (FM, AM and DAB digital radio) are transmitted on lower frequencies than those used by analogue TV signals. Lower frequency signals tend to pass through obstructions more easily than the higher frequency TV signals, and diffraction effects also become less significant at lower frequencies. Both of these factors will tend to lessen the effect of wind turbines on radio reception. In the event that interference which is directly attributable to the Development is experienced, the Applicant will endeavour to implement a suitable mitigation solution. Examples of technical solutions include: changing the receptor height, re-orientating the receptor to receive signals from an alternative transmitter, upgrading the receptor system or installation of satellite television.
- Based on the information received during consultation and the remote nature of the Development from properties, no effects are predicted on telecommunications or radio reception as a result of the Development.

14.2.5.2 Utilities

- Development traffic will use public roads for site access and a combination of new and existing site tracks for accessing the area in which the Operational Rigged Hill Windfarm turbines are sited, and in which the proposed new turbines would be sited. Beyond the operational Rigged Hill Wind Farm there are no known utilities on the Site, an overhead power line was located close to the site entrance, however this has recently been decommissioned.
- The earthworks for the initial decommissioning/construction activity are proposed on the site of the Operational Rigged 27. Windfarm, and there are no buried utilities other than the Operational Rigged Windfarm infrastructure.
- 28. As a result, the potential for damage to any utilities infrastructure during decommissioning/construction is low, and services checks will be carried out pre-construction to minimise potential effects and ensure relevant health and safety legislation is complied with.
- Thereafter during operation, there will be no disturbance to existing utilities. 29.

14.2.6 Summary of Effects

- Any effects arising from alterations to the existing overhead infrastructure in the vicinity of the Terrydoo Road will be short term 30. and temporary. These effects would only occur during the initial decommissioning / construction phases for a short duration whilst the necessary works are carried out.
- There are no significant effects predicted on telecommunications, television/radio reception or utilities as a result of the 31. Development.

14.3 Shadow Flicker

14.3.1 Scope

- Shadow flicker is an effect that can occur when the sun moves behind a wind turbine rotor and the shadows of moving wind turbine blades passing over a small opening (window) within a property, briefly reducing the intensity of light within the room and causing a flickering to be perceived. The likelihood and duration of shadow flicker depends upon the positioning of the sun, turbine and window locations, turbine orientation, time of day, time of the year and weather conditions.
- Flickering light can have the potential to cause disturbance and annoyance to residents if it affects occupied rooms of a house. 33. Individuals with photosensitive epilepsy can be sensitive to flickering light that is usually in the range of 3-50 Hertz (Hz). The

frequencies of flicker caused by modern turbines (less than 1 Hz) are below the frequencies known to trigger effects in these individuals⁷ and therefore shadow flicker from turbines is not predicted to affect any individuals with photosensitive epilepsy. These effects are therefore scoped out and not considered further in this assessment. Potential effects are considered in the context of nuisance.

14.3.2 Assessment Methodology

The potential effects assessed in this Chapter have been identified through desk-based technical assessments in line with the Best Practice Guidance detailed in Section 14.3.2.1.

14.3.2.1 Guidance

- 35. that: "Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as 'shadow flicker'. It only occurs inside buildings where the flicker appears through a narrow window opening. A single window in a single building is likely to be affected for a few minutes at certain times of the day during short periods of the year. The likelihood of this occurring and the duration of such an effect depends upon:
 - the direction of the residence relative to the turbine(s);
 - the distance from the turbine(s);
 - the turbine hub-height and rotor diameter;
 - the time of year;
 - the proportion of day-light hours in which the turbines operate;
 - the frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon); and,
 - the prevailing wind direction."
- Problems caused by shadow flicker are rare. At distances greater than 10 rotor diameters from a turbine, the potential for 36. shadow flicker is very low. The seasonal duration of this effect can be calculated from the geometry of the machine and the latitude of the site. Where shadow flicker could be a problem, developers should provide calculations to quantify the effect and where appropriate take measures to prevent or ameliorate the potential effect, such as by turning off a particular turbine at certain times.
- Careful site selection, design and planning, and good use of relevant software, can help avoid the possibility of shadow flicker 37. in the first instance. It is recommended that shadow flicker at neighbouring offices and dwellings within 500 m should not exceed 30 hours per year or 30 minutes per day".
- Planning Practice Guidance for Renewable and Low Carbon Energy⁸ was published by the UK Government Department for Communities and Local Government in 2013. Although this guidance only applies in England, it provides additional technical information on onshore wind power which is still applicable. The Planning Practice Guidance describes the conditions in the UK under which flicker might occur and states that "only properties within 130 degrees either side of north, relative to the turbines can be affected at these latitudes in the UK – turbines do not cast long shadows on their southern side".
- A detailed study was undertaken by Parsons Brinckerhoff Consultants on behalf of the Department of Energy and Climate 39. Change (DECC) in 2010 to update the government's evidence of shadow flicker⁹. This research drew the following conclusions:
 - "The study area of 130 degrees north detailed in the current government guidance was considered appropriate;

 - The frequency of flicker from modern wind turbines is unlikely to cause any health effects and nuisance and is not considered as a significant risk."

⁹ Department of Energy and Climate Change (DECC), (undated), Update of UK Shadow Flicker Evidence Base. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment data/file/48052/1416-updateuk-shadow-flicker-evidence-base.pdf [Accessed 14/12/2015].

Guidance presented within the Best Practice Guidance to PPS18: Renewable Energy describes shadow flicker as an effect

It confirmed that there is unlikely to be a significant effect at distances greater than 10 rotor diameters; and

⁷ Epilepsy Action, (2007), Photosensitive Epilepsy. Available online at: http://www.epilepsy.org.uk/info/photosensitive-epilepsy [Accessed 14/12/2015].

⁸ Department for Communities and Local Government, (2013), Planning Practice Guidance for Renewable and Low Carbon Energy. Available online at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225689/Planning_Practice_Guidance_for_Renewable_and_Lo w_Carbon_Energy.pdf. [Accessed 14/12/2015].

14.3.2.2 Consultation

14.3.2.3 Study Area

In line with the PPS18 on onshore wind, a 'Study Area' of ten rotor diameter distance (1,200 m) and 130 degrees either side of north around each proposed turbine location was mapped using a Geographical Information System (GIS).

14.3.3 Consultation

Consultation with the relevant organisations was initiated during the initial stage of the EIA to identify potential shadow flicker 41 effects that could be linked to the Development. A summary of the findings is detailed in Table 14.2.

Table 14.2: Summary of Consultation Responses on Shadow Flicker

Consultee	Type and Date	Summary of Consultation Response
Causeway	Letter	The Council is content that should no properties fall within 10 rotor diameters and 130 degrees
Coast and	26/01/2018	North of the Development then shadow flicker can be screened out but a note of this should be
Glens		included within the ES to show that it has been considered as it is a requirement of PPS18.
Borough		
Council (the		
Council)		

14.3.4 Assessment of Effects

No dwellings are located within 10 rotor diameters. The nearest dwelling is 90 Terrydoo Road (273725, 419673) located approximately 1,242 m to the west of Turbine 5. Given the distance between this property and the closest turbine, no significant shadow flicker effects are predicted and no further assessment is required.

14.3.4.1 Cumulative Effects

As there is no potential for significant shadow flicker effects from the Development alone, it is considered that it will not contribute to any cumulative shadow flicker effects occurring as a result of other wind farm developments in the area. A detailed cumulative assessment of shadow flicker is therefore not required and no cumulative shadow flicker effects are predicted.

14.3.5 Summary of Effects

No significant shadow flicker effects are predicted and no significant effects are anticipated.

