FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DREHID WIND FARM AND SUBSTATION, CO. KILDARE

VOLUME 1 - NON TECHNICAL SUMMARY

Prepared for:

North Kildare Wind Farm Ltd

Date: **June 2025**

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1. INTRODUCTION

This Non-Technical Summary (NTS) has been prepared by Fehily Timoney and Company (FT) on behalf of North Kildare Wind Farm Ltd. The report summaries the findings contained in Volume II which is the Main EIAR.

The Proposed Development site includes lands in the townlands of Ballynamullagh, Kilmurry, Killyon, Coolree, Mulgeeth, Drehid and Dunfierth and is ca. 79 ha in size. The site is 3.7km from the town of Enfield and 12.4km from the town of Kilcock. The site is accessed from the M4 motorway until Enfield, then along the R402 for ca. 7.7km and finally along the local road (L5025) to the entrance of the site. The site lies c. 2.8km south of the motorway M4 at Enfield and 1.2km southeast of the regional road R402 linking the M4 to the R420 east of Tullamore in County Offaly.

The Proposed Development is comprised of the Proposed Wind Farm and the Proposed Substation, for which consent is being sought under separate processes.

The Proposed Wind Farm will comprise of 11 No. wind turbines with a tip height of 147.9 m for T1 and 167 m for all other turbines (T2 to T11). The turbine model will be the Nordex N133 and the overall installed capacity of the wind farm will be 52.8MW.

The electricity generated by the Proposed Wind Farm will be transmitted by a collector system of underground cables to the Proposed Substation. The Proposed Substation will then connect to the National Grid by way of a loop-in/loop-out connection to the existing 110 kV Kinnegad-Rinawade overhead lines. The Proposed Substation will comprise of two separate compounds and buildings, an Eirgrid compound and an Independent Power Producer (IPP) compound, necessary to export the electricity generated from the Proposed Wind Farm to the national grid.

1.1 Site Description

The site contains an area of relatively flat farmland with elevations below the 80m contour. The site is predominantly made up of agricultural land and coniferous forestry at various stages of their lifecycle.

The Proposed Wind Farm consists of 11 no. turbines which are proposed in predominantly coniferous forestry and agricultural land. The majority of turbines are underlain by peat.

The Fear English River flows through the site. This waterbody is a tributary of the River Blackwater, which in turn is a tributary of the River Boyne.

Land use in the vicinity of the site is agricultural resulting in a mosaic of improved agricultural grasslands and areas of cutover bog and coniferous forestry.

The Proposed Substation is located to the north of the Proposed Wind Farm, in a block of coniferous plantation forestry. A short cable run (998 m) will connect the substation to two steel lattice towers which will connect into the existing overhead line, thereby connecting the substation to the national grid.

The location of the Proposed Development site is set out in Figure 1.1.

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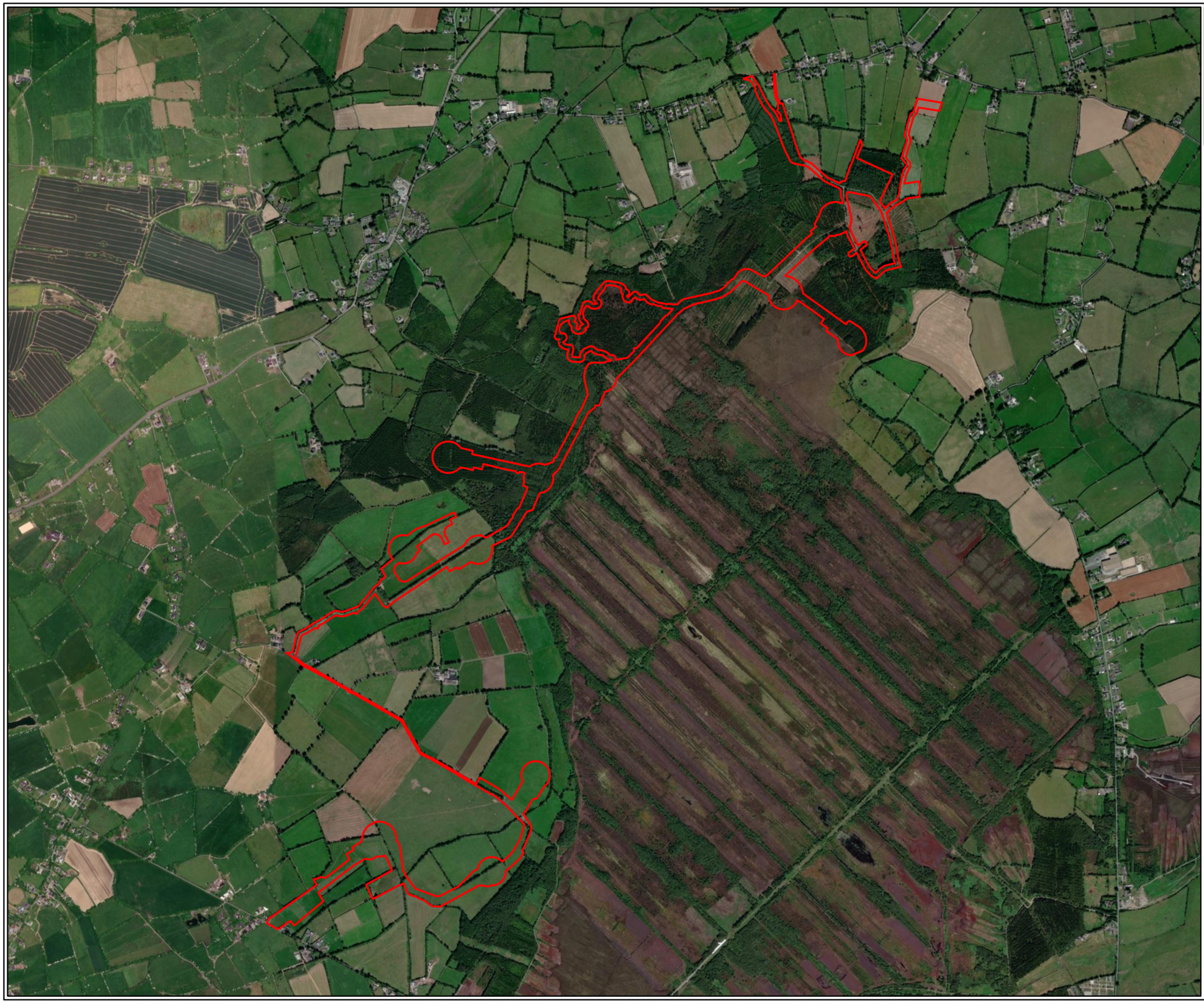

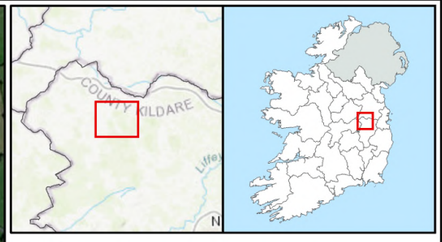

Legend

Proposed Development Boundary

TITLE: Site Location			
PROJECT: Drehid Wind Farm and Substation			
FIGURE NO:	1.1		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	28/04/2025	**PAGE SIZE:**	A3

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1.2 Structure of the EIAR

The EIAR has been prepared using the "grouped format structure". The format of this EIAR is designed to ensure that standard methods are used to describe all sections of the EIAR. Using this structure there is a separate chapter for each topic, e.g. air quality and climate, biodiversity, hydrology. The description of the existing environment, the Proposed Development and the potential impacts, mitigation measures and residual impacts are grouped in the chapter. The grouped format makes it easy to investigate topics of interest and facilitates cross-reference to specialist studies.

The structure proposed for the EIAR is as follows:

Volume 1 – Non-Technical Summary (NTS)

Volume 2 – Main EIAR

Volume 3 – Appendices to the Main EIAR

Volume 4 – Landscape and Visual Maps and Photomontages

The EIAR consists of the following chapters:

- Chapter 1 - Introduction
- Chapter 2 - Site Selection and Alternatives
- Chapter 3 - Description of the Proposed Development
- Chapter 4 - Policy
- Chapter 5 - EIA Scoping, Consultation and Key Issues
- Chapter 6 - Air Quality and Climate
- Chapter 7 - Noise and Vibration
- Chapter 8 - Biodiversity
- Chapter 9 - Land, Soils & Geology
- Chapter 10 - Hydrology and Water Quality
- Chapter 11 – Population, Human Health & Materiel Assets
- Chapter 12 – Shadow Flicker
- Chapter 13 - Traffic & Transportation
- Chapter 14 - Archaeology, Architectural and Cultural Heritage
- Chapter 15 - Landscape & Visual
- Chapter 16 - Telecommunications and Aviation
- Chapter 17 - Interactions of the Foregoing

1.3 Permission Period

A ten-year planning permission is being requested for this development. That is, planning consent would remain valid for ten years following the final grant. We note that the Planning Guidelines state that "Planning Authorities may grant permission for a duration longer than 5 years if it is considered appropriate, for example, to ensure that the permission does not expire before a grid connection is granted. It is, however, the responsibility of the applicants in the first instance to request such longer durations in appropriate circumstances"

A 10-year planning permission is considered appropriate for a development of this size to ensure all consents are in place. The expected physical lifetime of the turbine is approximately 35 years.

After this time, the developer will make a decision whether to replace or decommission the turbines. It should be noted that section 7.2 of the Planning Guidelines 2006[i] includes for the following:

'The inclusion of a condition which limits the life span of a wind energy development should be avoided, except in exceptional circumstances'

In this respect, the applicant requests the grant of permission is on the basis of a 35-year operational period from the date of commissioning of the wind farm.

1.4 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

2. NEED FOR THE DEVELOPMENT, SITE SELECTION AND ALTENATIVES CONSIDERED

The alternatives chapter sets out the reasonable alternatives that were considered in the preparation and design of the Proposed Development. This is included in order to give an indication of the main reasons for selecting the chosen options and alternatives considered.

2.1 Need for the Development

The Proposed Development is necessary to produce renewable energy for the Irish national grid in order to transition Ireland to a low carbon economy. The Proposed Wind Farm will play a role in providing renewable electricity in the Republic of Ireland, where in April 2025, the Irish Government published the latest update of the Climate Action Plan (CAP) which sets out an objective to achieve a 51% reduction in greenhouse gas emissions by 2030 (compared to 2018 levels) and climate neutrality by 2050, as mandated by the Climate Action and Low Carbon Development (Amendment) Act 2021 (Climate Action Plan, 2025). The plan also sets specific targets for onshore wind (6GW by 2025, 9GW by 2030).

The Proposed Substation is necessary to facilitate connection of the Proposed Wind Farm to the national grid. Other methods of connection have been explored and will be detailed further in this chapter. However, a 110 kV substation with loop-in/loop-out connection to the existing overhead Kinnegad-Rinawade 110 kV overhead line has been identified as the most favourable solution.

At a strategic level, the need for the Proposed Development is supported by International, European, and National environmental and energy commitments and policies. In Chapter 4 of this EIAR, a detailed analysis of these commitments and policies is outlined. This is in the context of substantial and continuing failure by Ireland in meeting climate targets to date.

The Climate Action Plan 2025 (or CAP25) provides a framework for delivering the Government's target of a 51% reduction (relative to 2018) in greenhouse gas (GHG) emissions by 2030. CAP25 follows the Climate Act 2021, which commits Ireland to a legally binding target of net zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030, with the CAP25 stating:

> *'(The plan) is our latest assessment and measurement of what we have achieved over the past year, building on actions taken over previous years. More importantly, it sets out what we need to do into 2025, so that we are prepared to take on the challenges of our second carbon budget period 2026-2030...*

> *…Effective planning is crucial, but our focus must now turn to turbocharging delivery, accelerating the significant progress that has been made in recent years...*

> *...Climate change is a 'threat multiplier' – wars and famines are being exacerbated as warming continues unabated and millions of climate refugees are displaced from their homelands. In the changing international environment it is critical that Ireland, and the European Union, continue to accelerate climate action.*

This is against the backdrop of the EU Copernicus Climate Change Service reporting that 2024 was the hottest in recorded history, with warming above the lodestar of 1.5C. The world has been passing milestones of temperature records, month after month, with devasting impacts. For every Climate Action Plan there are many new extreme weather events to reference. This year, we have witnessed deadly flooding in Spain, the sweeping destruction of Hurricane Milton in the United States and more recently the impacts of Storm Éowyn on our own communities. Climate change is not something in our future. It is very real, right now, and has been accelerating for years.'

At the County level the Kildare County Development Plan (CDP) 2023-2029 demonstrates a clear need for the Proposed Development. Chapter 7 of section 7.5 of the CDP refers to the 53.5 MW of "permitted wind farm developments" within Co Kildare. However, 48 MW of this share is actually accounted for by Drehid Wind Farm. It is clear that The Proposed Wind Farm, considered "permitted" in the CDP, forms the majority of the county's existing permitted wind development. This section of the CDP may have been drafted at a time when a previous iteration of the Proposed Development had been consented, therefore considering it "permitted" in the context of the CDP. However, the decision to give consent for the development was appealed by a third party to the High Court, and North Kildare Wind Farm limited subsequently decided to concede due to issues regarding the plans and particulars of the Proposed Development, following the 'Derryadd decision'. That is, the Applicant understood that more specific detail should be presented within the planning application regarding, for example, turbine tip height.

It is important to note that the Proposed Development had been permitted by An Bord Pleanála, and that the Applicant decided to concede in the High Court solely on the grounds of the Derryadd decision, as the Applicant believes that the application was otherwise fully appropriate. The current application for the Proposed Wind Farm presents specific turbine dimensions.

Furthermore, the turbine layout of the Proposed Wind Farm has been reduced from a 12-turbine layout to an 11-turbine layout; and crossings of the Fear English River have been reduced from 5 crossing points to 3 crossing points. As such, the current layout will have reduced potential impacts on the environment.

There is also the concurrent application for the Proposed Substation which will enable the Proposed Wind Farm to connect to the 110 kV Kinnegad-Rinawade overhead line, negating the requirements in the previous application for trenching a significant cable route into the local road network. As such, any concerns raised previously regarding potential impacts on the road network, arising from the trenching of the cable route, are now addressed.

It is important to note that the Proposed Development had been permitted by An Bord Pleanála, and that the Applicant decided to concede in the High Court solely on the grounds of the Derryadd decision, as the Applicant believes that the application was otherwise fully appropriate. The current application for the Proposed Wind Farm presents specific turbine dimensions.

In summary, It is evident that the current applications for the Proposed Development are broadly in line with the previously consented development; but now include the specific details required following the Derryadd decision, and the design has been refined further to reduce the potential impacts on the environment and local road network.

The Kildare CDP calculates that the county should have 280 MW of installed wind energy by 2030 but states that a more realistic 2030 target at this stage is 107 MW. The CDP states that there is currently 53.5 MW of permitted wind energy development within the county. However, The Proposed Development is used to calculate this figure. Without the Drehid Wind Farm, the permitted wind development within the CDP should be quoted as 5.5 MW. It is clear that the County Kildare has a lot of ground to make up long way to go to make up the target of 107 MW and that The Proposed Development is critical in attempting to meet this target of 107 MW of installed wind energy by 2030.

2.2 Site Selection

Firstly, a nationwide review was made of appropriate and suitable sites to develop a wind farm. The selection process at this level takes account of international, national and Regional policies and the main environmental designations and planning policy which indicates suitable areas for wind farm development. This involved the identification of environmentally designated sites, areas of existing windfarms, electricity grid capacity, population and settlements and relevant policies. It was also necessary to consider cumulative impacts on the environment.

From this process it was established that the Kildare, Meath and Westmeath areas have very little wind energy development. It was also noted that this area of the country has particularly good electricity infrastructure and good capacity to connect to the network. Less densely populated areas were then considered with density reducing greatly in the midlands region in comparison to the Greater Dublin Area region.

Following this process, a more focused study was conducted focusing on the Greater Dublin Area and Midlands. This search included the consideration of County Development Plan Policies and Designations, nature protection areas (Natura 2000 sites), areas in proximity to motorways, population density, protected sites and proximity to the electricity grid.

The Greenwire Wind Energy Project was proposed to develop a substantial network of wind turbines in the Midlands and Greater Dublin Region for export to the UK. Due to delay in policy for the export of wind energy, the developer chose to refine the project and provide renewable energy for the Irish electricity network. An area in North Kildare, Southwest Meath and East Offaly was identified as suitable for a refined wind farm project. Local level wind and landscape policy was examined and a suitable site acceptable for wind energy with medium to low landscape value was selected. From 13 no. identified areas, 5 no. were selected which would have up to 47 no. turbines as part of the Maighne Wind Farm project.

2.3 Site Selection, Layout, Design, Alternatives and Constraints

Following the decision by An Bord Pleanála, the subsequent decision from the High Court, and considering the area remains suitable for wind energy development, it was decided to refine the Maighne project to create a more concentrated development of turbines. Of the 5 no. original areas that made up the Maighne Wind Farm, a single site at Drehid was chosen due to a range of considerations including access, infrastructure, constructability, environmental considerations, landscape type and proximity to the electricity grid, as well as taking into account reason for previous refusal.

Following the selection of the Drehid area, further refinement took place in order to consider alternative site layouts in order to produce the optimal design. Wind energy guidelines were consulted, and the following aspects considered:

- Set back from houses;
- Set back from village and town cores, designated sites;
- Set back from other constraints such as watercourses and power lines;
- Suitable wind speeds;
- Landscape and visual sensitivity;
- Ecology
- Ornithology;
- Soils and Geology;
- Hydrology;
- Noise; and
- Cultural Heritage.