14.4 Aviation and Radar

14.4.1 Scope

- The operation of wind turbines has the potential to cause a variety of adverse effects on aviation during turbine operation. These include but are not limited to:
 - Physical obstructions; ٠
 - Generation of unwanted returns on Primary Surveillance Radar (PSR); and
 - Adverse effects on overall performance of Communications, Navigation and Surveillance (CNS) equipment.
- The Site is approximately 55 km north-west of Belfast International Airport (BFS), over 75 km north-west of Belfast City Airport and 20 km east of City of Derry Airport, the three major airports in Northern Ireland. The turbines of the Operational Rigged Hill Windfarm are within radar line of sight of BFS's primary surveillance radar, and have been accommodated to date by both the airport and NATS (En Route) Plc (NATS) which also uses the BFS radar. The Operational Rigged Hill Windfarm is not in radar line of sight of Belfast City Airport's radar and the City of Derry Airport does not currently have radar facilities. The Development is also beyond Derry Airport's obstacle limitation surfaces.
- There are no active Royal Air Force (RAF) bases within 50 km of the Site. The Site is located within a little used Ministry of Defence (MoD) low flying area and the current turbines are being accommodated. Similarly, there are glider and parachuting sites within 10 km of the Site (at Ballarena and Movenis Airfields) but these have co-existed with the Operational Rigged Hill Windfarm and therefore no objection is anticipated from these operators. As part of the Scoping Opinion received the MoD have requested that turbines are fitted with aviation warning lights, either 25 candela red or infra-red,omni directional flashing lights fitted to the highest practicable point of the structure.

- It is proposed that all the proposed turbines be lit with infra-red light compliant with MOD requirements. It should be noted that infra-red lights are not visible to the naked eye.
- Therefore, potential effects on aviation as a result of the Development, allowing for infra-red lighting, will be negligible and are 49 not considered further. The requirement for infra-red lighting, and details and positions of the proposed turbines can be secured via the use of an appropriately worded planning condition.

14.4.2 Consultation

Consultation with the relevant aviation organisations was initiated during the Scoping process, to identify any potential aviation 50 issues that could be affected by the Development. The findings are summarised in Table 14.6.

Table 14.6: Summary of Consultation Bosponsos on Aviation

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Ministry of Defence (MOD)	Email 27 July 2017	No safeguarding objections. MOD did request that turbines be fitted with aviation warning lights, either 25 candela red or infra-red, omni directional flashing lights fitted to the highest practicable point of the structure. The MOD also requested that details of the Development's turbines be notified to Defence Geographic Centre for charting and mapping purposes	It is proposed that infra-red lighting will be installed on the top of the nacelle on each turbine. Defence Geographic Centre will be notified of the relevant turbine details as requested by the MOD prior to erection.
		prior to their erection.	
Belfast International Airport	Scoping Opinion	No Response to Scoping Request	
City of Derry Airport	SPR email dated 14/09/17	No response received to Scoping Request.	Direct contact was made by the Applicant with the Airport, no response has been received to date.

14.5 Human Health

14.5.1 Scope

- 51. of the overall EIA process. With respect to the Development, this section would simply draw together the findings of other assessments undertaken as part of the EIA process.
- Limited Interactions with humans are possible, and consideration has been given to the findings of the following assessments: 52.
 - Traffic and Transportation (Chapter 12: Access, Traffic and Transport);
 - Noise (Chapter 10: Noise):
 - Residential Amenity (Technical Appendix A6.2);
 - Shadow Flicker (Section 14.3 of this Chapter); and ٠
 - Health and Safety at Work including best practice.
- The scope of the EIA in respect of Human Health was set out in the Scoping Report (Technical Appendix A2.1) and this was 53. agreed by the Council in its Scoping response, as noted in Table 14.3.
- Properly designed and maintained wind turbines are a safe technology. Site design and inbuilt buffers from sensitive receptors 54. 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, and have been scoped out of the assessment. Potential health impacts are therefore related primarily to decommissioning/construction related impacts, and operational impacts on residential amenity.

As per the EIA Regulation and as agreed at Scoping, a Human Health Impact Assessment (HHIA) has been included as part

14.5.2 Assessment Methodology

- The potential effects in this chapter have been identified through technical assessments in line with best practice guidance detailed in Section 14.5.3.
- The nature and magnitude of the potential effect will determine the people/population affected. 56
- Significance is assessed as per the assessments identified in **Section 14.5.1** above. 57.
- Cumulative effects are considered in the assessments drawn from, and where relevant these are included in this section. 58

14.5.3 Guidance

- Guidance presented within the Best Practice Guidance PPS18: Renewable Energy states that
- "Development that generates energy from renewable resources will be permitted provided that the proposal, and any associated building and infrastructure, will not result in an unacceptable adverse impact on:
 - Public safety, human health, or recreational amenity"
- Further guidance has been taken from the Institute of Environmental Management Association (IEMA) (2017) Health in Environmental Impact Assessment. A Primer for a Proportionate Approach¹⁰ and Health and Safety Executives Report entitled The Study and Development of a Methodology of the Estimation of the Risk and Harm to Persons from Wind Turbines¹¹. This report concludes that the risk of fatality from wind turbines (at 2 hub heights or greater from the turbine) is low in comparison to other societal risks. It is roughly equivalent to the risk of fatality from taking two aircraft flights per annum.

14.5.4 Consultation

Consultation with the relevant organisations was initiated during the initial stages of the EIA to identify any human health 62 effects that could be initiated by the Development. A summary of the findings is detailed in Table 14.3.

Table 14.3: Summary of Consultation Responses on Human Health

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Causeway Coast and Glens Borough Council (the Council)	Letter 26/01/2018 in response to the Scoping Report	The council is content with the suggested approach regarding Human Health	None required

14.5.5 Assessment of Effects

The sections below summarise the human health effects on potential receptors identified in the relevant technical 63 assessments referenced within Section 14.5.1 of this Chapter.

14.5.5.1 Traffic and Transportation

The potential effect that traffic and transportation associated with the Development has been considered in Chapter 12: 64. Access, Traffic and Transport.

14.5.5.1.1 Decommissioning/Construction Phases

A number of potential traffic effects are assessed in Chapter 12: Access, Traffic and Transport. Mitigation measures are both embedded in the design of the Development as discussed in Chapter 4: Site Selection and Design, and set out in

Chapter 12: Traffic and Transport, in order to reduce the traffic effects arising from the Development. The following are the key potential effects associated with access and traffic:

- Severance:
- Driver, pedestrian and cyclist delay and amenity; and •
- Fear and intimidation.
- Severance is the effect of splitting communities that exist on both sides of an access route, caused by increases in traffic 66. levels. Severance was considered in Chapter 12, Section 12.7.5. where it is noted that the proposed transport route passes through a number of settlements which have the potential to be affected by severance. It was concluded that the effect of severance during the decommissioning/construction phases is negligible and not significant in terms of the EIA Regulations.
- Driver delays usually occur at junctions and occur when junctions are operating close to or at capacity. The increase in traffic 67. as a result of the initial decommissioning/construction phases of the Development does not warrant the need for any junction capacity assessments and there are no existing capacity issues at any junction within the vicinity of the Development. Given the infrequent nature of potential delays and the avoidance of sensitive time-periods, congested junctions, over a temporary period of 12 months, are considered to be moderate sensitivity. However, the level of effect in terms of percentage increase of vehicles is classed as very low and therefore, the effect is expected to be slight. Any delays will be infrequent and of short duration, and hence not significant.
- Pedestrian and cycle delay and amenity have been considered. There is no existing pedestrian infrastructure present on 68. Terrydoo Road, from which access is taken, and therefore the pedestrian amenity is currently limited. Effects on pedestrian and cycle amenity, and on delay to public transport, are assessed as slight or negligible, and not significant.
- With regards to fear and intimidation, the strategic highway network to the Site is relatively straight with good visibility along its 69. extent. Fear and intimidation effects are assessed as slight or negligible, and not significant.