Following feedback from both the scoping exercise, public consultation, consideration of environmental studies and technical appraisal, a design review was carried out focusing on the layout and positioning of the turbines. The design review resulted in a decision to refine the development and reduce the number of proposed turbines from 14 to 12. These changes were adopted in order to reflect the feedback received during the consultation undertaken with the local community.

Reasons for the reduction of turbines included an agreed setback distance of 640m from non-involved residential receptors. The turbines which were removed from the Proposed Wind Farm were approximately 500m in proximity to a number of residential dwellings. Following public consultation, it was agreed to remove the proximate turbines and reconfigure the remaining turbines to maintain a 640m set-back. The proposed 12 turbine layout, following the refinement process, is thought to have the least impact on receptors and less environmental impact than the alternatives considered.

As part of the design process, a number of different turbine heights were considered for the Proposed Wind Farm. A key design consideration is choosing a dense layout of shorter turbines or a less dense layout of taller turbines. Studies suggest that a less dense layout is more favourable within the landscape. The selection of a 169m turbine tip height allows for the use of fewer, taller turbines with an increased efficiency and in return, greater economic benefit to the energy consumer.

A planning application was lodged for the 12-turbine layout, which was granted by An Bord Pleanála in 2020 pursuant to ABP Ref. PL09.306500 but subsequently quashed by High Court Order in 2023. Since the lodgement of the original Drehid Wind Farm Project 2018, it was subsequently determined that the existing Dunfierth 110 kV substation is not suitable for a new generator connection in its current format and would require a significant rebuild and additional network interruption to facilitate connection at this existing node. The project also received a grid connection offer through the Enduring Connection Policy for a new loop-in substation on the Harristown - Dunfierth(Tee) - Rinawade line, which was agreed as the preferred connection method. The Proposed Development therefore now intends to connect to the national grid via a new on-site 110 kV loop-in/loop-out substation within the project lands at the northern end of the site, this is called The Proposed Substation.

It was through this refinement process, the results of the Landscape Visual Impact Assessment and public consultation, that the Proposed Development came to its final iteration of 11 no. turbines with an overall tip height of 147.9 m to 167 m, connecting to the national grid by way of the Proposed Substation.

2.4 Alternative Grid Routes / Substation Locations

Proximity to the national grid with high capacity was one of the key drivers for selecting the location of this project. Wind energy projects must be capable of connecting to the national grid in a viable and sustainable manner. In advance of grid route selection (to join the Proposed Wind Farm to the national route by electrical cable) alternative options were considered.

Firstly, overhead powerlines were considered. This option proved undesirable as local policy states that undergrounding of cabling should be considered. Further to this, consultation with the local authority and stakeholders found that the preferred method was to place the cabling underground.

The next stage was to decide to which electricity substation should the development connect to. There are many economic, ecological, capacity and planning issues involved with the selection of a substation. At a high level it was first considered to connect to the substations which were proposed for the Maighne Wind Farm. These substations are located at Woodland, Co. Meath and Maynooth, Co. Kildare. Following the consideration of previous reasons for refusal which included impacts on local roads due to cable installation, the Dunfierth substation was identified due to its proximity to the Drehid site and capacity for wind development to the national grid.

However, as mentioned above, it was subsequently determined that the existing Dunfierth 110 kV substation is not suitable for a new generator connection in its current format. The Applicant received a grid connection offer through the Enduring Connection Policy for a new loop-in substation on the Kinnegad-Rinawade line, and therefore the Proposed Wind Farm is now intended to connect to the national grid by way of the Proposed Substation, in line with the grid connection offer.

2.5 Alternative Technologies

Prior to the commencement of the project, alternative renewable energy technologies were considered in order to determine which technology is viable economically, socially and environmentally, in order to meet Irelands renewable energy targets. This was a high-level study where the merits and weaknesses of each technology were considered in choosing a final option.

The options considered included:

- Bio-energy
- Offshore Wind
- Solar Energy
- Tidal and Wave Energy
- Do-nothing alternative

On examining the alternative options, it was found that each of the above technologies have merits, however, some were found to be non-commercially viable while others do not produce as high a yield of energy as on-shore wind energy. It was for this reason on-shore wind-energy development was chosen.

2.6 Conclusion

The alternatives considered during the refinement of the Proposed Development ranged from the original Greenwire Wind Energy Export Project which aimed to develop 750 turbines across the Midlands and Greater Dublin Area. This project, through the consideration of alternatives, evolved into the 47 turbine Maighne Wind Farm project which included 5 no. sites within Co. Kildare and Co. Meath.

Following a refinement process which considered the 5 no. sites, the Drehid site was selected. Alternatives were considered for the development which included turbine layout and grid connection options. The result of the refinement process was the Proposed Development, made up of 11 no. turbines (The Proposed Wind Farm) and a 110 kV on-site substation connecting the wind farm to the national grid (The Proposed Substation). When compared to the previous options considered, it is clear that the refined Proposed Development has much less environmental impacts than the previously considered Greenwire and Maighne projects.

3. DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Proposed Development

North Kildare Wind Farm Ltd. proposes to develop the Proposed Development (which consists of the Proposed Wind Farm and the Proposed Substation) which is located in north County Kildare. The Proposed Development site includes lands in the townlands of Ballynamullagh, Kilmurry, Killyon, Coolree, Mulgeeth, Drehid and Dunfierth and is ca. 79 ha in size. The site of the Proposed Development is located in relatively low-lying but undulating land with the majority of proposed turbines located beneath the 80m contour line.

The Proposed Substation is located to the north of the Proposed Wind Farm, in a block of coniferous plantation forestry. A short cable run (998 m) will connect the substation to two steel lattice towers which will connect into the existing overhead line, thereby connecting the substation to the national grid.

Within 1 km of the proposed turbines there are only 91 no. receptors; with no receptors located within 4 times the tip height of any turbine. This is due to the constraints-led design of the Proposed Development, which has had a particular focus on maximising the distance between turbines and receptors. Of these dwellings, 79 no. are registered as residential, 3 no. are registered as commercial, and 9 no. are registered as both commercial and residential.

North Kildare Wind Farm Ltd. is proposing to construct a wind farm at Drehid in Co. Kildare which will comprise of 11 no. turbines with a total installed capacity (TIC) of 52.8 MW (The Proposed Wind Farm). The wind farm will be connected by a 110 kV substation and loop-in connection (The Proposed Substation) to the national grid.

The Proposed Wind Farm as per the statutory planning application development description as contained in the Newspaper Notice and Site Notice is as follows:

The proposed development will comprise:

i. Construction of 11 no. wind turbines, each with a rotor diameter of 133 m. 10 no. turbines will have a hub height of 100.5 m and a tip height of 167 m; while one turbine (T1, closest to the site entrance) will have a hub height of 81.4 m and a tip height of 147.9 m;
ii. Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
iii. Construction/upgrade of 1. no. main site entrance (off local road L5025), and 1 no. additional site entrance (off local road L50242);
iv. Construction of 1. no. site entrance (off local road L5012) to accommodate the delivery of large turbine components;
v. Use of 1 no. existing Coillte entrance (off local road L5012) for pedestrian/cyclist access to an amenity trail;
vi. Construction of 9.67 km of new internal access tracks and associated drainage infrastructure;
vii. Upgrading of 951 m of existing tracks and associated drainage infrastructure;
viii. Establishment of 2 no. temporary construction site compounds and associated ancillary infrastructure including parking;
ix. Establishment of 1. No. temporary blade set down area;
x. Construction of drainage and sediment control systems;
xi. 3 no. Watercourse Crossings;
xii. Upgrade and extension to an existing recreation amenity trail and installation of signage, picnic tables and bicycle stands;
xiii. All related site works and ancillary development including signage, berms, culverts, drain crossings, landscaping, and soil excavation;

xiv. Forestry felling (both permanent and temporary) to facilitate construction and operation
xv. All associated underground electrical and communications cabling connecting the wind turbines to the proposed Substation including the laying of underground cabling along the local road L50242 which traverses the site.

A 35-year operational life from the date of full commissioning of the entire wind farm is being sought for all works (other than temporary and permanent works specified above). and the subsequent decommissioning.

The Proposed Substation as per the statutory planning application development description as contained in the Newspaper Notice and Site Notice is as follows:

The Proposed Development will constitute the provision of the following:

- Construction of a 110 kV Substation and associated works within the townland of Coolree. The Substation includes a total compound footprint of 1.32 hectares. , enclosed by palisade fencing. The Substation Compound will include :
  - 1 No. single storey substation control building (450 m2);
  - 1 No. single storey customer MV Building (160 m2);
  - Switchgear, Arc Suppression Coil, Cable Sealing Ends, Cable Chair, Circuit Breakers, Current Transformers, Disconnects, Post Insulators, Surge Arrestors, Grid Code Compliance Equipment and Voltage Transformers; and all associated ancillary works necessary to facilitate the development;
  - 9 No. lightning masts to a height of 20 m;
  - 2.6m high palisade guard railing with perimeter boundary fencing will be erected around the periphery of the compound for security and protection measures;
  - Lighting will be provided by 9 no. lighting columns, approximately 3m in height as well as exterior wall mounted lights on the control buildings.
- Erection of 2 no. line-cable interface masts to enable a loop-in/loop-out connection to the existing Kinnegad-Rinawade 110 kV overhead line. The steel lattice masts will extend to heights of 16m above existing ground level.
- Laying of 110 kV underground cabling between the proposed substation and the proposed loop-in/loop-out masts.
- Permanent access road (ca. 7.3 km in length) which traverses the townlands of Ballynamullagh, Kilmurry, Coolree and Mulgeeth to allow access to the substation including a short spur (ca. 0.9 km) off the main access track to access the 2 no. line-cable interface masts. The entrance to the local road (L5025) and local road (L50242) will be shared with the proposed Drehid Wind Farm.
- 3 no. Stream Crossings.
- Associated construction works and drainage infrastructure.
- Peat deposition area immediately adjacent to the proposed substation.

The development subject of this application will facilitate the connection of the proposed 11 no. wind turbine Drehid Wind Farm (the Proposed Wind Farm') to the national electricity grid. A planning application for the Proposed Wind Farm development is also being lodged to An Bord Pleanála.

This EIAR assessed the overall development, comprising both the Proposed Wind Farm and the Proposed Substation as described above.

North Kildare Wind Farm Ltd. are committed to implementing a community benefit package. Following consultation with the local community a number of measures are being considered which seek to bring opportunities for real environmental, economic and social benefits for the local area.

3.2 Community Benefit Package

Statkraft Ireland aims to be at the forefront of developing Community Gain. The concept of directing benefits from wind farms to the local community is something that is promoted by the National Economic and Social Council (NESC) and Wind Energy Ireland (WEI) amongst others. Whilst it may be simpler and easier to put a total fund aside for a wider community area, Statkraft is endeavouring to develop new ways to direct increased gain towards the local communities and people, with particular focus on those closest to the Proposed Development. Statkraft is firmly of the belief that it is local people that best understand the needs and requirements of the local community. As such we have engaged in a proactive way with local residents from an early stage in the design process in order to gain feedback on how local people feel that the most benefit can be brought to the area. The Community Benefit is discussed further in Chapters 3, 5 and 11 of this EIAR (Volume 2).

The Community Benefit Package which is being proposed for this project has been directed by feedback from ongoing consultation with the local community. Those spoken to in the local area felt that the project should bring with it real and tangible benefits for the local community and that these should be developed at an early stage from operation of the wind farm. It was also felt that there should be an opportunity for households in the area to receive a return from the project and that those closest to the wind farm should benefit most. In terms of developing a Community Benefit Package which would address these high-level aspirations, we are proposing the following schemes:

Local Economic Sustainability – Direct Return

In response to feedback from the local community, North Kildare Wind Farm Ltd. has committed to making a contribution of €1,000 (based on the estimated cost of an average household electricity bill in a rural area) available annually for all houses within 1km of the Proposed Wind Farm. The feedback from the local community was that if turbines were to be erected in their local area and electricity generated from them, that these houses should receive a discount in their electricity bills. It was also felt that those closest to the proposed project should benefit directly from the development.

Education

North Kildare Wind Farm Ltd. has committed to considering the development of an Educational Fund as part of the community benefit scheme to provide assistance to those in the local area looking to undertake further education. The Community Benefit Fund may also be used to provide support towards local childcare facilities and local schools.

Recreational Amenity Trail

As part of the Proposed Development it is proposed to enhance the existing walking trail from the local road to the north of the site. This Recreational Amenity Trail will consist of 2 routes – a shorter 1.2km loop in the northern section of the site and a longer route incorporating this route and other existing tracks and new site roads which is ca. 4km which will be open to the public as a walkway. This trail can be used by the local community and will be suitable for a number of activities including walking, bird watching, nature and wildlife exploration. The Amenity Trail will include an area for safely storing bikes and picnic areas with interpretative information provided to add to the experience.

3.3 Elements of the Proposed Development

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the wind farm and substation while at the same time maximising the energy yield of the wind resource passing over the site. The proposed development will have a maximum export capacity of 52.8 MW of electricity.

A rated output of up to 4.8 MW has been used below to calculate the maximum power output of the proposed wind farm, which would result in an estimated installed capacity of 52.8 MW. Assuming an installed capacity of 52.8MW, the proposed wind farm has the potential to produce up to 161,885 MWh (megawatt hours) of electricity per year.

The proposed turbines will have a tip height of 147.9 m for T1 and 167 m for all other turbines (T2 to T11). The wind turbines that will be installed on site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times. Each discipline within the EIAR have assessed the turbines based on their specified location and tip height. T1 will have a hub height of 81.4 m and all other turbines (T2 to T11) will have a hub height of 100.5 m.

Approximately 0.95 km of internal access tracks will be upgraded as part of the development and 9.67 km of new internal access tracks will be required. Existing access tracks have been utilised where possible for the proposed development. The Recreational Amenity Trail will partly use the upgraded wind farm track. All access tracks will be 4.5 wide along straight sections and wider at bends and as required. The tracks will be finished with a well graded aggregate. The drainage system will be installed adjacent to the internal access tracks. New roads within the site will be floated on both mineral soils and on peat soils. Floating roads are constructed without excavating the existing ground.

There are 3 no. of watercourse crossings required within the proposed development site. It is proposed to construct clear span bridges at these locations to minimise the environmental impacts and avoid any instream works. All minor watercourse and drain crossings within the site will be crossed using piped culverts. Piped culverts will only be used over very short stretches i.e. at track crossings, except at the Proposed Substation where a longer stretch of drain will need to be culverted as shown in the planning drawings. Pipe culverts have been sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change.

It is proposed to construct 1 no. onsite electricity substation within the proposed development site. The Eirgrid substation building will cover a footprint of approximately 450 sq.m with a pitched roof and an overall height of 8.55 m. The IPP switchgear room will consist of a building of approximately 160 sq.m with a pitched roof and an overall height of 5.85 m.

The substation compound is surrounded by a 2.6 m high palisade fence with associated gates for access. Eirgrid specification lightning masts will also be included as a safety measure. These will typically consist of 20 m monopoles.

Activities associated with the construction phase will include traffic management, peat management, tree felling, drainage system, temporary stockpiling of materials for re-use within the site

4. POLICY

4.1 International Policies and EU Directives and Policies

International and European legally binding agreements to reduce the reliance on fossil fuels and to manage climate change internationally have been adopted into Irelands National Energy Policy.

In June 2018, an agreement was made in the European Union regarding increasing renewable energy use in Europe. The new regulatory framework includes a binding renewable energy target for the EU for 2030 of 32% with an upwards revision clause by 2023. This agreement will help the EU meet the Paris Agreement goals. In terms of renewable energy production, the agreement has achieved:

- A new, binding EU renewable energy target of 32% by 2030, including a review clause by 2023 for an upward revision of the EU level target;
- Improved design and stability of renewable energy support schemes.

The revised renewable energy Directive 2018/2001/EU entered into force in December 2018. Following on from RES II, the EU adopted '*Directive (EU) 2023/2413*', known as *Renewable Energy Directive III* (RES III) on 20th November 2023, with an aim to further increase its renewable energy ambitions.

The European Climate Law, which entered into force on 9th July 2021, writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU countries as a whole, mainly by cutting emissions, investing in green technologies and protecting the natural environment. The law aims to ensure that all EU policies contribute to this goal and that all sectors of the economy and society play their part.

The RePower EU Plan was published on 18th May 2022 and is a plan which sets out a response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. The RePower EU Plan states:

"Wind energy represents a significant future opportunity: resources are stable, abundant and public acceptance is higher. Europe is the global leader in offshore wind. To further strengthen the EU wind sector's global competitiveness and achieve the REPowerEU ambition with fast wind energy deployment, supply chains need to be strengthened and permitting drastically accelerated."

4.2 Irish Energy & Environment Policies

The Irish Planning Policy system is set within a hierarchical structure. National policy is informed by EU Directives, Planning Legislation, Ministerial Guidelines, Government Policy and Capital programmes.

National Policies include:

- Revised National Planning Framework (2025)
- National Development Plan 2018-2027
- Climate Action and Low Carbon Development Act 2015
- Climate Action Plan 2025

Regional Policies include:

- Eastern & Midland Regional Assembly, Regional Spatial & Economic Strategy (June 2019)

The RSES remarks:

"The Region will need to shift from its reliance on using fossil fuels and natural gas as its main energy source to a more diverse range of low and zero-carbon sources, including renewable energy".

The RSES states that "*Onshore wind, bioenergy, solar and offshore energy"* will be required to decarbonise the energy sector for the region. The strategy notes that:

"New energy systems and transmission grids will be necessary for a more distributed, renewable energy focused system, harnessing both the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar".

The strategy also states that decentralisation of energy will be critical for the region to become more self-sufficient in relation to its energy needs and that this will involve a shift from conventional energy supply systems to a more diverse range of low and zero-carbon sources including renewable energy.