14.5.5.1.2 Operational Phase

70 visit the Development to conduct routine maintenance. This is unlikely to involve HGVs and would be of negligible magnitude, and hence any related effects will not be significant.

14.5.5.2 Noise

A full assessment of the potential effects of noise and vibration is provided in Chapter 10: Noise. 71.

14.5.5.2.1 Initial Decommissioning/Construction Phases

the Council, and a set of best practice measures to minimise effects is presented in Chapter 10: Noise.

14.5.5.2.2 Operational Phase

- Potential noise-sensitive receptors were identified in the vicinity of the Development. The potential for significant noise effects 73. are limited to residential amenity in the local area caused by operation of the proposed wind turbines, which reduces as the distance from the Development increases.
- The effects of noise from the operation of the Development have been assessed using the methodology for assessing wind turbine noise recommended by The Northern Ireland Executive¹². The existing levels of background noise were measured at a selection of representative properties situated in the vicinity of the Development, and their relationship to windspeed established. The measured background noise levels were corrected to exclude noise from existing operational wind turbines (including the operational Rigged Hill Wind Farm), following a methodology agreed with the Council.
- Appropriate noise limits for the Development were derived, taking into account the cumulative effects of other wind energy development in the locality, either in planning, consented, or operational¹³. Noise levels due to the operation of the

¹¹ Health and Safety Executive, 2013, RR968, Study and development of a methodology for the estimation of the risk and harm to persons from wind turbines, Available Online at http://www.hse.gov.uk/research/rrpdf/rr968.pdf [Accessed May 2019] ¹² ETSU-R-97, The Assessment and Rating of Noise from Windfarms, ETSU for the DTI, 1996 ¹³ Excluding the effects of the Operational Rigged Hill Wind Farm, which will be decommissioned.

Traffic during the operational phase will consist of movement by staff that will supervise the operation of the Development and

Noise and vibration effects during the initial decommissioning/construction phases were scoped out of the EIA as agreed by

¹⁰ IEMA (2017) Health in Environmental Impact Assessment. A Primer for a Proportionate Approach. [Online] Available at https://www.iema.net/assets/newbuild/documents/IEMA%20Primer%20on%20Health%20in%20UK%20EIA%20Doc%20V11.pdf [Accessed 11/01/2019]

Development were predicted using a recognised calculation technique, compared to the noise limits, and found to be acceptable.

As a result, all noise effects likely to arise from the Development were assessed as not significant.

14.5.5.3 Residential Visual Amenity

- An assessment of residential visual amenity has been undertaken in Chapter 6: Landscape and Visual (Section 6.7.5), and 77. further in the Residential Visual Amenity Assessment (RVAA) which is submitted in support of the planning application, as a standalone document, but does not form part of the ES.
- Residents are considered to be of high sensitivity to the Development as they are static 'receptors' whose enjoyment of the 78. property is likely to be affected by the quality of visual amenity experienced there. The purpose of the RVAA is to inform the planning process. It is in this context that the Technical Guidance¹⁴ makes the following statement: 'It is not uncommon for significant adverse effects on views and visual amenity to be experienced by people at their place of residence as a result of introducing a new development into the landscape. In itself this does not necessarily cause particular planning concern. However, there are situations where the effect on the outlook / visual amenity of a residential property is so great that it is not generally considered to be in the public interest to permit such conditions to occur where they did not exist before.'
- The Development would replace the Operational Rigged Hill Windfarm and would often be seen in context with the adjacent single Terrydoo turbines. A number of properties will experience a change in their view, and in certain scenarios would experience a significant visual change when compared to the current baseline.
- A significant visual change or effect does not equate to a significant effect on amenity under the EIA Regulations. Application 80. of the standard residential amenity test, of whether the visual change would be such to render a property an unattractive place to live, found that no neighbouring residential property assessed would fall into this category, during any phase of the Development. Under the EIA Regulations, any residential amenity effects are considered as negligible, consisting predominantly of views which already contain views of wind turbine development, and not significant.

14.5.5.4 Shadow Flicker

An assessment of the potential effects of shadow flicker is provided in Section 14.3 of this chapter. This concludes that no shadow flicker effects are predicted and therefore no significant effects are anticipated.

14.5.5.5 Health and Safety at Work

- There are various health and safety considerations particularly for workers during the initial decommissioning/construction phases of the Development. Workers are in closest proximity to the Development and as a result are considered to be the most at-risk group.
- Comprehensive health and safety assessments are an essential part of the construction process and would be carried out 83. prior to the initial decommissioning/construction phases in accordance with legislation. A Construction, Design and Management (CDM) co-ordinator will be appointed and be responsible for the provision of a predecommissioning/construction phase information pack, as required under the Construction (Design and Management) Regulations 2015. The appointed main contractor will be required to provide a construction phase plan.
- The initial decommissioning/construction phases of the Development would be managed in accordance with the Health and Safety at Work Act 1974 and would comply with all other relevant Health and Safety Regulations, including:
 - Construction (Health, Safety and Welfare) Regulations (Northern Ireland) 1996; ٠
 - The Construction (Design and Management) Regulations (Northern Ireland) 2016; and
 - The Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012.
- The Development would operate to the Health and Safety Executive 'Health and safety in the new energy economy: Meeting the challenge of major change' published in August 2010.

Following adoption of these measures, the risk to human health of decommissioning/construction workers is considered to be low and not significant in terms of the EIA Regulations.

14.5.6 Cumulative Effects

The above assessments include the potential for cumulative effects on each of the topic areas. It is possible that the interrelationship between two or more of the above effects, where they act on the same receptor, may lead to in-combination effects. These are assessed in the "Interrelationships" section 14.7 Interrelationships.

14.5.7 Summary of Effects

- Key determinants to the protection of human health, including mental health aspects associated with changes to amenity as a 88 result of the Development, have been considered as part of this HHIA. The outcome of the HHIA indicates that the Development is unlikely to negatively affect people's health and wellbeing in its widest sense. There are no effects that:
 - Cause potentially severe or irreversible negative effects;
 - Affect a large number of people to an unacceptable level; or
- As a result, **no significant effects** are predicted for any phase of the Development. 89.

14.6 Climate and Carbon Emissions 14.6.1 Scope

- The aim of the Climate Change Impact Assessment (CCIA) section is to determine how the Development is likely to interact 90. with a changing climate and whether any significant effects could arise. CCIA is a new form of environmental assessment required by the amended European Commission (EC) Directive 2014/52/EU¹⁵ as transposed into the EIA Regulations.
- The most recent climate projection iteration UK Climate Projections 2018 (UKCP18)¹⁶, has identified the following climatic 91. trends as a result of climate change:
 - Increased temperatures;
 - Sea level rise; and
 - from heavy precipitation events and decreases in summer rainfall).
- As none of the identified climate change trends listed above could affect the Development, the Development's vulnerabilities and resilience to climate change has been scoped out of the EIA.
- The assessment of the Development's effects on climate change has been scoped into the EIA, given the associated carbon reduction properties of windfarms and the potential for peat disturbance. Windfarms are low carbon forms of electricity generation, which is supported in general by UK energy policy as one of the means of reducing future climate change; these beneficial effects may be significant, and the net effect is assessed in this section.
- The scope of the EIA in respect of climate change was set out in Technical Appendix 2.1 Scoping Report and this was 94 agreed by the Council in its scoping response as noted in Table 14.8.