4.3 Kildare County Development Plan 2023-2029

The Kildare County Development Plan (CDP) 2023-2029 sets out the strategic framework for land use planning in the county.

Chapter 7 of the CDP sets out the energy and communications aim for the County:

"To encourage and support energy and communications efficiency and to achieve a reasonable balance between responding to EU and National Policies on climate change, renewable energy and communications and enabling resources to be harnessed in a manner consistent with the proper planning and sustainable development of the county"

The KCDP sets out the Council's objectives towards achieving renewable energy targets as follows:

Table 4-1: Extracts from the Kildare County Council Development Plan (2023-2029)

Policy / Objective	Description
Objective REP12	Ensure that economic and enterprise related development is provided in a manner which facilitates a reduction in greenhouse gas emissions and accelerates the transition towards a sustainable, low carbon and circular economy. The following measures shall be supported: • An increase in employment densities within walkable distances of communities and on public transport routes. • Promotion of walking and cycling and use of public transport through increased permeability and mobility management 116measures within and outside employment areas • The sourcing of power from district heating and renewables including wind and solar. Additional native tree planting and landscaping on existing and proposed enterprise zones and development sites to aid with carbon sequestration, contributing to the green infrastructure network of the County and promoting quality placemaking
Objective ECA1	Prepare, within 1 year of the adoption of the County Development Plan a Sustainable Energy Climate Action Plan (SECAP) for County Kildare to provide a baseline analysis for Kildare and for the inclusion of measurable targets on renewable energy and climate change mitigation.
Objective EC011	Encourage wind energy developments in suitable locations in an environmentally sustainable manner whilst having regard to Government policy and the County Wind Energy Strategy, while being sensitive to the EU and national target of 30% of land for biodiversity. Subject to AA screening and where applicable, Stage 2 AA so as to ensure and protect the favourable status of European sites and their hydrological connections. Such developments will have regard for protected species and provide mitigation and monitoring where applicable
Objective EC065	Support the target in the Climate Action Plan 2021 for a doubling of existing on-shore wind energy from circa 4GW (today) to 8GW by 2030

It is important to note that Chapter 7, section 7.5 of the CDP refers to the 53.5 MW of “permitted wind farm developments”. 48 MW of this share is accounted for by Drehid Wind Farm. It is clear that The Proposed Wind Farm, considered “permitted” in the CDP, forms the majority of the county’s existing permitted wind development

5. EIA SCOPING, CONSULTATION AND KEY ISSUES

Consultation is an important part of the Environmental Impact Assessment (EIA) process. The consultation process carried out for this site has been a lengthy, detailed and thorough process.

A number of issues and submissions were raised as part of the consultation process which have informed the EIAR and survey methodologies. Throughout the consultation process specific regard was had to the 'Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement' published in December 2016 including the fundamentals of the Code including engaging with the local community in an open, honest and transparent manner with the aim to not only provide clear and understandable information but also to gain feedback to understand the views of the local community and to use this information to inform the design process, thus allowing the local community an opportunity to have an influence on the final project design.

A detailed scoping report in respect of the proposed development project was forwarded to 72 consultees on the 12th of July 2018. The recipients included the Local Authority, Government Department, non-governmental organisations (NGOs), interested parties and key stakeholders.

A pre-planning meeting was held with Kildare County Council to discuss the proposed wind farm development. Current planning policy was discussed, as well as key site characteristics. The Drehid Landfill facility and the presence of a number of solar farm applications within the area was also discussed. A subsequent meeting with the Roads Department of Kildare County Council was held on 14th November 2018 to discuss details of haul routes and the traffic assessment.

As part of the consultation process, a project information leaflet, and a public letter entitled was distributed to houses within 1 km of the site boundary in July 2018.

Following feedback from the Community, the design team undertook a review of the layout to determine how best to address the community's feedback. In seeking to address these issues the Design Team amended the layout in order to increase separation distances from the local community.

Following the feedback from the local community, an updated Drehid Information Booklet (dated September 2018) was circulated to the local community within a 1km radius of the initial turbine layout.

As some refinements to the wind farm layout were made, resulting in the 11-turbine Proposed Wind Farm; and an alternative method of grid connection was identified, resulting in the 110kV Proposed Substation; an updated scoping letter was issued out to all consultees who had received the scoping report in 2018.

A new project brochure which confirms the design that is outlined in this application has been distributed in the consultation area in February 2025, prior to the lodgement of the planning applications. This brochure outlines the main aspects of the project and presents the major elements of the Proposed Development on a location map.

Project websites (www.drehidwindfarmSID.ie and www.drehidsubstationSID.ie) have been set up to provide easy access to all of the latest information on each application.

Over the course of engagement with the local community/individuals, local businesses and community groups, feedback was actively sought on ideas regarding the form that the community benefit scheme should take and how best to achieve maximum potential benefit for the local area from the community funding that would be associated with this project.

6. AIR AND CLIMATE

6.1 Existing environment

The study area is located in Zone D and the air quality index for health map on the EPA website shows that the current air quality within the study area is classed as 1 – Good. In terms of climate, the dominant influence on Ireland's climate is the Gulf Stream. Consequently, Ireland does not suffer from the extremes of temperature experience by other countries at the same latitude. Climatic data from Met Eireann's Mullingar weather station is presented in the chapter.

6.2 Construction impacts

The principal source of potential air emissions during the construction of the Proposed Development will be dust arising from earthworks, tree felling activities, trench excavation for cables, construction of the new access tracks, the temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials and the movement of material around the site. Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. A methodology developed by the Institute of Air Quality Monitoring (IAQM) was used to assess the potential impacts associated with dust emissions. The result shows that the potential dust impacts arising from the construction of the Proposed Development would be negligible.

Construction vehicles and plant emissions have the potential to increase concentrations of compounds such as NO_2, Benzene and PM_{10} in the receiving environment. A screening process was carried out and based on the type of development and the traffic volumes associated with construction of the Proposed Development, an air quality assessment model would not be required.

6.3 Operation impacts

Once the Proposed Development is constructed there will be no significant direct emissions to atmosphere. The operational phase of the wind farm will result in positive impacts on air quality due to the displacement of fossil fuels as an energy source.

The Proposed Development will, during construction, result in CO_2 losses, these are due to the manufacture, construction and decommissioning of the turbines; losses due to reduced carbon fixing potential; losses from soil organic matter and losses due to felling forestry. From an operational perspective, the proposed development will displace the emission of CO_2 from other less clean forms of energy generation and will assist Ireland in meetings its renewable energy targets and obligations. The burning of fossil fuels for energy creates greenhouse gases, which contribute significantly to climate change. These and other emissions also have the potential to give rise to acid rain, smog and ambient air quality reduction. A carbon calculator tool was used to assess the carbon emissions and savings as a result of the proposed wind farm. It is estimated that assuming an output of up to 52.8 MW, the Proposed Wind Farm will result in the net displacement 37,217 tonnes of CO_2 per annum (based on grid-mix of electricity generation) and over the 35-year lifetime of the wind farm 1,302,595 tonnes of CO_2 will be displaced. The proposed development is therefore likely to have a positive effect on climate due to the displacement of CO2 from the burning of fossil fuels.

The carbon payback time of the wind farm has been calculated using the Scottish Windfarm Carbon Assessment Tool. For the Proposed Wind Farm with 11 no. turbines assuming a turbine of 4.8 MW, the payback time for the construction of the wind farm is estimated at approximately 3.4 years of operation. The Proposed Substation will enable connection of the Proposed Wind Farm to the national grid, and therefore allow these positive impacts to be realised.

6.4 Mitigation Measures

Mitigation measures in relation to air quality include the use of a water bowser to spray works areas and haul routes; loads to be covered; revegetation of exposed soils; good maintenance of machinery; implementation of a dust control plan as part of the Construction and Environmental Management Plan; no idling of vehicles. As the operation of the wind farm will have positive impacts on air quality, mitigation measures are not required.

It is considered that the proposed development will have an overall positive impact in terms of carbon reduction and climate change. It will assist Ireland in meeting its targets set under the latest national policy, including the Climate Action Plan (CAP25) which is driven by the requirements for a reduction in greenhouse gas emissions along with energy security and competitiveness.

As no significant impacts on climate are predicted during construction, no mitigation measures are proposed. Mitigation measures are proposed during the construction stage to offset potential impacts on air quality and these are set out in the main chapter and in the CEMP. In terms of the operational phase, the operation of the wind farm will have a positive effect on climate due to the displacement of fossil fuels.

6.5 Residual Impacts

Following the implementation of the above mitigation measures, the proposed development may result in slight to moderate residual impacts arising from fugitive dust emissions during particular construction activities. These will be localised in nature and as they will be associated with particular elements of the construction phase, they will be temporary in nature and will not result in any permanent residual impacts. Impacts related to vehicle emissions will cease following construction and no significant impacts are anticipated.

There will be residual positive impacts from the operation of the proposed development in terms of the displacement of fossil fuel energy generation with renewable energy. It is estimated that an output of 52.8 MW for the Proposed Wind Farm will result in the net displacement of 37,217 tonnes of CO_2 per annum.

7. NOISE AND VIBRATION

7.1 Existing environment

The Proposed Development is set within a rural environment, comprising forestry and agricultural activities.

Baseline noise monitoring has been carried out at seven receptor locations surrounding the proposed wind farm. The purpose of the survey is to establish existing levels of background noise and the background noise level data to derive noise limits for the proposed development in accordance with best practice.

7.2 Construction impacts

Noise during the construction phase will arise from the deliveries and/or removal of material to and from site, preparation of access roads and drainage, piling of foundations, concrete mixing and pouring of foundations, preparation of hardstands and drainage, installation of wind turbines and works associated with grid connection. Construction noise levels were predicted using computer modelling software and based on current best practice construction standards. The predicted noise levels are typically below the noise limit. There are a number of instances where the predicted noise are above the noise limit but this is expected to occur at a limited number of dwellings during the instatement of sections of the internal access road. For locations near the site entrance, there are marginal exceedances of the noise limit during construction HGV movements. These exceedances are for a scenario without mitigation, and will be temporary and at a limited number of dwellings. Mitigation measures, mentioned below, bring the noise levels below the limit.

The potential for vibration at neighbouring sensitive locations during construction is typically limited to piling works, excavation works, and lorry movements on uneven road surfaces. Considering the distances proposed from the majority of works and the nearest sensitive locations, vibration from construction activities will not have a significant impact.

7.3 Operation impacts

Noise during the operational phase will arise from the wind turbines as they rotate to generate power. Noise may also be generated from ancillary equipment such as the substation on site.

There are no neighbouring operational or consented wind farm developments within 10 km of the proposed Drehid Wind Farm. The nearest wind farm development is Cloncreen wind approximately 15.2 km from the proposed development. This wind farm was not assessed as the wind farm is sufficiently distant and there are no potential impacts.

Operational wind farm noise levels were predicted using computer modelling software. The operational predicted noise levels are compliant with the daytime and night-time noise limits at the majority of occupied dwellings and planning applications for dwellings in the vicinity of the proposed wind farm. Exceedances occur at one dwelling at a wind speeds of 7 to 10m/s during daytime periods and wind speeds of 6 to 10m/s during night-time periods. However, the dwelling is occupied by an involved landowner.

The potential noise impact of the proposed substation has been modelled using software and the noise levels at the nearest dwelling are not considered to be significant.

There is no significant vibration effect associated with the day to day operation of the wind farm.

7.4 Decommissioning Impacts

Noise during the decommissioning phase will arise from dismantling of turbines, earthworks and removal of material from site. These activities would be of a lesser impact than for construction and these activities will be controlled through the relevant guidance and standards in place at the time of decommissioning.

7.5 Mitigation Measures

With mitigation measures including the provision of noise barriers and the application of good working practices, construction phase noise and vibration levels will be below the relevant limits. There is potential for temporary noise impacts during the instatement of sections of the internal access road and sections of the grid connection works, but these will be limited to a small number of dwellings and for a short period of time.

The results of the noise predictions presented show that operational noise levels meet the derived daytime and night-time noise limits at all non-financially involved residential properties (including mobile homes and planning applications) surrounding the wind farm. However, there is potential for noise limits to be exceeded at one financially involved residential dwelling. For completeness, mitigation measures to ensure that predicted noise levels meet the derived noise limits has been calculated. With mitigation measures there are no exceedances predicted.

7.6 Residual Impacts

With mitigation measures, construction activities with a duration longer than one month are expected to be below the construction noise limit at residential properties. As a result, residual construction impacts are not considered to be significant when assessed under these criteria.

There is potential for temporary elevated noise levels due to the instatement of sections of the access road and grid connection works. However, these works will be for a short duration at a particular property (i.e. less than 3 days) and where the works are to occur over an extended period, a temporary barrier or screen will be used to reduce noise level below the noise limit.

Operational wind farm noise levels meet the derived night and daytime noise limits at all residential properties (with the exception of the financially involved landowner) surrounding the wind farm which, under this criteria, is not considered to be of a significant impact.

The transformer selected for this site will be selected to ensure that there will be no residual impacts.

8. BIODIVERSITY AND ORNITHOLOGY

8.1 Introduction

The ecological appraisal for the proposed Drehid Wind Farm was carried out by Fehily Timoney and Company (FT) between 2021-2024, building upon surveys carried out for the previous EIAR (2012 – 2018) and 2019 FI response.

A series of ecological surveys were carried out at the site, including habitat, botanical and invasive species surveys, bat surveys, lepidoptera surveys, bird surveys and mammal surveys. In addition, Ecofact Environmental Consultants Ltd. carried out an evaluation of the impact of the proposed development on aquatic habitats, aquatic ecological communities and individual aquatic species. Triturus Environmental Ltd. carried out dedicated lizard, kingfisher and otter surveys.

Based on the results of these various studies, FT considered potential direct, indirect and cumulative effects of the proposed development on the existing ecological receptors both outside and within the site and proposed appropriate mitigation measures to minimise these potential effects.

8.2 Existing Environment

The proposed development does not overlap any designated nature conservation sites.

Potential effects on nationally designated sites (NHAs and pNHAs) are assessed within EIAR Chapter 8.1 Biodiversity and Chapter 8.2 Ornithology.

The Natura Impact Statement prepared for the proposed development assessed the effects of the proposed development on European Sites.

8.2.1 Habitats, Flora & Invasive Species

Habitats present within and adjacent to the proposed development site include the following:

- WD4 Conifer plantation
- WD2 Mixed broadleaved/conifer woodland
- WD3 (Mixed) Conifer woodland
- WS2 Immature woodland
- WN7 Bog woodland
- WN7/WS1 Bog woodland/Scrub Mosaic
- WD4/WN7 Conifer plantation/Bog woodland Mosaic
- WD1 Mixed broadleaved woodland
- WD1/WD4 Mixed broadleaved woodland/Conifer plantation Mosaic
- WS1/GS2 Scrub/Dry meadows and grassy verges Mosaic
- GA1 Improved agricultural grassland
- GA2 Amenity grassland
- GA1/GS2 Improved agricultural grassland/ Dry meadows and grassy verges Mosaic

- GA1 /GS4 Improved agricultural grassland/Wet grassland Mosaic
- HD1 Dense bracken
- WS1/HD1 Scrub/Dense bracken Mosaic
- GS2/GS3 Dry meadows and grassy verges/Dry-humid acid grassland Mosaic
- GS2 Dry meadows and grassy verges
- PB1 Raised bog
- HH3 Wet heath
- FL1 Dystrophic lake
- WS1/PB1 Scrub/Raised bog Mosaic
- WD3/PB1 Conifer woodland/Raised bog Mosaic
- WL1 Hedgerows
- WL2 Treelines
- WL1/WL2 Hedgerows/Treelines Mosaic
- FW2 Depositing/lowland rivers
- FW4 Drainage ditches

The cable route from the on-site substation to the Kinnegad-Rinawade 110 kV overhead line traverses conifer plantation, mixed broadleaved/conifer woodland, immature woodland, improved agricultural grassland and hedgerow.

No rare or protected flora species were recorded during botanical surveys. Rhododendron ponticum, snowberry, butterfly bush and cherry laurel were recorded at the proposed development site.

8.2.2 Mammal Surveys

During mammal surveys the following species and/or their field signs were observed on or adjacent to the proposed development site: badger, otter, fox, red squirrel, pine marten, Irish stoat, wood mouse, Irish hare, red deer and rabbit (an invasive species). While not observed during surveys, species such as hedgehog and pygmy shrew are likely to occur on site. Fallow deer (an invasive species) were recorded during previous surveys.

8.2.3 Bat Surveys

Bat surveys were completed for the proposed development during 2022 - 2024. The surveys encompassed activity surveys (transects), static detector surveys, preliminary roost assessments, summer and winter roost surveys.

Activity surveys during summer 2022 and summer 2023 recorded the following species in the wooded and agricultural habitats overlapped and adjacent to the proposed development: common pipistrelle, soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, Daubenton's bat, Brown long-eared bat, *Pipistrellus* Sp. and *Myotis* sp.

Static detector surveys during summer 2022 and summer 2023 recorded the following species: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat, whiskered bat, Brown long-eared bat, *Pipistrellus* Sp. and *Myotis* sp.

Roost surveys undertaken between summer 2022 and autumn 2024 did not detect any bat roosts within the roost survey study area (proposed development footprint plus 300m turbine buffer) or along the TDR. The presence of potential roosting features in trees which could be used by individual or low numbers of bats on a transient basis within the proposed development and along the TDR were recorded. Roost surveys also encompassed inspections of the 10 No. bat boxes in the northern part of the proposed development. During the most recent inspection, many of these were observed to have been destroyed or in poor condition, with no evidence of current occupation by bats.

8.2.4 Other Species

Marsh fritillary butterfly surveys (habitat appraisals and larval web surveys) were completed in September 2022 and 2023, confirming the presence of suitable habitat and larvae outside the proposed development along the margin of Timahoe North Bog south-east of T7.

Dedicated surveys for common lizard during 2021, 2022 and 2023 confirmed the presence of this species in the area in which the proposed development is located. Records were concentrated in the northern part of the proposed development, including neat T11; along the proposed grid connection, and south and south-east of the proposed grid connection. Isolated records in other areas comprised a sighting along a forestry track outside the proposed development site north of T6, and a sighting on Timahoe North Bog outside the proposed development east of T8.

Observations of adult common frogs around the bog pool east of T8 (within proposed development boundary but outside infrastructure footprint) and in recolonising cutover bog south-west of T4 (outside proposed development boundary) reconfirmed the presence of this species in the area. The potential for smooth newt to occur outside the proposed development footprint was also noted.

A number of invertebrate species including moths, butterflies, bees, damselflies, dragonflies and arachnids were also noted during current and previous surveys.

8.2.5 Aquatic Ecology

The proposed Drehid wind farm is located within the Boyne catchment. The watercourses surveyed are the Blackwater (Longwood) River, the Mulgeeth River, the Ballynamullagh Stream (Fear English River), the Drehid Stream and the Coolree 07 River. All of the sites are located within the Boyne catchment, and the Blackwater (Longwood) subcatchment. No Annex I habitats or non-native invasive species were noted at any of the survey sites.

The sections of the Fear English/Ballynamullagh River in close proximity to the proposed development are not of any potential value to fish or other sensitive aquatic organisms (survey sites 9, 10, A, B, C and D). This is because of the small size of the stream, its degraded physical status, and unsatisfactory water quality. The current Q rating for Site 6 (closest site suitable site for Q sampling downstream of sites 9, 10, A, B, C and D) is Q3 (Moderately Polluted). Brown trout, minnow, three-spined stickleback and stone loach were recorded in low numbers at Site 6. Other species recorded in the wider catchment included brook lamprey, minnow, salmon (Site 5 only) and white-clawed crayfish (site 5 only; recorded in 2021).

It is noted that there was an overall decline in water quality from 2018 to 2023, with agricultural and drainage maintenance impacts evident.

8.2.6 Ornithological Surveys

Ornithological surveys were carried out over two and a half years for the proposed development.

Two years of vantage point flight activity surveys were completed in accordance with SNH (2017) guidance. Breeding bird, breeding wader, woodcock, merlin, raptor, barn owl, hinterland and wintering bird surveys were also carried out.

Target bird species present within and in the immediate surroundings of the proposed development site included:

- Golden Plover
- Goshawk
- Great Black-backed Gull
- Grey Heron
- Hen Harrier
- Herring Gull
- Kestrel
- Kingfisher
- Lapwing
- Lesser Black-backed Gull
- Little Egret
- Merlin
- Peregrine Falcon
- Red Kite
- Snipe
- Sparrowhawk
- Stock Dove
- Swift
- Whooper Swan
- Woodcock
-

One further target species, curlew, was recorded during hinterland surveys only.

A number of secondary target species were also recorded during surveys: goldcrest, greenfinch, house martin, house sparrow, linnet, long-eared owl, meadow pipit, redshank, redwing, sand martin, skylark, spotted flycatcher, wheatear, starling, swallow, willow warbler and yellowhammer.

8.3 Construction Effects

An evaluation of all habitats, bird species, fauna and aquatic species was conducted, and the findings are presented in Chapter 8.1 and Chapter 8.2. Potential effects on biodiversity were then assessed.

A Natura Impact Statement (NIS) has been prepared for the proposed development and has been submitted with the planning application. The NIS addresses potential effects on European Sites resulting from the proposed development. There are no hydrological or ecological links between the proposed development and NHAs/pNHAs.

Construction of the proposed development will lead to habitat loss arising from construction of proposed infrastructure and associated felling buffers.

The total predicted habitat loss as a result of the Proposed Wind Farm is 27.68 ha or c. 7.5 % of the total habitat survey study area; of this, 80 % of the land-take is from habitats classified as low ecological value (dominated by conifer plantation and agricultural grassland).It is noted that c. 49% of proposed felling is for bat/turbine buffers which will be maintained as tree and scrub -free and zones for the operational phase. The majority of the remaining 51% of construction buffer felling areas will be available for replanting and / or natural recolonisation during the operational phase. A *Short-term Slight* to *Moderate* Reversible localised indirect drying out effect on wet heath and raised bog was identified.

Construction of the Proposed Substation (including Grid Connection) will lead to some permanent loss of habitat. The total predicted habitat loss as a result of the Proposed Substation is 3.71 ha or c. 1 % of the habitat survey study area; of this, 29 % of the land-take is from habitat classified as low ecological value (conifer plantation).

In the event of Rhododendron or cherry laurel being spread to wooded habitats or bogs at the site due to proposed works, *Long-term Significant* Reversible effects at the Local scale could occur. The spread of sycamore, butterfly bush, and snowberry could give rise to *Long-term Moderate* Reversible effects at the Local scale.

Prior to mitigation the following effects on mammals could occur during construction:

- Badgers - a Short-term Significant Reversible effect at the Local scale is predicted for badgers due to the proximity of setts to the proposed development.
- Otter - Short-term Slight Reversible effect at Local scale
- Red squirrel – Short-term Significant Reversible effect at Local scale
- Irish hare – Long-term Slight Reversible effect at the Local scale
- Wood mouse – Long-term Slight Reversible effect at the Local scale
- Pine marten – Short-term Significant Reversible effect at Local scale
- Irish stoat - Short-term Significant Reversible effect at Local scale
- Hedgehog – Short-term Significant Reversible effect at Local scale
- Pygmy shrew - Short-term Imperceptible Reversible effect at the Local scale
- Red deer – Short-term Imperceptible Reversible effect at the Local scale
- Bats – removal of linear features: probable permanent slight impact; disturbance during felling – possible short term significant impact

Indirect impacts could arise due to disturbance to fauna, however, this will be temporary in nature and given the availability of suitable displacement habitats present in the wider environment, affected mammals will be able to move to other locations in the locality until disturbance has ceased. Regarding disturbance, a *Short-term Imperceptible* Reversible effect at the Local scale is predicted for mammals.

Two bat boxes with negligible (due to degraded state) potential for use by bats will be affected by proposed access track construction. A total of nine trees with low potential for roosting bats, one low-moderate and one moderate potential trees are present within turbine felling buffers (potential roosting features were observed but no evidence of use by bats). As such, prior to mitigation, there is potential for injury/disturbance to bats potentially roosting in trees or bat boxes affected by the Proposed Wind Farm footprint, and loss of potential roosting features. A total of 12 trees with potential for occasional use by individual or low numbers of bats (negligible to low potential) (potential roosting features were observed but no evidence of use by bats) were identified as being potentially subject to effects from vegetation trimming associated with the TDR.

In terms of bat foraging/commuting/roosting habitat loss, a *Long-term Moderate* Reversible effect at the Local scale is predicted for bats prior to mitigation. Regarding injury or disturbance, prior to mitigation, a *Short-term Significant* Reversible effect at the Local scale could occur for bats.

Indirect effects to common lizard prior to mitigation due to disturbance causing temporary abandonment would result in *Temporary Imperceptible* Reversible effects at the Local scale.

A *Temporary Imperceptible* Reversible effect at the Local scale for common frog is predicted, considering both direct and indirect effects.

In the event that polluted runoff from construction of T8 entered the adjacent bog pool, there is the possibility that a *Short-term Significant* Reversible effect at the Local scale could occur for smooth newt prior to mitigation.

Potential for a *Short-term Significant* effect prior to mitigation for marsh fritillary was identified. Effects ranging from *Short-term Imperceptible to Slight were identified for other lepidoptera species.* Effects ranging from *Temporary* to *Short-term Imperceptible to Moderate were identified for a number of bee species identified in the desktop study.*

Potential construction phase effects (both indirect and direct) on aquatic ecology associated with the Proposed Wind Farm, in the absence of mitigation, are assessed as being Reversible *Short-term Slight Negative* and in the local context. For the Proposed Substation, any potential direct effects on aquatic ecology are assessed as Short-term Imperceptible Reversible at the Local scale, while indirect construction phase effects on aquatic ecology in the absence of mitigation are assessed as being Reversible *Short-term Slight* in the local context.

The potential effects of construction on birds may be considered as:

- Possible loss or deterioration of habitats; and
- Disturbance or displacement of birds.

Habitat loss can be direct through land take of breeding or foraging habitats for key species or indirect such as effective habitat loss through avoidance or disturbance due to the above factors. For direct impacts during construction land take of potential breeding or foraging habitat is the primary impact. This may constitute land stripping or vegetation removal affecting ground nesting birds, hedgerow removal or trimming if this takes place during the breeding season and loss of nesting or roosting sites such as trees.

High levels of activity and disturbance during construction may cause birds to vacate territories close to works, especially in species vulnerable to disturbance. The displacement of birds from areas within and surrounding developments can effectively amount to habitat loss. If a proposed location is therefore avoided as a result of the disturbance, then effective habitat loss can occur. Examples of causes of disturbance during construction which may lead to displacement are vehicle and personnel movements, vibration and noise from the construction process and visual intrusion.

The predicted effect of habitat loss was assessed for all target species and significance of effects prior to mitigation was determined. Indirect effects due to disturbance displacement were assessed in the same way.

8.4 Operational Effects

The operational phase will have a lower potential for effects on the local ecology than the construction phase. The main potential operational effects of the proposed development will arise from the rotation of the blades of the wind turbines and, to a lesser extent, from vehicular movement in relation to wind turbine maintenance along access roads. The rotation of the blades may result in displacement of local wildlife due to the avoidance by birds of the area around the turbines. In addition, the rotating blades present a potential collision hazard to local bird and bat species.

A Natura Impact Statement [NIS] has been prepared for the proposed development. The NIS addresses potential impacts on European (Natura 2000) sites resulting from the proposed development. There are no hydrological or ecological links between the proposed development and NHAs/pNHAs.

Maintenance of bat felling buffer by mechanical means will result in a *Temporary Imperceptible* Reversible direct effect on habitats at the Local scale. Prior to mitigation, sediment erosion and runoff during the operational phase could result in a *Short-term Slight* Reversible effect at the Local scale until soils are re-vegetated. The *Short-term Slight* to *Moderate* Reversible localised indirect drying out effect identified for raised bog and wet heath during construction stage may persist during the early stages of the operational phase.

The potential for establishment/spread of *Rhododendron ponticum* could give rise to *Long-term Significant* Reversible effects at the Local scale prior to mitigation. Potential spread of sycamore, butterfly bush, and snowberry due to turbine buffer maintenance works could give rise to *Long-term Slight* Reversible effects at the Local scale prior to mitigation.

Maintenance of the bat felling buffers around turbines may result in periodic disturbance to mammals.

In the event that a new badger sett was established inside or within 50m of the bat felling buffers during operation, potentially *Significant Short-term* Reversible effects at the Local scale could occur prior to mitigation. Any negative effects to other mammals during the operational phase of the windfarm are assessed as *Long-term Imperceptible* Reversible effect at the Local scale.

Based on use of Ecobat analysis of static detector results while considering the collision risk of individual bat species in accordance with NatureScot (2021) guidance, a *Long-term Moderate* Reversible effect at the *County* level is assessed for Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle prior to mitigation. Given the low collision risk and low recorded activity levels for *Myotis* species and brown long-eared bat prior to mitigation, the potential direct effects of the operational phase upon *Myotis* species and brown long-eared bat are considered to be *Long-term Not Significant* and Reversible at the Local level.

Maintenance of the bat felling buffers around turbines may result in periodic disturbance to common lizard. In the event of disturbance to breeding lizards, a *Temporary Moderate* Reversible effect at the Local scale (direct and/or indirect) could occur prior to mitigation. There is potential for localised water pollution during the operational phase which could have a negative indirect effects on breeding common frog or smooth newt. The potential effects on frogs and/or newts prior to mitigation is a *Temporary Slight* Reversible effect at the Local scale prior to mitigation.

There is potential for the local marsh fritillary population to expand into the bat/turbine felling buffers during the operational phase, giving rise to potential for *Short-term Significant* Reversible effects at the Local scale prior to mitigation. Potential effects to other butterflies during the operational phase of the Proposed Wind Farm are assessed as *Short-term Not significant* to *Slight* Reversible Effects at the local scale.

Maintenance of the bat felling buffers around turbines could potentially result in disturbance breeding Barbut's cuckoo bee, gipsy cuckoo bee, Gooden's nomad bee, large red tailed bumble bee and patchwork leafcutter bee. Prior to mitigation, a *Temporary Moderate* Reversible direct effect at the Local scale is predicted in this regard.

There is a potential impact (prior to mitigation) on water quality within the site, due to sediment erosion and runoff during the operational phase until soils are re-vegetated. Potential operational phase effects on aquatic ecology are assessed as being *Imperceptible Temporary* Reversible and in the local context.

Regarding avifauna, a collision risk model analysis was undertaken for the proposed wind farm in accordance with SNH (2017) guidance and Band (2024). This modelling used data from vantage point surveys carried out during winter 2021-22 and 2022-23, and summer 2022 and 2023. The species that were selected for collision risk modelling were: Buzzard, Golden Plover, Goshawk, Great Black-backed gull, Grey Heron, Herring Gull, Kestrel, Lapwing, Lesser Black-backed Gull, Little Egret, Merlin, Peregrine, Snipe, Sparrowhawk, Stock Dove, Swift and Whooper Swan . These species have been selected because they were recorded within the 500m turbine buffer (SNH Buffer), and are of conservation concern: i.e., they are red or amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert et al, 2021), are listed on Annex I of the Birds Directive (79/409/EEC) or are susceptible to collision effects. For each species, the collision risk was calculated, and the significance of the effect assessed.

One of the potential operational impacts of wind farms is avoidance where the wind farm may act as a barrier to movements (Masden *et al*. 2009). The effect of birds altering their migration flyways or local flight paths to avoid any infrastructure is a form of displacement (Drewitt and Langston, 2006). The primary impact of barrier effect is increased energy expenditure when birds have to fly further to circumvent an obstacle. The effect of operational displacement and barrier effect was determined for each of the target species and the significance of the effect determined.

8.5 Operational Effects

Decommissioning activities of will take place in a similar fashion to the construction phase. Potential decommissioning effects will be similar to the construction phase but on a reduced scale.

8.6 Mitigation Measures - Construction

A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented.

The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the Proposed Wind Farm and Proposed Substation have been kept to the minimum necessary, including the use of layout design methods to minimise excavation works.

In order to protect the existing raised bog and nearby groundwater wells from the effects of dewatering, groundwater cut-off techniques (such as sheet piling) will be used in preference to lowering of the water table (dewatering) during excavation and construction works in the vicinity of raised bog areas. This will avoid the possibility of significant drainage of the adjacent peat bogs. It is also proposed that drain blocking is carried out in the area of raised bog near T10.

Any re-instated habitats such as Hedgerows will utilise native species suitable for the area. Hedgerow and treeline planting will be carried out for the Proposed Wind Farm. This will reinstate or replace linear habitat loss to ensure no net loss of these habitats occurs. New hedgerows will be planted along the outer perimeter of turbine buffers at T1, T2, T4 and T5 within the proposed wind farm site to mitigate linear wooded habitat loss and enhance and maintain connectivity in the agricultural landscape.

Prior to works, an invasive species survey will be undertaken in the area to reconfirm the findings of the EIAR.

The invasive species plan and management plan (ISMP) will be adhered to for works in any areas where invasive species are present.

A pre-construction mammal survey will be undertaken within the potential zone of influence of the Proposed Wind Farm and Proposed Substation in order to reconfirm the existing environment as described in the EIAR.

An ecologist will supervise areas where vegetation, scrub, treeline and hedgerow removal will occur prior to and during construction as appropriate.

Construction operations for the proposed development will take place predominantly during the hours of daylight to minimise disturbances to faunal species at night.

Where possible, tree felling in forestry areas will be limited to time periods outside which pine martens may have young in dens (March and April). Where possible, any required tree felling of trees in forestry areas will be limited to time periods outside which red squirrel may have young in dreys (peak period January to March).

Detailed mitigation and procedures to prevent negative effects to badgers is described within Chapter 8.1 and location-specific information and mitigation is detailed within the confidential badger report.

In the event that a new otter holt should be encountered at any point, then NPWS will be informed and *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2008d) will be followed. Due to the distance separating Holt 1 from proposed infrastructure (over 150m), no mitigation other than trail camera monitoring is required. In the case of the low-potential inactive Holt 2, due to unsuitability for breeding otter, no mitigation other than trail camera monitoring is required. A toolbox talk shall be provided to all construction workers accessing the site to raise the awareness of the species.

To minimise risk to bat populations, a buffer zone is recommended around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude (SNH/NatureScot, 2021). The buffers required for each turbine are presented in Table 8-52 (Chapter 8.1).

Where hedgerows and treelines are affected by turbine clearance buffers, bats will be directed away from tree-free buffers along an alternative commuting route. Where bat buffers are applied, the surrounding hedgerows and treelines should act as commuting corridors, leading bats away from the turbine location, and these hedgerows should not end abruptly at the bat buffer zones. This will be achieved by planting new pollinator-friendly hedgerows, connecting existing hedgerows onsite, around the bat buffers. Preconstruction roost surveys will be undertaken to reconfirm the baseline.