14.6.2 Assessment Methodology

- 95 over the lifetime of the Development. It provides a mechanism by which carbon costs of the Development can be weighed against the carbon savings associated with the operation of the Development during its lifetime. As the Development is proposed in perpetuity, an assumption of a maximum 70-year lifespan has been made.
- The data sources and assumptions used in the carbon balance assessment are detailed in **Technical Appendix A14.1**: Carbon Calculator Inputs and Outputs.

Specifically, may affect groups of people who already suffer poor health or are socially excluded to an unacceptable level.

Change in the frequency, intensity and distribution of rainfall events (e.g. an increase in the contribution of winter rainfall

The methodology uses the Scottish Government's Carbon Calculator Tool¹⁷ to calculate the carbon savings and carbon losses

¹⁴ Landscape Institute (2019). Technical Guidance Note 2/19 'Residential Visual Amenity Assessment (RVAA)

¹⁵ European Parliament and Council Directive 2014/52/EU amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.

¹⁶ Met Office (2018). UKCP18 Headline Findings. [online] Available at <u>https://www.metoffice.gov.uk/research/collaboration/ukcp</u> ¹⁷ Scottish Government, 2016, Calculating Carbon Savings from Wind Farms on Scottish Peatlands - A New Approach [Online] Available at: http://informatics.sepa.org.uk/CarbonCalculator/

The assessment is a comparative one, comparing the effects on carbon with and without the proposed Development. 97.

14.6.3 Guidance

- In order to establish a comprehensive assessment methodology, the following guidance has been followed:
 - The Institute of Environmental Management and Assessment (IEMA) guidance document 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaption' (2015)¹⁸;
 - The IEMA guidance document 'Environmental Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance' (2017)¹⁹; and
 - European Commission 'Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment' (2013)²⁰.

14.6.4 Consultation

Consultation with the relevant organisations was initiated during the initial stages of the EIA to identify any climate change effects that could be initiated by the Development. A summary of the findings are detailed in Table 14.8.

Table 14.8: Summary of Consultation Responses on Climate Change

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Causeway Coast and	Letter 26/01/2018 in	The council is content with the proposed	None required
Glens Borough	response to the Scoping	CCIA methodology, the guidance and data	
Council	Report	sources referred.	

14.6.5 Assessment of Effects

The following section discusses the results of the Scottish Government's Carbon Calculator Tool when applied to the Development. Appendix A14.1: Carbon Calculator Inputs and Outputs provides the full set of inputs and results produced by the Tool.

14.6.5.1 Carbon Savings

- Every unit of electricity produced by a windfarm development displaces a unit of electricity which would otherwise have been produced elsewhere. The mix of electricity produced in the UK includes coal oil and gas fired generation, and therefore displacing this represents carbon savings.
- ¹⁰² The electricity produced from the Development is assumed to substitute energy production by entirely coal-fired generation, or a mix of fossil fuels, or the national grid mix of energy generation. 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 future grid mix. As a result, carbon emission savings are calculated for each scenario in the carbon calculator (see Appendix A14.1: Carbon Calculator Inputs and Outputs).
- Carbon savings for the expected scenario are summarised in Table 14.9. Carbon savings are expressed in terms of tonnes of carbon dioxide (CO₂).

Table 14.9: Carbon Savings for the Development (Expected Scenario)

	Expected CO ₂ Saving (t CO ₂ yr ⁻¹)
Coal fired electricity generation	69,351
Grid mix electricity generation	21,219
Fossil fuel mix electricity generation	34,751

¹⁸ IEMA (2015) IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation [Online] Available at: https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf ¹⁹ IEMA (2017) IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance' [Online] Available at: https://www.iema.net/policy/ghg-in-eia-2017

14.6.5.2 Carbon Losses

- The manufacturing, construction and installation of the wind turbines has an associated carbon cost, and carbon losses are also generated by the requirement for extra capacity to back up wind generation. Carbon losses associated with reduced carbon fixing potential and loss of soil organic matter occurs through excavation of peat for construction and drainage effects. Carbon losses may also be associated with felling of existing forestry; however, as no forestry is present on Site, this does not apply to this Development.
- Peat-forming vegetation that leads to organic soils (peatlands) act as carbon sinks, whereby they absorb carbon dioxide and release it due to land use change. Windfarm developments on peatland may result in negative effects on these habitats if not appropriately considered during scheme design and development. Changes to the peatland habitat through development could result in a significant effect on its ability to store carbon, potentially resulting in reduced carbon benefits of the Development.
- the distribution of peat across the Site, with a focus on the reuse of existing infrastructure wherever possible, to minimise disturbance of active peat.
- Carbon losses for the expected scenario are summarised in Tak 107

Table 14.10: Carbon Losses for the Development (Expected Scenario) Losses

Losses due to turbine life (e.g. manufacture, construction, deco

Losses due to back-up

Losses due to carbon fixing potential

Losses from soil organic matter

Losses due to Dissolved Organic Carbon (DOC) and Particula

Change in emissions due to improvements of degraded bogs

Change in emissions due to removal of drainage from foundati

Net emissions of Carbon Dioxide

14.6.5.3 Payback Period

- The carbon payback period is a measurement/indicator to help assess a proposal. The shorter the payback the greater the benefit the Development will have in displacing emissions associated with electricity generated by burning fossil fuels.
- displaced fossil fuel power generation and any site improvements.
- The estimated payback period for the Development is 1.5 years compared to grid-mix electricity generation. In comparison to fossil fuel mix and coal fired electricity generation, the payback period of the Development reduced to 0.9 years and 0.5 years respectively. Table 14.11 goes into further detail on payback periods for the Development.

²⁰ European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment. Available at http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

The proposed Development layout was determined through an iterative design process which involved careful consideration of

	t CO ₂ Equivalent (total for wind farm lifetime)
ommissioning)	23,995
	22,566
	622
	838
te Organic Carbon (POC)	20
	-15,494
ons and hardstanding	-1,152
	31,394

The payback period is calculated taking the total carbon cost (carbon losses) and dividing by the annual carbon gains from

Compared to	Expected Scenario	Best Case Scenario	Worst Case Scenario
Coal fired electricity generation	0.5	-0.1	1.4
Grid mix electricity generation	1.5	-0.3	4.5
Fossil fuel mix electricity generation	0.9	-0.2	2.7

Table 14.11: Payback in years for each scenario used in the Carbon Calculator

111. On this basis, the CO₂ emissions of the Development are forecast to be cancelled out within c.1.5 years. The CO₂ emissions savings for the operational lifetime beyond that would be a positive net benefit of the Development to reducing climate change. No time limit has been assumed for the operational phase of the Development, and all operation beyond the payback time represents a benefit in terms of net reduction of carbon emissions. The longer the Development operates, the greater the benefit. The Development will have a moderate (and significant) beneficial effect on carbon emission savings which increases proportionally with the duration of the operational phase.

14.6.6 Cumulative Effects

- The UK Government has set ambitious targets for reducing greenhouse gas emissions by 2050 as part of the UK Climate Change Act 2008²¹. The legally binding targets are for a reduction of at least 80% by 2050 against the 1990 baseline. Whilst Northern Ireland does not have any separate climate change legislation, any emissions produced in Northern Ireland and hence any reductions in emissions will contribute to the UK's overall total and therefore Northern Ireland has a role to play in meeting the legally binding targets.
- Table 5.3 of the Digest of UK Energy Statistics 2018²² report details the sources used in generation of electricity throughout 2017 by major power producers. Renewable electricity represented 29.3% of total UK generation in 2017 with onshore wind having the highest share of renewable capacity and generation (at 31.7% and 29% respectively). 10.2% of total energy consumption came from renewable sources, as detailed within Table 6.7 of DUKES 2018²³. The Development will contribute around 28-29 MW of installed capacity.
- 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.

14.6.7 Mitigation Measures and Residual Effects

Sections 14.6.5.3 and 14.6.6 identify positive effects that are moderate and major respectively. Through the iterative design 115. process, these positive effects have been maximised. As a result, the residual effects are as assessed above. .

14.6.8 Summary of Effects

- The Development will have a significant positive effect on carbon savings and a significant positive effect when considered cumulatively with UK-wide renewable energy deployment.
- Whilst not affecting the significance of the assessed effect, the findings should be considered in the context of increasing 117. importance in society and government of acting to address climate change. The UK Government recently passed a motion declaring a climate emergency²⁴, following a lead taken by over 104 local authorities²⁵ and following substantial public pressure. 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".

14.7 Interrelationship Effects

- Schedule 4, Part 1, paragraph 3 of the EIA Regulations requires that the ES considers the interrelationships between aspects of the environment likely to be significantly affected by a development.
- Interrelationships may occur where two or more effects arise that have the potential to have an effect on the same receptor during any particular phase of a development. An effect taken in isolation may not have a significant effect on a receptor, but where several effects are considered in an interrelated manner, the resultant combined effect may be considered significant, depending on the nature of the effects.
- Typically, where one individual effect dominates, the assessment focuses on whether the addition of other effects on that 120. receptor would make a material difference. Where individual effects are similar in magnitude, the assessment focuses on whether the combined effect could be significant.

14.7.1 Methodology

- Residual effects assessed as "negligible" (with a magnitude described generally as "no detectable or material change", or "a barely discernible change") in other chapters of this ES are considered not to have the potential to contribute to interrelationship effects, and are not considered in this assessment. For the avoidance of doubt, all effects not explicitly assessed elsewhere in the ES are considered to be negligible and are therefore not assessed.
- Only receptors that are predicted to be the subject of more than one potential effect have been included in the assessment. Receptors predicted to be the subject of only a single effect are excluded because there is considered to be no potential for a cumulative interrelationship effect to take place.
- The rationale for receptor inclusion or exclusion has been explicitly detailed in section 14.7.2. 123.
- A matrix has been used to detail which potential effects from different sources are predicted to impact each of the included 124 receptors.
- 125. It should be noted that uncertainty in the assessment of effects, for most of the technical chapters in this ES, is dealt with by making conservative, or worst-case, assumptions. As this assessment considers the "in-combination" effects of multiple individual effects, it is based on there being multiple worst-cases simultaneously, which in turn is likely to be overly conservative.
- There are no specific guidelines on how the assessment of interrelationship effects should be undertaken, and so a gualitative approach has been used, using the results of the individual assessments, and based on professional judgement. Note that the assessment of the interaction effect may come to a different conclusion than the effect on the individual topic, as it is the combination of effects that are being assessed.
- The sensitivity of receptors has been assessed as set out in the individual Chapters 6 to 13 of this ES, and therefore 127. residents are considered to have a high sensitivity, although noting that this will be somewhat diminished by the presence of an operational windfarm in the baseline scenario. In-combination effects of moderate or major magnitude have been assessed as significant, based on professional judgement. Magnitude has been assessed in accordance with the generic guidance in Chapter 2: Environmental Impact Assessment Methodology, which describes magnitude as:
 - Negligible- no detectable change to a location, environment, species or sensitive receptor;
 - Minor- a detectable but non-material change to a location, environment, species or sensitive receptor;
 - •
 - Major- a fundamental change to a location, environment, species or sensitive receptor.

Moderate- a material, but non-fundamental change to a location, environment, species or sensitive receptor; and

ittachment data

²¹ UK Government (2008) UK Climate Change Act 2008. Available at <u>http://www.legislation.gov.uk/ukpga/2008/27/part/1/crossheading/carbon-</u> budgeting

²² Department for Business, Energy & Industrial (2018) Digest of United Kingdom Energy Statistics (DUKES) (2018) [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695804/R

²³ Department for Business, Energy & Industrial (2018) Digest of United Kingdom Energy Statistics (DUKES) (2018) [Online] Table 6.7. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uplo ²⁴ Houses of Parliament (2019). Transcript of 1st May 2019. HC Deb, 1 May 2019, c225. Available at: https://www.theyworkforyou.com/debates/?id=2019-05-01c.225.0 [accessed on 08/07/2019]. ²⁵ https://climateemergency.uk/blog/list-of-councils/

14.7.2 Effect Interrelationship Matrix

- A matrix, Table 14.12, has been used to detail which potential residual effects are predicted to impact each of the included 128 receptors. Receptors are grouped at this stage to provide focus.
- 129. It is noted that noise effects (Chapter 10) are not sub-categorised into Negligible, Minor, Moderate and Major, and hence "not significant" effects could potentially contribute to interrelationship effects. Where residential properties lie within the 35 dB noise contour (the lower end of the range of daytime fixed lower noise limits as specified in reference guidance; in Chapter 10, sections 10.2.2.3 and 10.3.8.1) as shown on Figure 10.2, these are included below.
- **Table 14.12** below identifies the potential relationships between the effects in one chapter and receptors in another, considered in this ES. For some interrelationships, the in-combination effects are already described within individual chapters, as noted in Table 14.12. Other interrelationships are not described anywhere else in the ES, and are assessed below.

Table 14.12: Potential Interrelationships between ES chapters

	Chapter	6	7	8	9	10	11	12	13	14
	Title	Landscape and Visual	Hydrology, Hydrogeology and Geology	Ecology	Ornithology	Noise	Cultural Heritage	Access, Traffic and Transport	Socio-Economics, Tourism and Recreation	Other Issues
6	Landscape and Visual	N/A	-	-	-	Residents	In Ch. 11	Residents	In Ch. 13	-
7	Hydrology, Hydrogeolog y and Geology		N/A	In Ch. 8	-	-	-	-	-	In Ch. 14
8	Ecology			N/A	In Ch. 9	-	-	-	-	-
9	Ornithology				N/A	In Ch. 9	-	-	-	-
10	Noise					N/A	-	In Ch. 10	In Ch. 13	-
11	Cultural Heritage						N/A	-	-	-
12	Access, Traffic and Transport							N/A	-	-
13	Socio- Economics, Tourism and Recreation								N/A	-
14	Other Issues									N/A

14.7.3 Residential Receptors

The only potential interrelationship effects not already assessed in other chapters of this ES relate to the potential effects on 131. residents.

- 132. Potential effects on residents during the initial decommissioning / construction phases include:
 - Changes in their visual environment because of the visibility of the decommissioning/construction activity (Chapter 6: ٠ LVIA, Section 6.7.5); and

- Changes in the traffic on the decommissioning/construction routes leading to changes in pedestrian amenity, severance, vibration and driver delay (Chapter 12: Access, Traffic and Transport, Sections 12.7.3, 12.7.4 12.7.5 and 12.7.6).
- ^{133.} Potential effects on residents during the operational phase include:
 - Changes in their visual environment due to the fewer but taller turbines (Chapter 6: LVIA, section 6.7.5); and • Changes in the noise environment because of changes to noise conditions resulting from the proposed turbines (Chapter
 - 10: Noise).
- Specific receptors that were identified in each of these chapters are detailed in **Table 14.13** for the initial decommissioning/ 134. construction phase effects and Table 14.14 for operational phase effects.