Flashing red aviation lights will be provided on perimeter turbines. These will not negatively effect bats. Bat boxes 4 and 5 adjacent to the proposed/existing access route will be replaced with new boxes (4a and 5a) located directly north along the woodland edge bordering agricultural fields. The tree PRF (knothole in trunk) of tree C will be retained and relocated to the riparian zone along the Fear English River North of T4.

Preconstruction surveys and where required avoidance measures are specified for other species including lizard, common frog, smooth newt, lepidoptera and bee species.

With regards to aquatic ecology a Surface Water Management Plan (SWMP) is included in the CEMP. The Surface Water Management Plan sets out measures to avoid siltation, erosion, surface water run-off and accidental pollution events which all have the potential to affect water quality within the site and surrounding river network during the construction phase. A comprehensive suite of mitigation measures to prevent and control potential effects on the aquatic environment are detailed in the CEMP/SWMP, Chapter 8.1 Biodiversity and Chapter 10 Hydrology and Water Quality. The implementation of mitigation through avoidance and design has been used to minimise potential effects on aquatic ecology: buffers are in place between proposed infrastructure and hydrological features such as rivers and streams; where possible, existing stream crossings have been utilised. Clear span bridges are to be used at the three proposed stream crossing points on site to reduce the potential effect on stream beds and to avoid instream works (foundations will be located 2.5m from the river edge).

An ecologist will supervise areas where vegetation, scrub, treeline and hedgerow removal will occur prior to and during construction as appropriate.

Subject to other environmental concerns (e.g., run-off), the removal of vegetation and scrub as well as trimming of trees to facilitate the proposed development will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) to protect nesting birds. Where vegetation removal is required outside this period, vegetation will be inspected for nesting birds by a suitably qualified Ecologist. In the event of birds nesting within areas required to be felled, suitable mitigation including implementation of buffer zones and/or seasonal constraints (based on known breeding cycle of species) and nest monitoring will be put in place.

A re-confirmatory survey (March/April) will be conducted of the proposed infrastructure to assess any evidence of target species activity or occupation of new territories (e.g. in the case of breeding Snipe or Woodcock). Appropriate seasonal and spatial constraints will be implemented as required.

Grazing whooper swans using the fields near T1-T3 will be monitored prior to and during construction to detect if any disturbance/displacement occurs, and also to investigate whether habituation to construction disturbance occurs. In the event that wintering whooper swan are regularly using areas within or in close proximity to the proposed wind farm prior to construction, or if significant disturbance/displacement occurs (as determined by the ECoW/Ornithologist), a 600m exclusion zone around winter grazing areas will be implemented until wintering whooper swans have left in spring.

A preconstruction kingfisher survey will be undertaken to reconfirm the baseline. Proposed Water Quality protection measures will benefit kingfisher through protection of aquatic habitats and associated aquatic prey resources.

Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance. Where removed or altered, re-instated hedgerows will be planted with native species of native provenance.

8.7 Mitigation Measures – Operation

An ecological walkover survey covering the bat felling buffers will be undertaken prior to mechanical vegetation clearance to maintain these buffers as tree and scrub-free zones. This survey will ensure any potentially sensitive receptors which may establish in the buffers during the operational phase are detected prior to clearance, allowing significant effects to be avoided via avoidance/timing and other suitable mitigation as required.

A post-construction Annex I survey and habitat assessment will be carried out on the intact raised bog adjacent to T9 and T10 to determine the habitat condition and monitor the effectiveness of design/avoidance mitigation measures in preventing drying out of this habitat.

Invasive species will continue to be monitored, and where required, treated within the project area according to the invasive species management plan (ISMP) for as long as they persist within the site. In the event that any invasive species are detected during the operational phase in areas where they could potentially interact with/be spread by operational activities, the procedures and control measures detailed in the ISMP will be followed.

In the event that a new badger sett is discovered during maintenance of bat felling buffers (vegetation trimming), NPWS will be informed and the relevant guidance *Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes* (NRA, 2008c) and will be followed.

Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed (SNH 2021). As such, all turbines will be operated in a manner which prevents 'idling' during low wind speeds. This will reduce the potential for bat/turbine collisions during periods of low wind speed when bats are likely to be more active.

While bat activity varied by species, no locations had activity for any species higher than low/moderate levels (based on Ecobat median percentile scores). Therefore, increased cut-in speeds (above manufacturer's specified cut-in speed) are not required from commencement of operation, but will rather be reserved for implementation where required based on operational monitoring.

Monitoring of bat activity at turbine locations using static detectors will take place for at least three years after construction. an annual review at the end of each of these years will determine whether increased cut-in speeds should be implemented. If, following any of the initial three years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will be implemented. Alternatively, if it is found that the results of bat activity surveys and fatality searches reconfirm the level of bat activity at turbine locations remains low or low/moderate then curtailment will not be required. Bat activity will subsequently be monitored in years 5, 10, 15, 20, 25 and 30 with further review after each monitoring period.

If required based on operational monitoring results, cut-in speeds should be increased to 5.5 m/s during the bat activity season (April-October) or where temperatures are optimal for bat activity, from 30 minutes prior to sunset and to 30 minutes after sunrise at turbines where surveillance shows high bat activity levels for High and Medium-Risk species and/or if bat carcasses are recorded. Cut-in speed restrictions will be operated according to specific weather conditions:

- When the air temperature is greater than 7°C (as bat activity does not usually occur below this temperature).
- Generally, bat activity peaks at low wind speeds (<5.5m/s). As such, it has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, particularly during late summer and the early autumn months.

The vegetation-free buffer zones around the identified turbines will be managed and maintained during the operational life of the development.

The success of the implemented mitigation measures for bats on the project will be monitored for a period of three years post construction, with further monitoring in years 5, 10, 15, 20, 25 and 30.

Bat fatality monitoring will be undertaken during all monitoring years, comprising carcass removal trials and turbine searches.

Maintenance of bat felling buffers (vegetation trimming), will be undertaken outside the bird breeding season (March- August inclusive). This measure will also avoid potential disturbance to common lizard and bee species during breeding periods.

The pre-clearance bat buffer ecological survey shall include a marsh fritillary habitat appraisal, followed if necessary by a larval web survey. This will ensure that suitable mitigation and avoidance measures can be implemented in the event that marsh fritillary establish in the bat felling buffers during the operational phase.

There is potential for an indirect effect on frogs or smooth newt due to water quality changes from erosion and sediment. Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.

Regarding aquatic ecology, it is not envisaged that maintenance will involve any significant effects on the hydrological regime of the area. Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.

A post construction avian monitoring programme is to be implemented at the subject site in order to confirm the efficacy of the mitigation measures; the results of this will be submitted annually to the competent authority and NPWS during years 1, 2, 3, 5, 10 and 15 post construction.

Fatality monitoring, flight activity surveys, monthly wildfowl census, breeding bird surveys, breeding wader surveys and breeding woodcock surveys will be conducted.

It is not envisaged that maintenance will involve any significant impacts on the hydrological regime of the area. Weekly inspections of the erosion and sediment control measures on site will be required during the construction period, followed by fortnightly inspections until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.

8.8 Mitigation Measures – Decommissioning

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

Following removal of the turbines, the bat felling buffers will be allowed to succeed to woodland.

Any re-instated habitats such as Hedgerows will utilise native species suitable for the area. Similar mitigation measures will apply for the decommissioning phase as for the construction phase.

Due to the proposed retention of the roads, hard standings and electrical infrastructure, potential for effects on water quality and aquatic ecology will be reduced in comparison to construction. The only potential sources of siltation will be the areas of soil used to cover the turbine foundations. The mitigation measures outlined above for the construction phase will also be implemented as relevant for the protection of aquatic ecological interests during the decommissioning phase.

Decommissioning operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. & Langston, R. H., 2006). Turbines components will be broken up onsite prior to removal, and as such vegetation trimming requirements to facilitate turbine removal will be minimal (reduced in comparison to construction stage) or not required.

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance.

Any re-instated habitats will include native species where possible to enhance habitat diversity for birds.

8.9 Residual Effects

8.9.1 Proposed Wind Farm

Construction of the wind farm will lead to some permanent loss of habitat. The habitat loss will be the total area covered by the roads plus the footprint of each of the proposed turbines and all other wind farm infrastructure. Not all land-take is permanent; the temporary compound and blade transfer areas will be reinstated following construction, and upon decommissioning the turbine foundations will be covered to permit re-establishment of semi-natural habitats, and modifications such as at roundabouts along the turbine delivery route will be reinstated. Measures to be undertaken to deal with invasive species are included in the CEMP. With the application of the appropriate mitigation measures as outlined in the current chapter, it is considered that the effects of the Proposed Wind Farm on habitats/flora will be minimised to an acceptable level, resulting in *Slight* Reversible residual effects at the Local scale (i.e. noticeable changes in the character of the environment without affecting its sensitivities).

Imperceptible Reversible residual effects at the Local scale on terrestrial mammals are envisaged for Proposed Wind Farm following the implementation of mitigation measures during the construction phase, operation phase and the decommissioning phase.

With the implementation of mitigation measures, *Imperceptible* to *Not significant* Reversible residual effects at the Local scale arising from Proposed Wind Farm are predicted for bats.

With the implementation of mitigation measures, *Imperceptible* Reversible residual effects at the Local scale are predicted for other species.

The Proposed Wind Farm will have an overall slight negative effect on aquatic ecology and fisheries during the construction phase in the local context in the absence of mitigation measures. However, this will be effectively reduced to an *Imperceptible* Reversible residual effect at the Local scale following the implementation of mitigation measures.

There are no links (e.g. hydrological or ecological links) between the Proposed Wind Farm and any of the national sites located within 15 km. With the implementation of mitigation measures, no residual effects as a result of the Proposed Wind Farm on the integrity of designated sites are predicted.

The limitation through mitigation of potential indirect effects on water quality such as siltation and run-off of suspended solids will significantly reduce the potential for impacts affecting aquatic ecological interests in the receiving environment. All mitigation measures provided for the protection of aquatic ecology and fisheries, in addition to the mitigation measures for water quality protection to be detailed in the Surface Water Management Plan, will effectively protect aquatic ecological interests downstream of the proposed development.

To minimise effects on those species which the literature suggests can be negatively impacted, a re-confirmatory preconstruction survey (March/April) will be conducted to assess any evidence of target species activity or the occupation of new territories. Should any new nests be recorded, works at these locations will be restricted to outside the breeding season (April-July) or until chicks are deemed to have fledged (following monitoring). Targeted surveys for waders/woodcock and wintering whooper swan will also be undertaken, triggering seasonal and spatial restrictions as required to minimise disturbance to these species.

A comprehensive monitoring program will also be implemented following construction of the proposed wind farm; this will monitor the degree of displacement/disturbance and barrier effects, if any, on existing species as a result of the development, in addition to comprehensively monitoring any bird fatalities.

It is considered that with the implementation of mitigation, the proposed wind farm will have an **Imperceptible** to **Slight Reversible** Residual Effect in the local context on avifauna.

It will result in a **Long-term Moderate Reversible** Residual Effect to woodcock in terms of construction-stage habitat loss. However, the abundance of suitable displacement habitat in the local area, the fact that assessment of habitat loss is based on the total habitat resource within the land ownership boundary rather than all suitable habitat in the locality, in addition to operational recolonisation of road felling buffers and berms by wooded habitats, the realised effect of habitat loss arising from construction more closely aligns with a **Medium-term Slight** to **Moderate** effect.

Residual effects associated with the operational phase of the proposed wind farm are comprised of: **Long-term Slight** to **Moderate Reversible** Residual Barrier Effects to lapwing, golden plover and kestrel; **Long-term Slight** to **Moderate Reversible** Residual Disturbance/Displacement Effects to kestrel, and **Long-term Moderate Reversible** Residual Disturbance/Displacement Effects to snipe. It is noted that habituation over the lifetime of the wind farm is likely to reduce effects for all of the above residual operational effects identified.

Residual effects associated with the operational phase of the proposed wind farm are **Short-term Slight** to **Moderate** Disturbance/Displacement Effects to whooper swan followed by a **Long-term Not significant** effect with habituation.

Residual effects associated with the TDR are assessed as **Long-term Imperceptible.**

8.9.2 Proposed Substation

Construction of the Proposed Substation will lead to some permanent loss of habitat. A *Permanent Slight* Reversible residual effect at the Local scale will arise from habitat loss associated with the Proposed Substation.

For all other ecological receptors, residual effects associated with the Proposed Substation will be *Long-term Imperceptible* Reversible residual effects at the Local scale.

It is considered that with the implementation of mitigation, the proposed substation will have an **Imperceptible** to **Slight Reversible** Residual Effect in the local context on birds. A **Long-term Not significant** Residual Effect in the local context will remain for woodcock. A **Long-term Not significant** Residual Effect in the local context will remain for raptors (Criteria: EPA, 2022).

Biodiversity enhancement measures are also detailed in Chapter 8.1 and Chapter 8.2. These include planting of berms, the erection of bird and bat boxes, damming of drains in the adjacent Dunfierth bog, enhancement of hedgerows, pine marten den boxes, insect hotels, lizard refuges, hibernacula for mammals and retention of felled wood onsite.

9. SOILS AND GEOLOGY AND HYDROGEOLOGY

9.1 Existing environment

The Proposed Development site is underlain by Lucan Formation. It is comprised of Dinantian (Carboniferous) dark limestone and shale (Calp).

It is described as dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar.

No rock outcrops are recorded around the Proposed Development area. The nearest historical boreholes, labelled as 726, 727 and 728, have logged rockhead level at a depth range between 26.5 and 33.5mBGL.

The Proposed Development site is predominantly underlain by a locally important aquifer along the whole Proposed Development area. The groundwater flow regime of this underlying bedrock aquifer is described as moderately productive by GSI.

Immediately to southeast, at a minimum distance of 300m from the Proposed Development area, a locally important aquifer is moderately productive only in local zones.

The Proposed Development site is mainly bounded along the western side by peat bog comprising Mulgeeth bog to the north and east and in Drehid bog to the south and west. Therefore, only shallow to moderately deep bodies of peat are expected as confirmed through the previous peat probing campaigns.

Underlying gravel deposits derived from limestones are limited to the peat bog along the northern area of the Proposed Development.

Till derived from limestones is underlying the peat bog and the gravel deposits. It also outcrops to the eastern limit of the peat bog and along the southern area of the Proposed Wind Farm.

During the Peat Stability Assessment presented in Appendix 8.1 peat depths of between 0.3m and 5.4m were recorded from peat probes across the site, with an average depth of 2.4m.

Based on the analyses presented, the development areas are considered stable since no data points were recorded to have a FoS of less than 1.30.

The nearest active quarries to the site are the Kilsaran Clonard Quarry located in Co. Meath and the Keegan Quarries Clonard Ltd, Ballyonan, Co. Kildare. It produces Limestone aggregates and fill materials. The Keegan Clonard quarry produces washed sand and gravel aggregates. There have also been mineral occurrences recorded surrounding the site that includes zinc, silver and lead. None of these mineral occurrences are located within the site boundary.

Groundwater vulnerability, is the term used to represent the geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability for the site is classified by the GSI as ranging from ‘Low’ to ‘High’ across the site, ‘low’ in areas covered by peat and ‘moderate’ to ‘high’ in the areas composed of farmland (underlying glacial and fluvial deposits). Along the limit of both kinds of deposits, there is a transition strip with moderate vulnerability. Nevertheless, FT confirms typical low permeability cover (peat) under 3.0 m and occasionally between 3.0 – 5.0m. The peat is assumed to be underlain by fine and coarse glacial deposits with moderate to high permeability.

There is a public supply source protection (SPZ) area directly to the north-east of the site that covers approximately 10 square kilometres. The SPZ comprises an Outer Protection Zone which underlies turbines T9, T10, T11 and the proposed substation. There is an Inner Protection Zone immediately north-west of T11, there are no turbines proposed within the Inner Protection Zone.

9.2 Construction impacts

The main characteristics of the proposed development that could impact on soils, geology and hydrogeology are:

- Construction of wind turbine foundations and hardstanding areas
- Construction of access tracks
- Construction of site drainage
- Minor alterations to public roads for turbine delivery
- Construction of substation
- Construction of site compounds
- Cable trench and grid connection construction
- Temporary material storage
- Drainage
- Tree Felling
- Vehicular movement
- Storage and use of diesel
- Installation of wastewater holding tank for site compound and substation
- Landscaped clearfell storage and berms for permanent surplus storage

The magnitude of potential impacts during construction prior to mitigation, is considered to be of slight to moderate significance. A CEMP accompanies the EIAR as an appendix (Volume 3) which identifies key risks and minimise same by the application of the principles of avoidance, prevention and protection. Proposed mitigation measures are outlined below with full details of the proposed mitigation measures associated with the proposed development are set out in Chapter 9 Land, Soils and Geology, Section 9.6, Volume 2.

9.3 Operation impacts

Very few potential direct impacts are envisaged during the operational phase of the proposed development. These include:

- Some construction traffic may be necessary for maintenance of turbines which could result in minor accidental leaks or spills of fuel/oil.
- The grid transformer in the substation and transformers in each turbine are oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater.

9.4 Mitigation Measures

One of the primary mitigation measures employed at the preliminary design stage is the minimisation of volumes of soil excavation and lengths of track and trench construction.

The proposed turbine locations have been carefully selected in areas of the site which is relatively close to

the existing access tracks to minimise the length of new access tracks required. Drainage will be towards the existing drainage network.

To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or immediately after heavy rainfall (>10mm/hour).

Excavation will precede the turbine, cable trench and access track construction, whereby topsoil and soft soils will be excavated and replaced with granular fill where required. Excavation will be carried out from access tracks where possible in order to reduce the compaction of topsoil.