Chapter / effect type	Receptor	Magnitude
6: Visual	Residents of properties within 7 km	Medium to High
12: Pedestrian amenity	Residents along the construction transport route	Low
12: Driver delay	Drivers along the abnormal load route	Low
12: Vibration	Residents along the construction route	Low

Table 14.14: Non-negligible operation phase effects arising in two or more chapters

Chapter / effect type	Receptor	Magnitude
6: Visual	Residents of properties within 7 km	Medium to High
10: Noise	Residents of 37 Temain Road and 90 Terrydoo Road	Within the 35 dB contour

The above effects have been set out for each receptor in Table 14.15. 135.

Table 14.15: Non-negligible interrelationship effects by receptor Construction Phases **Operational** Phase Visual effects Increased turbine noise None None

Receptor	Initial Decommissioning/
Residents of 37 Temain Road and 90 Terrydoo Road	Visual effects Driver delay
Residents along the construction transport route and within 7 km	Visual effects Pedestrian amenity Vibration
Drivers along the abnormal load route (if different to construction route) and within 7 km	Visual effects Driver delay

14.7.4 Assessment of Effects

This section considers the effects of the interrelationship between the individual effects identified in Table 14.15 for each 136 receptor or receptor group.

14.7.4.1 Residents of 37 Temain Road and 90 Terrydoo Road

137 During the initial decommissioning / construction phases, the high magnitude visual effects at these two properties (Chapter 6: LVIA, Section 6.7.5.1 and 6.7.5.2) and their environs are likely to be the greatest change in experience of living at these properties and are only likely to occur over a temporary c. eight-month period. A low magnitude effect associated with the transport of abnormal loads is also predicted (Chapter 12: Access, Traffic and Transport, Section 12.7.4). The transportation of abnormal loads will occur over an estimated two-month period and compromise of approximately 50 loads, and would only be realised if a resident was travelling on the same roads at the same time as the abnormal load traffic. Both

properties have alterative access and depending on the destination required may not require to travel along the abnormal load route. As result, short-term driver delay effects are unlikely to add substantially to the visual effect.

- Both properties on this road are set well back from the ALV and construction routes, and in open areas that allow airborne vibration to disperse. As a result, airborne vibration from vehicle movements at these two properties is expected to be negligible. The difference between the visual effects and the overall change when added to a potential driver delay effect is expected to be a detectable, short term, but non-material change (as a worst-case), and so is assessed as minor, and not significant.
- ^{139.} During the operational phase, the visual effects at these two properties and their environs is associated with the increase in height of the proposed turbines at the Development, this is likely be the greatest change in experience of living at these properties. The Operational Rigged Hill Windfarm and Terrydoo Road Wind Turbines may have the potential to influence background noise levels in the locality (as stated in Chapter 10: Noise, Section 10.4). The assessed operational noise scenario was found to be compliant with noise limits and not a significant effect. In addition to this, the baseline scenario includes the Operational Rigged Hill Windfarm and a certain level of baseline wind turbine noise will be present currently, reducing the magnitude of change (this is not considered in **Chapter 10** in accordance with topic-specific guidance). As a result, changes in noise effects are very unlikely to contribute substantially to the overall effect. The difference between the visual effects and the overall change when added to a potential increase in wind turbine noise is expected to be a detectable, short term, but non-material change, and so is assessed as minor, and not significant.

14.7.4.2 Residents along the construction route and within 7 km

- During the decommissioning / construction phases, the medium to high (where visible and depending on location) magnitude visual effects at residential properties within 7 km of the Site (Chapter: 6 LVIA, Section 6.7) are likely to be the greatest change in experience of living at these properties. Other potential effects are associated with the construction traffic predominantly consisting of HGVs, including pedestrian amenity and vibration (Chapter 12: Access, Traffic and Transport, Section 12.7).
- As noted in **Chapter 12** the construction and associated traffic generation will occur over an estimated eight-month period, the effects of traffic generation would be realised only if a resident was travelling on the same roads at the same time as an the construction traffic coupled with visibility of the Development, which is statistically likely to be the case for only a small proportion of residents within 7 km of the Site. As a result, short-term driver delay effects are unlikely to add substantially to the temporary visual effect.
- Potential effects on pedestrian amenity are proposed to be mitigated through implementation of a Traffic Management Plan 142. (TMP) as set out in Chapter 12: Access, Traffic and Transport, Section 12.9.2.
- Airborne vibration from passing HGVs could affect a small number of properties in close proximity to the construction traffic route. These effects, if they occur at all, would be highly localised, short-term in nature and limited to when HGVs pass.
- The difference between the visual effects and the overall change when added to a potential traffic generation or driver delay effect is expected to be a detectable, short term, but non-material change (as a worst-case), and so is assessed as minor, and not significant.

14.7.4.3 Residents along the ALV route and within 7 km

In common with the preceding section, the decommissioning / construction phases, the medium to high (where visible and depending on location) magnitude visual effects at residential properties within 7 km of the Site (Chapter: 6 LVIA, Section 6.7) are likely to be the greatest change in experience of living at these properties. A further potential effect of driver delay is associated with the movement of abnormal loads (Chapter 12: Access, Traffic and Transport, Section 12.7).

The abnormal loads will be delivered over an estimated two-month period, and comprise approximately 50 vehicle movements. A delay would be realised only if a resident was travelling on the same roads at the same time as an abnormal load coupled with visibility of the Development, which is statistically likely to be the case for only a very small proportion of residents within 7 km of the Site. As a result, short-term driver delay effects are unlikely to add substantially to the temporary visual effect.

14.7.5 Summary of Interrelationship Effects

146. Non-negligible effects of the Development identified in more than one chapter of this ES, acting on a single receptor and excluding those effects already assessed elsewhere in this ES (such as visual and noise effects on recreational receptors, which are assessed in Chapter 13), have the potential to cause interrelationship effects. These have been identified as acting on nearby residents, as a result of visual and traffic effects during the decommissioning/ construction phases, and visual and noise effects of the operational phase of the Development. These have been assessed and found to be, in all cases, detectable, short term, but non-material changes (as a worst-case), and so are assessed as minor, and not significant in terms of the EIA Regulations.

14.8 Statement of Significance

- The Development will have no significant effects on aviation, telecommunications, television reception, shadow flicker, or 147. human health.
- The Development will have a positive, and significant, effect on carbon savings, by displacing electricity generation from other 148. sources that emit carbon dioxide. 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.
- In-combination effects associated with the interrelationships between effects assessed in other ES chapters that could act on a single receptor have been assessed as being not significant.

15 Summary of Effects and Mitigation

15.1 Introduction

This chapter of the Environmental Statement (ES) summarises mitigation measures proposed elsewhere in this ES.

Chapters 6 to 14 of the ES report the findings of the assessments of the predicted effects of the Development on a topic-by-2. topic basis. The significance of these effects has been assessed using criteria defined in the topic chapters. Where appropriate, the significance of effects has been categorised as major, moderate, minor or negligible. In the context of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (the EIA Regulations), effects assessed as being of 'major' or 'moderate' significance are considered to be significant effects. For some of the assessments, effects are either considered to be significant or not significant in the context of the EIA Regulations, without sub-categorising.

15.2 Summary of Mitigation Measures

Table 15.1 summarises the predicted significant effects of the Development prior to, and following, the implementation of committed mitigation measures, to which the Applicant is committed, as proposed in order to reduce or eliminate significant adverse environmental effects. Only effects assessed as significant, prior to mitigation, are shown in this table. Summaries of all significant and non-significant effects can be found at the end of each assessment chapter.

15.3 Embedded Mitigation

Embedded mitigation includes design changes that were made in order to reduce or eliminate adverse effects, as well as normal good practice measures, and these have avoided the majority of potentially significant effects. Embedded mitigation is

Table 15.1: Summary of Significant Effects and Associated Mitigation Measures

considered in the "Predicted Effect" column in Table 15.1, and is not treated as "Mitigation" for these purposes. These are set out in the following locations in the ES, and details are not repeated here:

- Chapter 3: Development Description;
- DCEMP);
- Technical Appendix A3.2: Draft Habitat Management Plan (Draft HMP); and
- Technical Appendix A7.2: Water Construction and Environmental Management Plan (Outline WCEMP).
- The process of applying the embedded mitigation is set out in Chapter 4: Site Selection and Design. The key design 5. aspects comprising embedded mitigation are:
 - to minimise visual confusion and ensure a balanced/compact array from key views;
 - Achieving an appropriate scale of turbine, taking account of the landscape context;
 - the Operational Rigged Hill Windfarm;
 - where possible:
 - Maximising the separation from residential dwellings; and •
 - Respecting other environmental constraints and associated buffer separations. ٠

15.4 Specific Mitigation Measures

In addition to mitigation proposed to address significant adverse effects, as shown in Table 15.1, certain chapters have also 6. proposed further measures to reduce effects that were assessed as not significant before mitigation. These are set out in Table 15.2.

Chapter	Receptor	Predicted Effect	Significance prior to Mitigation	Mitigation				
Decommissioning/Cons	ecommissioning/Construction Phase							
Chapter 6: Landscape and Visual	Immediate Landscape Setting: Binevenagh LCA	Landscape change	Significant (temporary)	None available				
	Immediate Landscape Setting: Roe Basin LCA	Landscape change	Significant (temporary)	None available				
	Viewpoint 1: Terrydoo Road	Visual change	Significant (temporary)	None available				
	Viewpoint 2: Temain Road to Aghansillagh and Temain Hill	Visual change	Significant (temporary)	None available				
	Viewpoint 3: Edenmore Road, Limavady	Visual change	Significant (temporary)	None available				
	Viewpoint 5: Drumsurn, Beech Road	Visual change	Significant (temporary)	None available				
	Viewpoint 19: B66, west of Ringsend, north of Site	Visual change	Significant (temporary)	None available				
	Drumsurn	Visual change	Significant where there are open views from properties and recreational areas	None available				
	Limavady	Visual change	Significant (temporary) for residential receptors along the southern and south- easterly edge of the settlement	None available				
	B66 (Limavady to Aghadowey)	Visual change	Significant (temporary) along 6 km when travelling east and 2.9 km when travelling west. Not significant elsewhere	None available				
	B68 (Limavady to Dungiven)	Visual change	Significant (temporary) from Limavady for 1 km of the route. Not significant elsewhere	None available				

Technical Appendix A3.1: Outline Decommissioning and Construction Environment Management Plan (Outline

• The avoidance of inconsistent turbine spacing leading to relatively large gaps, outliers and excessive turbine overlapping

The utilisation of existing infrastructure, reuse of existing access roads and utilisation of the same general area/footprint of

Understanding and respecting the ground conditions and topography of the Site, including avoiding effects on active peat

Residual Effect
Significant (temporary)

Chapter	Receptor	Predicted Effect	Significance prior to Mitigation	Mitigation	Residual Effect
	B70 (Garvagh to Ringsend)	Visual change	Significant (temporary) intermittently along 5 km section of the route between just south of Glenkeen Bridge to Ringsend when travelling north. Not significant elsewhere	None available	Significant (temporary)
	National Cycle Network Route 93	Visual change	Significant (temporary) for 1.8 km around the crossing of the A2 and south of Limavady to the crossing of B192. Not significant elsewhere	None available	Significant (temporary)
	The Ulster Way Long Distance Route - Corick Mountain to the Development	Visual change	When walking north: Significant (temporary) between Donald's Hill (4.5 km south of the Development Site) and the Development Site. Not significant elsewhere.	None available	Significant (temporary)
	The Ulster Way Long Distance Route - Castlerock to the Development	Visual change	When walking south: Significant (temporary) through Cam Forest and Springwell Forest, for 1.2 km until the path reaches the B66, to the north-east of Boyds Mountain for a short (0.5 km) section of the route, from 1 km north of the Development, and for approximately 1.5 km through it. Not significant elsewhere.	None available	Significant (temporary)
Chapter 9: Ornithology	Hen Harrier	Risk of Disturbance and displacement	Moderate (temporary)	Avoidance by design set back of >500 m and implementation of the Construction Mitigation Strategy	Minor (temporary)
	Snipe	Risk of Disturbance and displacement	Moderate – minor (temporary)	Implementation of the Construction Mitigation Strategy, Habitat Management Plan and Snipe Management Strategy	Negligible (temporary)
	Meadow Pipit	Risk of Disturbance and displacement	Moderate – minor (temporary)	Implementation of the Construction Mitigation Strategy, Habitat Management Plan and Snipe Management Strategy	Negligible (temporary)
	Skylark	Risk of Disturbance and displacement	Modertate – minor (temporary)	Implementation of the Construction Mitigation Strategy, Habitat Management Plan and Snipe Management Strategy	Negligible (temporary)
Chapter 11: Cultural Heritage	Unknown (buried) archaeological remains	Damage or destruction to unknown (buried) archaeology should they occur within Development footprint	Minor/Moderate: potentially Significant, albeit low potential for unrecorded remains on this Site.	Watching brief in undisturbed portions of the Development footprint only.	Not Significant (minor)
Chapter 13: Socio- economics and recreation	Ulster Way	Direct, temporarily diverting the footpath onto its original route.	Significant (Moderate and temporary)	None	Significant (Moderate and temporary)
	Ulster Way	Indirect, from visual changes.	Significant (Moderate and temporary) for 1 km either side of the Site and minor/negligible for the remainder of the route	None	Significant (Moderate and temporary)
	The Views Self Catering Cottage	Indirect, from visual changes	Significant (Moderate and temporary)	None	Significant (Moderate and temporary)
Operational Phase		1			1
Chapter 6: Landscape and Visual	Immediate Landscape Setting: Binevenagh LCA	Landscape change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Immediate Landscape Setting: Roe Basin LCA	Landscape change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Viewpoint 1: Terrydoo Road	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Viewpoint 2: Temain Road to Aghansillagh and Temain Hill	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Viewpoint 3: Edenmore Road, Limavady	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)