All the access tracks will be floated, excluding the entrance from public road to T1 (0.4m of average excavation depth) and the Overhead line platform (0.3m of average excavation depth). Turbines T8, T9 and T10 and related hardstands will be piled. No borrow pits will be used and all fill and aggregate will be imported from local quarries.

Surplus soil or rock excavated during the course of the works will be temporarily stored in a level area and will be re-used on site in the form of berms and landscaped clearfell areas around Turbines T8, T9, T10 and T11. Temporary storage may also be required after excavation and prior to transportation within the site.

To mitigate against the compaction of soil at the site, prior to the commencement of any earthworks, the work corridor will be pegged, and machinery will stay within this corridor so that peatland / soils outside the work area is not damaged. Excavations will then be carried out from access tracks, where possible, as they are constructed in order to reduce the compaction of topsoil.

No spoil stockpiles will be left on site after construction.

Any contaminated soils will be handled, removed and disposed of in accordance with the requirements of the local authority and/or EPA and waste management legislation.

Prior to removal of material from site for disposal WAC (Waste Acceptance Criteria) testing should also be undertaken in accordance with recommended standards and in-line with the acceptance criteria at a suitably licenced landfill or treatment facility.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Gravel fill will be used to provide additional support to drains where appropriate. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion by covering during adverse weather. Where necessary sheet piling or other measures will be used to provide integrity for unstable excavations, particularly within peat, alluvial, gravel or for excavations below the water table.

Support may also be required to support elevated floating roads which are being excavated for the installation of cable trenches. The stability of all excavations will be assessed in advance by an experienced geotechnical engineer. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes by the provision of silt traps and silt fencing as required (refer to Chapter 10 – Hydrology chapter).

Unregulated drainage will not be permitted within the Proposed Development site. Any pumping of excavations will be directed into existing drainage networks via settlement ponds and will not be allowed to discharge directly to the ground except under licence.

All fuel and liquids will be stored on site in fully bunded areas. In addition, an effluent holding tank along with other protection measures will be used at the substation in order to protect the Source Protection Zone at Drehid and prevent any discharges to ground.

Haul roads will be capped as soon as practicably possible to cover exposed subsoils and as such reduce the concentration of suspended solids in the run-off.

A suitably qualified person will be appointed by the developer to ensure the effective operation and maintenance of drainage and other mitigation measures during the construction process;

Due to the dispersed nature of the site, refuelling of plant during construction will be carried out at a number of dedicated refuelling station locations on site, typically at each compound or at least 100m from a watercourse using mobile bowsers.

Each station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site. Only emergency breakdown maintenance will be carried out on site and appropriate containment facilities will be provided to ensure that any spills from breakdown maintenance vehicles are contained and removed off site.

Portaloos and/ or containerised toilets and welfare units will be used to provide toilet facilities for site personnel during construction. Sanitary waste will be removed from site via a permitted waste contractor.

9.5 Residual Impacts

Following the implementation of the mitigation measures to be applied, the wind farm is expected to have a low impact on the receiving environment. As such, overall development represents a low risk to the geology, hydrogeology and peat stability of the area.

Residual impacts that are most likely to occur at the site of the proposed development would be as follows:

- Changes in ground surfacing including areas of new hardstands will impact on the hydrology of the site and may result in increased runoff of rainwater and increased drainage discharge. It is anticipated that this should not have a major impact upon the hydrology of the site.
- The drainage infrastructure that will be emplaced as part of the roads and turbines development will also change the sub-surface hydrology by replacing some manmade drainage systems with line interceptors and point discharges to buffered outfalls. Careful design of this drainage to mimic natural conditions will help to mitigate negative impacts of artificial drainage.

When the mitigation measures are implemented in full, any effects on the receiving environment will be of imperceptible significance.

10. HYDROLOGY AND WATER QUALITY

10.1 Existing Environment

The area of the Proposed Development is located across a number of river catchments namely the Fear English River, Kilcooney River and the Blackwater. The Proposed Development, predominantly drains to the River Boyne and its tributaries. The main tributary of the River Boyne is the River Blackwater and a number of its small tributaries.

The Fear English River flows through the site and the Kilcooney River flows adjacent to the site. Both rivers are tributaries draining to the River Blackwater. The Kilcooney River rises near Carbury at approximately 95mOD and flows in a north-easterly direction adjacent to the site for approximately 1km before its confluence with the Fear English River. It joins the Fear English River to the south of Ballynamullagh.

The Fear English River rises in Parsonstown at approximately 88mOD and flows in a northerly to north-easterly direction along the eastern boundary of the site. After the confluence with the Kilcooney River, the Fear English River continues in a north easterly direction for 3km to Johnstown Bridge, where it meets the River Blackwater.

From Johnstown Bridge the River Blackwater flows in a north-westerly to northerly direction for approximately 12.5km, crossing the Royal Canal and the Blackwater Bridge at Kilmurry before joining the River Boyne at Rourkestown.

The River Boyne then flows on for 12km in a north easterly direction towards Trim in County Meath. At Trim the River Boyne turns northwards and flows for 18km to Navan Town. From Navan Town, the River Boyne veers in an easterly direction, flowing for 30km towards Drogheda. The River Boyne flows out into the Irish Sea 6km to the east of Drogheda.

10.2 Construction Impacts

During the construction period, the development has the potential to lead to impacts on hydrology unless appropriate mitigation is applied.

Tree felling, new site access roads, turbine hard-standing areas, the on-site substation and other new, hard surfaces have the potential to contribute to a low-level increase in run-off.

The estimated changes in the volume of runoff correspond to a 1-in-100 year, 30-minute duration storm at the Proposed Development site. The calculations include the increases in run-off due to the increase in hardstanding as a result of the development in each of the catchments. In order to assess each item individually, the analysis has been split into the Proposed Wind Farm and the Proposed Substation as follows:

Table 10-1: Estimated changes in volume of run-off (Proposed Wind Farm)

Catchment	Increase in Run-off
Blackwater (Longwood)_020	0.19%
Blackwater (Longwood)_010	0.005%
Overall Increase in Runoff	0.10%

Table 10-2: Estimated changes in volume of run-off (Proposed Substation)

Catchment	Increase in Run-off
Blackwater (Longwood)_020	0.1%
Blackwater (Longwood)_010	None
Overall Increase in Runoff	0.1%

An overall increase in run-off of 0.1% could be expected from the parts of the Proposed Wind Farm draining to the River Blackwater catchment. A 0.1% increase could also be expected from the Proposed Substation which also drains to the River Blackwater catchment. This estimated increase in run-off will reduce over time as vegetation is re-established on the site. It is not expected therefore that the estimated increases will give rise to any significant impacts.

Further, the magnitude of the impact does not take into account the proposed mitigation measures.

The relatively low increase in surface run-off water has the potential to cause localised soil erosion and consequent sediment release into the receiving watercourses via the drainage system for the proposed development if no mitigation is applied.

Possible potential indirect impacts on drainage and surface water quality during the construction phase of the Proposed Wind Farm prior to mitigation include:

- Increased sediment loading of streams;
- There is a potential for temporary drawdown at the foundation excavations in areas of bog (T6, T7, T8, T9, T10 and T11). This drawdown is likely to occur for approximately five weeks until the foundation area is reinstated, after which the bog will recharge. Proposed piling at T8, T9 and T10 will mitigate against the potential drawdown as there will be lesser excavation works required. This will reduce potential effects on the bog.
- Tree felling could lead to an increase in sediment and nutrients in the surface water run-off, if the brash is left in place in the riparian buffer zones.
- Small diameter cross-drains could lead to blockages and consequent flooding and concentration of flows.
- Refuelling activities adjacent to water bodies could result in fuel spillages, polluting receiving waters.
- Excavation of peat could lead to an increase in suspended solids in the surface water run-off and from minor quantities of exposed mineral soils. The removal of the vegetated material will also lead to an increase in the rate of run-off along the route of the site access roads and hard-standing areas. This increase in the rate of run-off could lead to a minor increase in flooding downstream.
- Blockage of cross-drains could lead to consequent flooding and concentration of flows.
- Overland flow entering excavations could increase the quantity of surface water to be treated for sediment removal.
- Internal cable trenches could act as a conduit for surface water flows and subsequent flooding elsewhere on the site.
- Stream flows could be impeded due to inappropriate design of stream crossings.

- Open bodies of water and saturated ground present a risk to the safety of site personnel and the public. Hazards of this type include the streams and rivers throughout the site.
- The construction of new infrastructure has the potential to obstruct existing overland flow.
- Overland flows entering roadside drains could result in a concentration of flows and subsequent erosion of drains and a reduction in the efficiency of any proposed stilling ponds.

Potential indirect impacts associated with the Proposed Substation would be similar to those listed above for the Proposed Wind Farm. However, the Proposed Substation occupies a smaller area and would require less excavation. Therefore, potential effects associated with excavation of peat are expected to be of a lesser magnitude at the Proposed Substation compared to the Proposed Wind Farm.

To facilitate the turbine delivery route to the Proposed Wind Farm, two temporary crossing structures will have to be installed across the OPW Arterial Drainage channels. Flows in the drain could be impeded if the crossing structures are not designed correctly. However, the proposed crossing structures will be temporary bridges which will provide a clear span crossing, which will not obstruct flows within the drains.

A flood risk assessment was carried out to assess potential impacts of a flood event on the Proposed Wind Farm and on the Proposed Substation. The flood risk assessment revealed that a 1-in-100 year flood event from the Fear English River would break the river's banks and extend over the area where the turbine T6 is proposed. As such, the ground will be raised locally for T6 so it is above the flood level. To compensate for the volume of flood extent occupied by the raised T6 hardstanding, and a 'flood compensation area' will be provided around T6 which will consist of a shallow excavation which will accommodate flood water in the case of a flood event occurring.

10.3 Operation Impacts

The main potential hydrological impact of the development is a 0.1% increase in the run-off to the River Blackwater catchment from the Proposed Wind Farm, and a similar increase in the run-off to the same catchment from the Proposed Substation, due to the change in land use resulting in an increase in impermeable ground conditions. The time of concentration of surface water flows will decrease as a result of the additional hard-surfaced areas resulting in additional flows being discharged to the roadside drains during rainfall events. Some infiltration will occur through the road construction material to be used in the site access roads.

Due to the insignificant increase in potential run-off from the site and the non-intrusive nature of site operations, there should be negligible release of sediment to the watercourses post-construction.

During the operation phase, small quantities of oil will be used in cooling the transformers. There is potential for contamination via the drainage system, in the event of an uncontrolled release of any oil to the drainage network and in the absence of oil and petrol interceptors.

It is not envisaged that the maintenance activities taking place on the wind farm, involving general maintenance for the operation of the wind farm and including maintenance of the drainage system and reinstated areas, will give rise to any significant, impacts on the hydrological regime of the area.

The increase in the rate of surface water run-off due to the increase in hard surface areas as a result of the proposed development within the waterbody catchments, in addition to existing large-scale development in these waterbody catchments, could lead to a minor cumulative risk of flooding downstream.

10.4 Mitigation Measures

Proposed drainage measures to reduce and protect the receiving waters from the potential impacts during the construction of the proposed development are as outlined in detail in Chapter 10 of Vol 2. These include measures to prevent runoff erosion from vulnerable areas and consequent sediment release into the nearby watercourses to which the proposed development site discharges and the appointment of a suitable qualified person to oversee the implementation of mitigation measures.

It is not envisaged that the operation of the wind farm or the substation will result in significant impacts on the hydrological regime or water quality of the area, as there will be no further disturbance of soils post-construction, and only a minimum of traffic movement.

The conceptual drainage has been designed to operate effectively during the operation period. The stilling ponds will be a permanent feature and will continue to be effective in filtering the run-off from the site should any accidental release of silt combine with the surface water run-off during operational activities.

During the operation period the swales will have vegetated and will serve to attenuate flows and remove suspended solids from the run-off.

10.5 Residual Impacts

The residual significance of the effects of the Proposed Development on sensitive downstream receptors is expected to be low taking account of mitigation measures outlined.

Following the implementation of mitigation measures, the residual risk to the receiving watercourses from hydrological impacts would be negligible during the construction period and negligible during the operation of the Proposed Development. The implementation and efficacy of the mitigation measures will be monitored throughout the construction and operation phases.

Mitigation systems will be in place before development works commence.

The proposed development, if undertaken as proposed, will not have an adverse effect in terms of hydrology on the integrity of the following environmentally protected designated site:

- River Boyne and River Blackwater cSAC and SPA, located at 19.6km to the north of the site by hydrological links, from the site boundary.

As a result, the Proposed Development is not expected to contribute to any significant, negative cumulative effects. In circumstances where the proposed mitigation measures are implemented in full, a high degree of confidence can be assured that any effects on the receiving environment will be of low significance.

11. POPULATION, HUMAN HEALTH AND MATERIAL ASSETS

Chapter 11 of Volume 2 of the EIAR includes a description of the existing environment and the likely effects on population, human health and material assets arising from the proposed development. These include:

- Population;
- Employment and Economic Activity;
- Land Use;
- Recreation, Amenity and Tourism;
- Human Health and Safety;
- Potential for the project to cause accidents and/or natural disasters and the vulnerability of the project to potential disaster/accidents; and
- Material Assets

11.1 Existing Environment

The Proposed Development is located around the townland of Drehid. The main towns and villages within the vicinity of the Proposed Development are Enfield, Co. Meath, Kilcock, Maynooth, Clane, Derrinturn Co. Kildare, and Edenderry, Co. Offaly.

Within 1 km of the proposed turbines there are only 91 no. receptors; with no receptors located within 4 times the tip height of any turbine. This is due to the constraints-led design of the Proposed Development, which has had a particular focus on maximising the distance between turbines and receptors. Of these dwellings, 79 no. are registered as residential, 3 no. are registered as commercial, and 9 no. are registered as both commercial and residential.

The population of the study area for the Proposed Wind Farm increased by 6.4% between 2011 and 2022. The growth of the study area has been significantly lower than that of Co. Kildare which experienced a population growth of 17.8% between 2011 and 2022. The population of the study area for the Proposed Substation increased by 7.1% between 2011 and 2022, also low compared with the population growth for the county.

The proposed development is located in relatively low-lying but undulating land. The landcover is classified in Corine as 2.3.1 Pastures; 3.1.2 Coniferous Forest and 3.2.4 Transitional Woodland shrub. The most common form of farming within the study area, and Co. Kildare is Pastures.

Tourism is an important sector to the national economy and for Kildare. Tourist attractions in Co. Kildare include Castletown house Parklands, the National Stud, the Japanese Gardens, the Great Plains of the Curragh, the Curragh Military Museum, the Bog of Allen Centre, and Lullymore Heritage Park. Recreational amenities in Co. Kildare include a number of horse racecourses, as well as trails and forestry's and parks.

According to the CSO data records for 2022, 88% of people within the study area stated that they had very good or good health. Generally speaking, Ireland is considered to have a high level of health.

Renewable and non-renewable material assets or resources that are located within the area include the Timahoe North Solar Farm, a number of other nearby solar farms in construction/operational phase, quarries, and utilities such as powerlines and telephone lines. For more detail on the cumulative projects considered, please see the full EIAR chapter (Chapter 11 of Volume 2).

11.2 Potential Impacts – Construction

During the construction phase of the proposed development, construction workers will travel to the site from the local area. This may create short-term/temporary population growth associated with the employment of construction workers, tradespeople, labourers and specialised contractors. It is estimated that up to 160 jobs (with an installed capacity of up to 52.8MW) could be generated during the construction phase.

There will be no permanent impact to population in terms of changes to population trends, density, household size, or age structure as a result of the construction phase.

Temporary effects will occur on land use as a result of the construction and installation of cable routes.

There will be potential effects to recreation, tourism and amenity users around the site from increased construction traffic, and dust and noise nuisance during the construction of the wind farm.

Potential construction impacts from the cable route will be minimal where the cables are being installed given that cable in public road corridor will account for a short distance of approximately 1km. Any disruption will be mitigated where possible by maintaining access for people throughout, and where this is not possible, in minimising the impact, as well as clearly communicating the timing and level of works to the local community.

The construction of the wind farm will require use of natural resources such as aggregates which will be sourced from quarries and pits within the area.

Utilities such as overhead power lines or telephone lines or underground services may require diversion or be temporarily disrupted during the construction of the wind farm development.

The construction of the cable trenches, along a short distance of a public road, will have a slight, negative temporary impact on the roads concerned during construction, with some road likely to require re-surfacing.

Importation of materials and equipment for the Proposed Development will also increase shipping traffic at the ports being used and increase freight on the motorway, national primary route and regional road network.

11.3 Potential Impacts – Operation

Once constructed, it is envisaged that there will be direct and indirect employment associated with the operational phase. The proposed wind farm development could create between 16 and 21 long term operational jobs.

A Recreational Amenity Trail is proposed as part of the development. The Recreational Amenity Trail will have a positive impact on human health and tourism also.

The Department of the Environment, Heritage and Local Government's document: Wind Energy Development Guidelines for Planning Authorities, 2006, notes that tourism and wind energy developments can co-exist happily. This concept is supported by a number of other sources including the Sustainable Energy Ireland's Attitudes towards the development of wind farms in Ireland, document (2003). Fáilte Ireland have also provided in their guidelines that some large-scale developments can improve the visitor experience through provisioning of safety and conveying a sense of environmental responsibility.

Based on international literature and peer-reviewed articles, it can be reasonably assumed that no impact on property values within the area will arise as a result of the Proposed Development.

Given that the proposed development's footprint will occupy a small proportion of the development site area, it is anticipated that there will be minimal effects arising from the proposed use and existing land use.

The proposed development is expected to have a minimal impact on agricultural practices on the lands due to a small area of land being lost. This is not expected to have an adverse impact on livestock (cows or sheep) or horses in the surrounding area.

It is not anticipated that the workings of the turbines will present a danger to the public. The wind farm is designed to last a minimum of 35 years and the turbines are equipped with a number of safety devices to ensure safe operation during their lifetime.

Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases of the Proposed Development are limited and therefore no adverse effects will occur.

11.4 Potential Impacts – Decommissioning

The potential impacts associated with decommissioning will be similar to those associated with construction but at a reduced level. Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be a slight, positive temporary impact to population and the local economy in the study area associated with the employment of construction workers within the vicinity of the wind farm during the decommissioning phase.

The Recreational Amenity Trail will be kept in place following decommissioning.

There will be no adverse negative impact on human health or material assets arising from the decommissioning phase.

The Proposed Substation would remain in place following the decommissioning of the Proposed Wind Farm, and will be taken charge of by EirGrid.

11.5 Cumulative Impacts

No cumulative effects have been identified to have any significant 'in combination' impact arising from the proposed development in conjunction with another permitted or under construction project or plan.

11.6 Mitigation Measures

A number of mitigation measures will be implemented during construction, operation and decommissioning of the wind farm in order to reduce or off-set any potential effects of the proposed development on the environment.

No mitigation measures will be required with respect to population given that there will be no adverse effects on population trends, density, household size, or age structure as a result of the proposed development.

Rates and development contributions paid by the developer will contribute significant funds to Kildare County Council which will be used to improve the services available to the people of the County.

The proposed community benefit package will provide benefit and funding for local community schemes and accordingly, may enhance the local community interaction.

There is not likely to be any significant negative impact on local house prices.

Given that the effects are predominantly positive in respect of socio-economics, employment and economic activity, no mitigation measures are necessary.

During the construction phase, the developer will communicate with the local community, detailing construction activities to ensure that people are aware of all activities.

Mitigation measures for recreation, tourism and amenity are primarily related to preliminary design stage of the wind farm and recreational amenity trail development, which has allowed for the prevention of unnecessary or inappropriate development to occur that would significantly affect any recreational or tourist amenity.

A Construction Environmental Management Plan (CEMP) has been prepared on a preliminary basis for the proposed development and will be finalised on appointment of the contractor for the main construction works.

Signage will be located along the trail at regular locations to clearly define the route of the trail. Safety signage will also be located at regular locations regarding fire prevention and public health & safety awareness.

Regular maintenance and upkeep of the trail will be provided with litter bins located along the trail.

No mitigation measures are required in relation to human health during the operational stage of the proposed development.

It is proposed to undertake silt trenching as part of the construction works which will identify existing services along the proposed cable routes. This will minimise the impact in terms of disruption or damage to existing utilities. It is not intended to divert existing services but instead where possible the cable will be laid above or below existing services. Communication with the services providers will be maintained for the duration of the construction works.

Non-renewable resources will be sourced locally, insofar as possible to minimise transportation distances and indirect impacts on climate change.

11.7 Residual Impacts

The residual effects of the proposed development with respect to population are considered slight and positive, given the enhanced employment opportunities that will give rise to potential indirect increases in population in the immediate locality.

The proposed development will have a positive residual impact on socio-economics, as a result of the employment opportunities associated with the construction and operation of the wind farm. There will also be a positive effect from income spent by construction and operations workers in the local area.

The rates generated from the proposed development will result in positive residual impacts for both the local area and wider county of Kildare resulting from the investment in services, infrastructure and facilities.

The community benefit programme proposed will support local environmental improvements and recreational, social or community amenities and initiatives which will also give rise to positive residual impacts. The Recreational Amenity trail will have a positive residual impact on the local community.

While there may be a short-term negative impact to recreation, amenity and tourism during the construction phase of the development, there will be no significant, adverse impacts in the surrounding area. During the operational phase of the wind farm there will be a positive impact on recreation, amenity and tourism through the provision of an on-site public walkway.

There will be no risks associated with the operation of the wind turbines and cables and the substation will not have an impact on human health during operation.

The proposed development will result in a positive residual impact on non-renewable resources by offsetting the use of fossil fuel power generation.

12. SHADOW FLICKER

At certain times of the year when the sun is shining and is low in the sky, the rotation of wind turbine blades could occasionally cast moving shadows on residences in close proximity to the turbines. These moving shadows of the turbine blades can periodically reduce light coming from the window of a room, causing the light to appear to flicker.

The potential for shadow flicker to occur and the intensity and duration of any effects depend upon the following factors:

- the location and orientation of the window relative to the turbines;
- whether a window has direct, unobstructed line of sight to the turbine rotor;
- the distance of the building from the turbines;
- the turbine geometry;
- the time of year (which impacts the trajectory of the sun's path across the sky);
- the frequency of cloudless skies (particularly at low elevations above the horizon); and,
- the wind direction (which impacts on turbine orientation).

All seven conditions outlined above must exist simultaneously for shadow flicker to occur at a dwelling. Shadow flicker does not generally have any effect on health or safety but could on limited occasions present a brief nuisance effect for some human receivers.

12.1 Existing environment

A study area of 1,330 m from each of the 11 wind turbines was selected for this assessment. This is based upon ten times the maximum rotor diameter (133 m) that would be used within the Proposed Wind Farm. The assessment considers all potential shadow flicker sensitive receptors identified within the study area, which includes habitable residential buildings and buildings that are mixed residential and commercial. TNEI have identified 185 receptors as being within the study area. The receptor locations are detailed on Figure 12-1 and presented in tabulated format in Table 12-3 of Chapter 12 of the EIAR (volume 2).

12.2 Operation impacts

The shadow flicker appraisal was carried out using EMD International WindPro. This software determines the position of the sun throughout the year at different times of the day and with this, it calculated the duration of shadow cast across the windows of nearby houses.

The shadow flicker model indicates that there is the potential for shadow flicker to occur at 143 receptors considered within the study area. At the remaining receptors, there is no potential for shadow flicker effects to occur because the sun's angle relative to the turbines and receptors never reaches the required position

Based on the potential shadow flicker calculations for the Proposed Wind Farm, predicted levels of shadow flicker considering typical sunshine hours would exceed 30 hours per year at only 5 receptors under the realistic-case scenario (realistic case scenario takes account of the sunshine hours recorded in Met Eireann data). The predicted maximum theoretical hours per day of shadow flicker exceeds 30 minutes at 82 receptors.

12.3 Mitigation Measures

Shadow flicker control modules, consisting of light sensors and specialised software, will be installed on the turbines to ensure that mitigation is implemented. The calculated shadow flicker periods can be input into the turbine control software and when the correct conditions are met (i.e. the light intensity is sufficient) during a potential period of shadow flicker, individual turbines will cease operation as required until the conditions for shadow flicker are no longer present. North Kildare Wind Farm Ltd. are willing to provide protection from shadow flicker by committing to shutting down turbines for all instances where shadow flicker effects may occur in practice at residential dwellings within 10 rotor diameters of the turbines, this procedure is defined as "zero shadow flicker" mitigation. The "zero shadow flicker" mitigation strategy will minimize any shadow flicker that could potentially occur at the residential dwellings, however, it should be noted that when the conditions for shut down due to shadow flicker are met, there will be a short period of time before complete shutdown occurs as the turbines gradually come to a stop. This will depend on the reaction time of the shadow flicker control modules and the particular turbine type, as well as a gradual reduction in rpm i.e., the blades will not come to a sudden stop.

12.4 Residual Impacts

The implementation of the proposed Shadow Flicker System will ensure that shadow flicker at all residential buildings will be as close to zero as is practicable, and therefore no residual impacts will occur.

13. TRAFFIC AND TRANSPORTATION

This chapter details the existing roads, traffic and transportation system in the vicinity of and leading to the Proposed Development during construction, operation and decommissioning. It examines the potential for impacts on the network due to haul routes and turbine delivery route.

With a development of this nature, the most significant traffic impacts will occur during the construction phase, which is anticipated to be of 18 months' duration. The development will be generally unmanned and remotely monitored during operation, with minimal traffic movements to and from the site chiefly for maintenance and environmental monitoring. The decommissioning phase will have a lesser impact than the construction phase.

The cumulative impact of the development with other committed and likely developments in the area was included in order to provide a robust assessment of the operation of the road network. The committed developments taken into account in the traffic analysis include developments which have not yet received planning permission and therefore this represents a conservative estimate of the network's performance.

The results of the analysis indicate that the local road network has an abundance of spare capacity to comfortably accommodate traffic associated with the Proposed Development.

13.1 Construction impacts

The potential impact of traffic generated by the Proposed Development on the local road network was assessed by comparing the performance of the network with projected future traffic volumes for two scenarios: with and without the construction of the Proposed Development. This was done by examining the effect of the additional construction traffic on the road links and junctions in the vicinity of the site during the construction year of 2026, for the morning and evening peak hours of 08.15-09.15 and 17.00-18.00 respectively.

Throughout the construction phase, traffic will be generated by the following activities:

- Heavy Goods Vehicles (HGVs) importing construction materials;
- HGVs exporting waste/spoil materials;
- HGVs delivering plant/cranes and fuel; and
- Workforce traffic.

The links and junctions continue to operate well within capacity with the addition of this traffic, and the impact of this element of the works was therefore considered minimal.

A suitable route for turbine component deliveries was selected, from the M4 via the R402 and onto local roads approaching the site as detailed in Chapter 13 and in the TDR report (Appendix 13.1, Volume 3). These will be carried out off-peak, likely at night, and in conjunction with An Garda Síochána. This will be carried out in such a manner as to minimise effects on operation of the road network, and as such this process will have a negligible and temporary impact.

Overall, the impact of the construction of the Proposed Development on the local road network and junctions was considered to be minimal. All junctions will continue to operate within capacity during the peak morning and peak evening periods.

13.2 Operation impacts

The Proposed Development will be unmanned once operational and will be remotely monitored. Traffic associated with the operational phase of the scheme will comprise personnel visiting the substation and individual turbines. It is anticipated that the traffic associated with this phase will be minimal. Visits for maintenance purposes will be intermittent and equate to a maximum of two vehicles a day when necessary, i.e. four vehicle trips.

13.3 Mitigation Measures

As part of the design process for the Proposed Development, various mitigation measures are included to minimise the impact of the development on the local road network. These include:

- Turbine delivery route selection process;
- Haul route selection process;
- Method of grid connection selection process;
- Single main site entrance, with access to secondary site entrance only to be right-in, left-out; and a turbine delivery entrance only to be utilised for the delivery of large turbine components and also only to be right-in, left-out;
- Banksmen to control construction phase traffic along the L50242 and coordinate delivery of turbine components via the entrance off the L5012;
- A range of construction mitigation measures including preparation of a Construction Environmental Management Plan, pre-condition surveys on roads, signage, public consultation and a safety assessment among others.

13.4 Residual Impacts

In summary, the proposed development is likely to incur a slight short term temporary negative impact on localised sections of the road network during construction and will have no permanent impacts on the road or transport network in the vicinity of the site.

14. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

Chapter 14 outlines the archaeological heritage, architectural heritage and cultural heritage issues in respect of the lands Proposed Development in north County Kildare. . Where potential likely and significant impacts are identified mitigation measures to remove, remedy or lesson the impacts are proposed.

The proposed development consists of 11 wind turbines, associated hardstanding areas, new access tracks, underground electrical and communications cabling, drainage works, temporary site compounds and the turbine delivery route. Six turbines are located in the northern forested portion of the site (T6 to T11) and five in the southern pasture fields (T1 to T5). It also includes a 110kV substation, a loop-in connection to existing overhead lines.

The assessment was informed by desk-based research using national and local heritage datasets, historic mapping, aerial photography, previous archaeological reports, and non-invasive field inspections. Consideration was given to all recorded and potential cultural heritage assets including UNESCO World Heritage Sites (and candidate sites), national monuments, recorded monuments (RMP), protected structures (RPS), the National Inventory of Architectural Heritage (NIAH), undesignated vernacular and industrial heritage, and intangible cultural heritage such as placenames and traditions.

Potential impacts on cultural heritage assets were assessed both within the proposed development footprint and in the surrounding landscape, including impacts on the setting of cultural heritage features. Photomontages were used to evaluate potential impacts on key sites.

14.1 Existing Environment

The site lies within the easternmost extent of the Bog of Allen, a lowland landscape historically used for industrial peat extraction. The bog environment has yielded a rich array of archaeological material, particularly preserved wooden trackways (toghers), platforms and structures dating from the prehistoric to the medieval period. These trackways, revealed through surveys and excavations, once connected dryland islands through the bog to ritual and settlement sites.

The surrounding historic landscape includes gravel ridges with early medieval ringforts and ecclesiastical sites, as well as post-medieval and industrial features. Historic cartographic analysis and topographical finds from the National Museum of Ireland further demonstrate the area's long and diverse cultural history.

14.2 Direct Impacts

There are no recorded national monuments or protected structures within the footprint of the proposed Drehid Wind Farm or the associated substation site. No direct physical impacts are predicted on designated archaeological or architectural heritage assets.

However, the proposed development is located in areas of archaeological potential, particularly in transitional zones between peatland and dryland areas. While no recorded features lie directly within the development footprint, there remains a potential for the uncovering of previously unrecorded subsurface archaeological features during groundworks.

Setting Effects on Heritage Assets

The assessment found that the proposed wind farm will result in visual effects on the setting of six cultural heritage assets during its operational lifetime. These effects range from not significant to slight in terms of impact significance and will be fully reversible upon decommissioning.

The most sensitive site assessed was the Carbury Hill Complex, including Newbury Hall, where minor visual changes are anticipated but will not alter key views or heritage relationships resulting in an impact slight significance. For two nearby recorded ringforts in Drehid and Mulgeeth, low-level setting impacts were identified due to turbine proximity, although the archaeological understanding and integrity of these sites will remain intact. The visual change in the setting of the sites for the duration of the wind farm is considered to result in a low impact on the significance of the recorded monuments with an overall effect of slight significance. Three further ringforts in Coolree were found to have negligible impacts.

14.3 Mitigation Measures

The following mitigation measures are proposed:

- All groundworks associated with turbine bases, access tracks, internal cabling, drainage, hardstanding areas and the substation will be subject to archaeological monitoring under licence from the National Monuments Service DHLGH.
- In the event that archaeological material is discovered during construction, works will cease in the affected area and the relevant statutory authorities will be notified immediately.
- Any required mitigation, such as preservation in situ or excavation, will be agreed with the National Monuments Service.
- A baseline condition survey will be carried out for Johnstown Bridge (RPS B04-25) along the turbine delivery route which will be monitored during construction phase.
- The construction team will be made aware of cultural heritage constraints to ensure that no accidental impacts occur.
- All works will be carried out in accordance with national heritage legislation and in consultation with the relevant authorities.

14.4 Conclusion

With the implementation of the recommended mitigation measures, the Drehid Wind Farm is not predicted to result in any significant adverse effects on known cultural heritage assets. Any residual impacts will be localised and primarily visual in nature, and the potential for unknown subsurface features will be managed through appropriate archaeological practices.

15. LANDSCAPE AND VISUAL

15.1 Introduction

The Landscape Chapter describes the landscape context of the proposed Drehid Wind Farm and assesses the likely landscape and visual effects of the proposed Drehid Wind Farm on the receiving environment.

Landscape Impact Assessment (LIA) relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. **Visual Impact Assessment (VIA)** relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. **Cumulative landscape and visual impact assessment** is concerned with additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

Study Area

The Wind Energy Development Guidelines published by the Department of the Environment, Heritage and Local Government (2006) specify different radii for examining the Zone of Theoretical Visibility of proposed wind farm projects (ZTV) based on turbine height. As the proposed turbines are greater than 100m tip height, the ZTV radius and therefore, study area radius is 20km from outermost turbines.

15.2 Methodology

This LVIA uses methodology as prescribed in the EPA, Landscape Institute and Scottish Natural Heritage guidance documents.

Production of this Landscape and Visual Impact Assessment involved baseline work in the form of desktop studies and fieldwork comprising professional evaluation by qualified and experienced Landscape Architects. The study areas was established, mapping produced which indicates area from which the development is potentially visible, selection of Viewshed Reference Points (VRPs) and subsequent assessment in terms of potential for landscape and visual impacts.

15.3 Receiving Environment

The landscape of the study area is predominantly flat to mildly undulating with occasional isolated hills and crests of low hills such as those in the southern extents of the study area, which include the Hill of Allen, Red Hill and Dunmurray Hill. A subtle elevated area also emerges in the north eastern quarter of the study area and continues towards the perimeter of the study area. The land cover of the central study area (<5km) is a combination of cutaway peatland, and associated marginal farmland, reverting scrubland and forestry around the peatland fringes. The peatland influence then gives way to more productive agricultural farmland, particularly to the north and west. The proposed Drehid Wind Farm site threads its way along peatland fringe farmland and forestry at the north-western edge of a substantial cutaway peatland area. The same land cover pattern of the central study area is repeated in the wider study area (>5km), but with the majority of peatland areas being in the south and west and a more consistent land cover of agricultural grassland with some cropping in the northern and eastern extents of the study area.

The western outskirts of Dublin city are located beyond the eastern periphery of the study area and its comprehensive urban land cover dissipates in a westerly direction (towards the study area) as a series of satellite commuter settlements, major transport routes and industrial/business parks interspersed with fragmented peri-urban farmland.

The closest settlements to the proposed wind farm include Longwood, which is just approximately 9km to the northwest.

Allenwood, Robertstown and Kilmeage are all located to the south-southeast of the site at respective distances of 7km, 10km and 11km away. Enfield is a sizeable settlement that is approximately 3km to the north of the site just beyond the smaller rural settlement of Johnstown Bridge (2km north). The small villages of Derrinturn and Carbury lie 3.5km and 4.5km to the southwest and west respectively with a network of local roads between them which are densely stocked with rural residential dwellings.