Chapter	Receptor	Predicted Effect	Significance prior to Mitigation	Mitigation	Residual Effect
	Viewpoint 5: Drumsurn, Beech Road	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Viewpoint 6: Ringsend	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Viewpoint 19: B66, west of Ringsend, north of Site	Visual change	Significant (permanent/reversible)	None available	Significant (permanent/reversible)
	Drumsurn	Visual change	Significant (permanent/reversible) where there are open views from properties and recreational areas	None available	Significant (permanent/reversible)
	Ringsend	Visual change	Significant (permanent/reversible)for a small number of properties in the upper, western part of settlement	None available	Significant (permanent/reversible)
	Limavady	Visual change	Significant (permanent/reversible) for residential receptors along the southern and south-easterly edge of the settlement	None available	Significant (permanent/reversible)
	B66 (Limavady to Aghadowey)	Visual change	Significant (permanent/reversible) along 6 km when travelling east and 2.9 km	None available	Significant (permanent/reversible)
	B68 (Limavady to Dungiven)	Visual change	Significant (permanent/reversible) from Limavady for 1 km of the route. Not signicant elsewhere.	None available	Significant (permanent/reversible)
	B70 (Garvagh to Ringsend)	Visual change	Significant (permanent/reversible) intermittently along 5 km section of the route between just south of Glenkeen Bridge to Ringsend when travelling north. Not significant elsewhere	None available	Significant (permanent/reversible)
	NCN 93	Visual change	Significant (permanent/reversible) for 1.8 km around the crossing of the A2 and south of Limavady to the crossing of B192. Not significant elsewhere.	None available	Significant (permanent/reversible)
	The Ulster Way Long Distance Route - Corick Mountain to the Development	Visual change	Significant (permanent/reversible) from Donald's Hill north for 4.5 km	None available	Significant (permanent/reversible)
	The Ulster Way Long Distance Route - Castlerock to the Development	Visual change	Significant (permanent/reversible) through Cam Forest and Springwell Forest, for 1.2 km until the path reaches the B66, to the north-east of Boyds Mountain for a short (0.5 km) section of the route, from 1 km north of the Development, and for approximately 1.5 km through it. Not significant elsewhere.	None available	Significant (permanent/reversible)
Chapter 8: Ecology and Fisheries	Bats	Collision from operational wind turbines	Signifcant Moderate (permanent)	Curtailment of turbines during periods of highest risk (detailed within Technical Appendix A8.4)	Not significant (permanent)
Chapter 9: Ornithology	Hen Harrier	Displacement	Moderate – minor, Significant (permanent/reversible)	Avoidance by design set back of >500 m and implementation of the Draft Habitat Management Plan (Technical Appendix A3.2), Construction Mitigation Strategy and Ornithology Monitoring Plan (OMP)	Minor (permanent/reversible)
	Snipe	Displacement	Moderate – minor, Significant (permanent/reversible)	Draft Habitat Management Plan (Technical Appendix A3.2)	Negligible (permanent/reversible)
	Meadow pipit	Displacement	Moderate – minor, Significant (permanent/reversible)	Draft Habitat Management Plan (Technical Appendix A3.2).	Negligible (permanent/reversible)
	Skylark	Displacement	Moderate – minor, Significant (permanent/reversible)	Draft habitat Management Plan (Technical Appendix A3.2)	Negligible (permanent/reversible)
Chapter 14: Other issues	The climate	Reduction in emissions of greenhouse gases	Significant, beneficial (permanent)	None; the benefit was maximised through the design process	Significant, beneficial (permanent)

Table 15.2: Summary of Additional Measures for Non-Significant Effects

Chapter	Receptor	Predicted Effect	Significance prior to Additional Measures	Additional Measures	Residual Effect
Decommissioning/Cons	struction Phase	,			
Chapter 7: Hydrology	Peat	Peat Disturbance	Minor (temporary)	Best Practice Measures for management and storage of peat and peaty soils, as set out in the outline Peat Management Plan, Technical Appendix A7.4). Compensation through localised peat bog restoration and implementation of remediation/compensation in line with the measures	Not significant (temporary)
				outlined within the Draft HMP (Technical Appendix A3.2).	
	Peat	Peat Stability	Low/Negligible (temporary)	Implementation of drainage measures in accordance with best practice.	Not significant (temporary)
				Best Practice Measures for avoiding peat and the management of peat and peaty soils.	
Chapter 8: Ecology and Fisheries	Habitats (including active peat)	Permanent loss of small areas of habitat during decommisioning/construction	Imperceptible effect, not significant (permanent)	Measures outlined within the Draft HMP (Technical Appendix A3.2): Restoration of degraded blanket bog and wet heath habitat; and Planting of a replacement hedgerow	Not significant; slight to moderate positive effect in the medium-term) that is also permanent resulting in 'net gain'.
	Badgers	Animals may be trapped in trenches or open pipework	Slight (temporary)	Providing means of escape in trenches, and blocking pipes overnight	Not significant (temporary)
	Lizards	None	None	Pre-construction surveys, and provision of refugia	Not significant (slight positive effect in the long-term)
Chapter 9: Ornithology	Other Bird Species	Disturbance	Minor – Negligible (temporary)	Avoidance by design and maintence of the set back distance	Negligible (temporary)
	Other Bird Species	Displacement	Minor – Negligible (temporary)	Maintenance of set-back implementation as per the Construction Mitigation Strategy (Chapter 9).	Negligible (temporary)
Chapter 10: Noise	Residential Properties	Decommissioning/Construction noise, specified noise limits will be met.	Not significant (temporary)	The good practice measures detailed below will be implemented to manage the effects of noise and will be required of all contractors: • Operations shall be limited to times agreed with CCGBC; • Deliveries of turbine components, plant and materials by HGV to site shall only take place by designated routes and within times agreed with CCGBC; • The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery and activities, as advocated in BS 5228; • Where practicable, the work programme will be phased, which would help to reduce the combined effects arising from several noisy operations; • Where necessary and practicable, noise from fixed plant and equipment will be contained within suitable acoustic enclosures or behind acoustic screens; • All sub-contractors appointed by the main contractor will be formally and legally obliged, and required through contract, to comply with all environmental noise conditions; • Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night time construction activities likely to generate significant noise levels, e.g., turbine erection; and • Any plant and equipment normally required for operation at night (23:00 - 07:00), e.g., generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45 dB, LAeq, night shall not be exceeded at the nearest noise-sensitive receptors.	Not significant (temporary)
Chapter	Receptor	Predicted Effect	Significance prior to Additional Measures	Additional Measures	Residual Effect
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Chapter 11: Cultural Heritage	Known archaeological remains	None as none are recorded within the Development footprint. Nearest known archaeological remain is 300 m north-west of T7.	Potential for Minor effect on cropmark site (LDY017:030) due to construction of the access track. Permanent effect if it occurs.	A watching brief is recommended during construction to ensure that if this cropmark sit is present it can be recorded and documented ensuring preservation by record.	Not significant (permanent)
Chapter 13: Tourism, Recreation, Land Use and Socio-economics	Local & Regional economy	Opportunities for local suppliers to be engaged in the construction process giving rise to both direct and indirect benefits to the local and regional economy.	Minor, beneficial (temporary)	SPR will seek to secure positive direct and indirect benefits for the local/regional economy by encouraging the use of local labour, manufacturers and suppliers where possible. SPR will hold 'Meet the Developer days' prior to construction to allow local contractors to engage with the process and maximise opportunities	Not significant (beneficial, temporary)
Operational Phase					
Chapter 9: Ornithology	Other bird Species	Displacement	Minor – Negligible (permanent)	The HMP will provide beneficial effects to other bird species using the site in addition to those it is specifically designed for.	Negligible beneficial (permanent/reversible)
	All Bird Species	Collision Risk	Minor - Negligible (permanent)	In accordance with existing management practices, stock welfare/carrion including livestock will be checked on a frequent basis and any fallen stock removed from the site to dissuade any scavengers (e.g. ravens). Installation of alternative kestrel nesting opportunities i.e. nest baskets / boxes away from the turbine area to provide opportunities to reduce potential collision risk and alternative nesting sites for kestrels away from the commercial conifer plantation. Removal of an existing area of reseeded trees which will create a foraging area for a number of species in addition to snipe and hen harrier.	Negligible beneficial (permanent/reversible)
Chapter 13: Tourism, Recreation, Land Use and Socio-economics	Ulster Way	Direct, new circular route Indirect, from visual changes	Minor, beneficial (permanent)	Creation of new route though Cam Forest.	Not significant (beneficial, permanent)
	Local & Regional economy	Opportunities for local suppliers to be engaged in the construction process giving rise to both direct and indirect benefits to the local and regional economy.	Minor, beneficial (permanent / reversible)	SPR will seek to secure positive direct and indirect benefits for the local/regional economy by encouraging the use of local labour, manufacturers and suppliers where possible, this includes the payment of business rates and payment of land rents.	Not significant (beneficial, permanent/reversible)