Emanating from the M50 orbital motorway around Dublin City are the M4 and M7 motorways, which travel in a, westerly and south-westerly direction respectively. The M4 motorway passes within 2.5km to the north of the site as it crosses the study area in and east – west direction, whilst the M7 remains beyond 18km from the nearest turbines. There are few national primary and secondary roads within the study area, but there is a web of regional roads. The nearest of these to the site is the R402, which runs in a northeast – southwest direction within 1km of the site at it nearest point. The R403 runs in a perpendicular direction from the R402 at Carbury and passes some 3km to the south east of the site at its nearest point.

The national rail network also diverges from Dublin and one of these branches follows the Royal Canal towards Mullingar before splitting northwest towards Sligo and westward towards Galway. This branch is at its nearest point to the site as it passes through Enfield (3km north).

The key public recreational facilities within the central study area are the network of canals and towpath walks. These historic transport routes also link many of the towns and villages within the study area. The Grand Canal travels west from Dublin and passes through Robertstown, Allenwood and Edenderry on its way to the River Shannon. Its associated walking path is known as the 'Grand Canal Way' and it runs approximately 6km to the southwest of the site at its closest point. The Royal Canal passes through the central study area on its slightly more northerly journey from Dublin through Dunboyne, Enfield and Mullingar. It is around 3km to the north as it passes through Enfield at its nearest point to the site.

15.4 Policy Environment

Department of Environment, Heritage and Local Government Wind Energy Development Guidelines (2006)

The Wind Energy Development Guidelines (2006) provide guidance on wind farm siting and design criteria for a number of different landscapes types. The site of the proposed development is considered to be located within a landscape that is generally consistent with the 'Flat Peatland' landscape type in terms of flatness and broad scale land use patterns, which consist of predominantly cutaway peatland and peatland fringe forestry in the central and south-central study area. However, there is also flat farmland and peatland fringe farmland in the north-central study area that shares some characteristics with the 'Hilly and Flat Farmland' landscape type from the Guidelines. In instances where two or more landscape types are potentially applicable, the Guidelines recommend consideration of the advice for each landscape type rather than just that, which is considered to be most applicable.

Kildare County Development Plan (2023-2029)

Within the County Kildare Landscape Character Assessment, the proposed Drehid Wind farm is shown to be wholly contained within the 'Western Boglands' LCA, albeit at the northern fringes of this LCA where it coincides with the 'North-Western Lowlands' LCA. Indeed, the proposed wind farm hugs the marginal peatland fringes between cutaway peatland (the defining feature of the Western Boglands LCA) and flat farmland (the defining feature of the North-Western Lowlands LCA). The 'Western Boglands' LCA is assigned a High sensitivity classification, whilst the 'North-Western Lowlands' LCA is assigned a Low sensitivity classification in the Kildare County Development Plan.

In terms of land use compatibility, Table 13.3 of the Kildare CDP indicates that Windfarms have 'Medium' compatibility (the median category) within the Western Boglands LCA and 'High' compatibility (the second highest category) within North-Western Lowlands LCA.

The Kildare County Development Plan contains a number of designated scenic views. These consist of scenic routes, hilltop views and canal views from canal bridges. There are no scenic designations within the immediate vicinity of the site, but several occur within 10km and relate to either canal views or slightly elevated views from local hills. Relevant designated views are included in the visual impact assessment.

15.5 Mitigation Measures

Given the nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site measures as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early stage site selection and design phases, which are integral to the proposed wind farm as assessed (embedded mitigation). In this instance the three main forms of landscape and visual mitigation employed are:

- The use of fewer taller turbines rather than a greater number of shorter turbines (height versus density relationship)
- Consolidation of the turbine layout
- The buffering of residential receptors

15.6 Landscape Impact Assessment

There will be physical impacts on the land cover of the site as a result of this development, but these will be relatively minor in the context of the already modified cutaway peatland, conifer plantations and pastoral farmland. Furthermore, a high proportion of the existing track network from these land uses will be utilised in the construction and operational phases of the development.

The principal landscape impact will be the change in character of the immediate area due to the introduction of large scale structures with moving components. These will be a prominent and defining landscape feature within the local landscape as would be the case for a commercial scale wind farm placed into almost any landscape context. Nonetheless, this is a broad landscape context of large cutaway bogs, conifer plantations and marginal peatland fringes where field sizes tend to be large. In this respect, the proposed wind farm will be well assimilated in terms of scale and function within the flat terrain and broad land cover patterns of the central study area. The proposed wind farm will be a new and defining feature of the landscape character in the central study area, but it is not considered to be an incongruous feature within this robust and productive landscape setting.

Overall, it is not considered that the proposed wind farm will give rise to significant landscape impacts. Instead, the significance of landscape impacts is considered to be Moderate-slight within the immediate context of the site (nearest 2-3km). Thereafter, significance will reduce to Slight and Imperceptible at increasing distances as the development becomes a progressively smaller component of the wider rural landscape fabric.

15.7 Visual Impact Assessment

Whilst local residents are acknowledged to be among the most susceptible viewer groups, this is balanced by the slightly lower value of the views that are afforded from within the lowland landscape of the central study area. These views tend to be limited in extent and are of a typical rural nature, which is reinforced by the fact that there are no scenic designations within the central study area aside from unaffected canal bridge views around Enfield. The 'Medium-low' sensitivity that has been commonly attributed to the 'local community' viewpoints, reflects that the visual setting of the central study area can accommodate some degree of visual change without critically affecting the qualities / values associated with these views. The value of designated scenic views within the study area tends to relate more to the extent of the view on offer rather than remote or naturalistic character. In this instance, the landscape in view is generally a productive rural one, within which, the view of new development will not necessarily conflict with scenic values.

The nature of visibility within the study area has been analysed using a sequential combination of tools that began with computer generated Zone of theoretical Visibility (ZTV). This was followed by Route Screening Analysis (RSA) from the local road and canal network, then finally the assessment of photomontages generated from an extensive range of representative visual receptor locations and associated contextual views.

Of particular note is the results of the Route Screening Analysis, which showed a substantially lower degree of actual visibility occurs in the central study area than is implied by the ZTV maps. Even where visibility does occur, a significant proportion of this is classified as 'partial visibility' of less than one full blade set.

The photomontage set illustrates that there are two distinct ways in which the proposed wind farm tends to be viewed from within the study area. Either, the turbines are fully visible in a clear and cohesive manner from a very limited number of elevated vantage points or, it is partially visible with only the nearest of the proposed turbines rising above and between sections of foreground vegetation in a more ambiguous manner. The first scenario is typically from designated scenic view, which all occur beyond the central study area (5km) in this instance, whilst the second scenario is more typical of the other receptor types contained within the lowland setting of the central study area. On balance of the inverse nature of the 'screening' versus 'legibility' relationship, it is not considered that the proposed Drehid Wind Farm will give rise to any significant visual impacts. The highest significance of visual impact attributed in this instance is 'Moderate' and this level of effect is very localised, being within 1.5km of the nearest turbines in all instances – a peatland fringe farmland zone, within which, the local population is sparse.

15.8 Cumulative Impacts

In a cumulative sense, it is considered that the proposed wind farm represents a discretely located addition to the wind energy development that is gradually becoming a more characteristic landscape feature throughout the lowland, midlands landscape, particularly within marginal peatland areas. There are few opportunities for intervisibility of the proposed wind farm in-combination with other wind energy developments from within the lowland plains fabric of the Kildare, Meath and Offaly. Where occasional elevated vantage points allow intervisibility such as with the Northern Hills LCA, the proposed development is either contained at a disparate viewing angle or one of the developments is a distant background feature in the view of the other.

In respect of cumulative impacts with other forms of development, it is considered that only substantial scale developments within the central study area (c.5km radius) have any potential to generate significant cumulative effects in combination with the proposed wind farm. Several proposed and permitted solar farms as well as a landfill extension development were identified within this zone. However, the nature of visibility of these ground hugging and substantially enclosed forms of development restrict the potential for intervisibility with the proposed wind farm. Although the in-combination effect on the landscape fabric of the area is an increased intensity of built development, this is in the form of alternative rural land uses rather than urbanisation. Consequently, it is considered that the significance of cumulative effects is only 'Slight'.

16. TELECOMMUNICATIONS AND AVIATION

16.1 Telecommunications

The rotating blades of a wind turbine can occasionally cause interference to electro-magnetically-propagated signals. Such interference could, in theory, affect all forms of electromagnetic communications including:

- Satellite communications
- RADAR
- Cellular radio communications
- Aircraft instrument landing systems
- Air traffic control
- Terrestrial microwave links
- Television broadcasts

The objective of this assessment is to identify turbines in close proximity to existing masts, telecommunication links and assess the potential impact on local telecommunication operations and television reception.

Existing environment

Baseline studies were carried out to establish the location of existing telecommunications links and masts relative to the proposed turbine locations, to assess the potential for interference.

FT also undertook a specific telecoms consultation with the various Telecommunication Operators (TOs) to establish whether any telecommunication links or services in the vicinity of the proposed turbines can be affected by it. Following this consultation, it was established that there are five service providers that have telecommunication links in proximity to the turbines of the Proposed Wind Farm.

Operation impacts

Consultation with potentially affected TOs confirmed that a number of turbines could potentially impact the services of three TOs.

Mitigation Measures

Mitigation options may be different for each service affected, depending on the type of service and the level of any interference expected. Some measures include diverting telecommunications links, fiber-optic communications systems or technology upgrade. One of the consulted providers required assurances such as accurate coordinates, threshold distance for micro-siting or avoid interfering with telecommunication links while working on the construction of the development. For one of the potentially affected telecom providers, a detailed analysis is being carried out to determine a more precise clearance zone. When this analysis is carried out these mitigation measures will be implemented. A meeting with the potentially affected telecom providers will be arranged to discuss detailed design mitigation measures if required at the time of construction.

A 2rn Protocol Agreement has been signed by North Kildare Wind Farm Ltd and 2rn in relation to interference on viewers television sets and broadcast radio receivers.

Residual Impacts

The implementation of a suitable mitigation strategy will ensure that local telecommunications or television are not adversely affected by the development of the Proposed Wind Farm.

16.2 Aviation

The potential for the development to have an effect on aviation interests has been considered.

Existing environment

The Proposed Development site is located approximately 40km from Dublin Airport, approximately 27km from Baldonnel/Casement Aerodrome and Clonbulloge is located at approx. 19km. Clonbulloge is currently owned by the Irish Parachute Club which is based at the airfield, flying restrictions are enforced around this area, and parachuting activities are particularly popular at the weekends and public holidays. A number of unlicensed airfields are located within 10km which include Allenwood Airstrip, Milicent Airfield, Moyglare Airfield and Taggarts Airstrip.

The recommended consultation zone within the vicinity of an aerodrome varies according to the type of service available and associated airspace procedures. The guidance recommends the following distances:

- Obstacle Limitation Surfaces: Up to 15km from a licensed aerodrome's reference point (ARP). Unlicensed aerodromes have no defined criteria but a 5km radius from the airfield is considered an acceptable area to consider.
- Published Instrument Flight procedures: Radius of 56km from an airport.
- Surveillance: There are two types of Radar, Primary Surveillance Radar (PSR and Secondary Surveillance Radar (SSR).
    - PSR requires assessment within line of sight;
    - SSR requires assessment within 16km
    - Navigational Aids: Within 10km of the facility;
- VHF Communications: Within 10km of the facility.

The Proposed Development falls within a classification of airspace known as Class G. Class G airspace is known as 'Uncontrolled Airspace' meaning aircraft are not subject to air traffic control by any authority, military or civilian. Pilots operating under Visual Flight Rules (VFR) in Class G airspace are ultimately responsible for seeing and avoiding other aircraft and obstacles as contained within SERA.5005, Visual Flight Rules.

The site of the Proposed Development is situated within the Irish Air Corps Restricted Area EI-R16. As such, the Department of Defence (DoD) were consulted in 2018, and again in 2024.

In 2018, the DoD responded to our scoping letter, attaching their Air Corp Draft Document called 'Air Corp Wind Farm/Tall Structures Position Paper' (dated August 2014). This draft position paper requests that 'applications or proposals for structures in these areas of a height greater than 45m above ground level at the site of the object must be referred to Irish Air Corps for assessment of potential impact on flight operations.

In 2024, the DoD requested that all turbines are illuminated by Type C, Medium intensity, Fixed Red obstacle lighting, visible to Night Vision equipment. This lighting requirement is in line with a similar request from IAA in 2018. They also advised that the site is located within proximity to Irish Air Corps Restricted Area EI-R16 and the area contained within MOA3, MOA4 and within 20 NM of Baldonnel.

In terms of the observations raised by the DoD, the issues can be summarised as follows;

First Observation:

1. Obstacles above 45m need to be published and obstacles 150m and above require aviation lighting. The DOD have submitted an additional requirement for Infra-Red lighting to accommodate night vision equipment. This is understood and accepted as a requirement.

Second Observation:

1. The proposed development falls within the lateral boundary for MOA4. As demonstrated within this report, there is unlikely to be an impact to operations as a result of the proposed development.
2. MOA3 is approximately 30km to the northwest of the proposed development, i.e., the proposed development is well clear of the lateral limits of MOA3 and therefore will not impact operations within that designated area.
3. In terms of proximity to EI-R16, the airspace designation commences at an altitude above the proposed development and therefore vertically clear of the designated area.
4. In summary, the proposed development should not be a concern to the DOD on the basis that it:
    a) Falls within the lateral limits of MOA4, with penetration up to 4500ft at own discretion, i.e., no restrictions;
    b) Does not fall within the lateral limits of MOA3 therefore no impact; and
    c) Is vertically clear of EI-R16.

Construction Impacts

During the construction phase, the equipment required in the construction process of the development may present a physical obstruction and affect the operations of Visual Flight Rules (VFR)[1] aircraft.

Operation impacts

As the Proposed Development falls within Class G, clear of EIR16(B), it will not impact Air Corps operations. However, the Proposed Development does fall within a larger area for Air Corps operations published as Military Operating Area 4 (MOA4). MOA4 has a published vertical limit from surface (ground level) to FL450 (circa. 45000ft). The publicly available information for the airspace permits penetration of other flights up to 4500ft without permission required. Therefore, airspace users have relative freedom of airspace access of up to 4500ft meaning the Proposed Development should not impact safe operations in this airspace on the basis the obstacle environment will be published and lit according to aviation requirements. A known obstacle environment cannot be deemed more unsafe than other aircraft entering the same volume airspace without permission.

1 "VFR" means the symbol used to designate the Visual Flight Rules;
"VFR flight" means a flight conducted in accordance with the Visual Flight Rules.

The initial review identified that nearby aerodromes with licensed aerodromes, Dublin, Baldonnel/Casement, Weston and Clonbulloge are all beyond the 15km consideration to the Obstacle Limitation Surfaces (OLS). Although some unlicensed airfields are approximately within 10km of the Proposed Development, the review identified none within 5km. Therefore, the proposed development will not impact the OLS of any nearby aerodromes.

In terms of Instrument Flight Procedures (IFPs), only Dublin, Weston and Baldonnel/Casement aerodromes have published IFPs, these all fall within the 56km of the Proposed Development.

Class G airspace is known as 'Uncontrolled Airspace' meaning aircraft are not subject to air traffic control by any authority, military or civilian. IFP design requires that the procedures be contained within Controlled Airspace, therefore there is unlikely to be an impact to the IFPs serving Baldonnel/Casement, Weston and Dublin Airports.

Dublin Airport has a published ATC Surveillance Minimum Altitude Chart that supports 'vectoring3' of aircraft. The minimum altitude available for vectoring, in the area of the proposed development, is 4000ft Above Mean Sea Level (AMSL), Figure 2 indicates the location of the proposed development. The Minimum Obstacle Clearance Altitude (MOCA) required between the lowest altitude and the highest obstacle is 1000ft. The highest terrain in the area of the proposed development is not above 300ft AMSL, using this as a worst-case elevation with the addition of the wind turbine maximum tip height of 169m (converted is 555ft) results in the obstacle being 855ft AMSL. Therefore, there is sufficient buffer between the lowest available altitude and the created obstacle environment.

With regard to Surveillance Radar, there are two types, namely: Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR).

PSR is a non-cooperative system that detects any moving target which is then processed to the Air Traffic Control (ATC) display screen. A wind turbine can, in some cases, cause the PSR to detect the moving blades of a windfarm. There are three PSR systems in Ireland located at Dublin, Shannon and Cork airports.

It is evident from the publicly available information that the proposed development falls within the Dublin coverage at 169m and as a result there may be an impact. Whilst the entire development site is within PSR coverage, it is highly unlikely that this will cause an impact to ATC operations at Dublin Airport. This is based on the type of operations and use of radar processing, coupled with the use of SSR that will result in an unlikely impact.

SSR is a cooperative system that interacts with aircraft-based systems known as transponders. Eurocontrol guidance5, adopted by the European Aviation Safety Agency (EASA), states that obstacles beyond 16km from an SSR site will not impact the system and that no assessment is required. Since all SSR radar sites are beyond 16km from the Proposed Development there is no impact to these systems.

The navigational aid and communication infrastructure supporting the ATC and aviation environment is located within the relevant airport boundaries. The criteria to determine whether these infrastructure systems will be impacted is for them to be located within 10km of the proposed development. Local unlicensed airfields do not have any supporting infrastructure and therefore not impacted.

Decommissioning Impacts

During the decommissioning phase, the turbines will be dismantled and removed from the site, thereby removing all potential obstacles to future aviation interests. Thus, there will be no likely effects on aviation during the decommissioning phase.

Furthermore, the Proposed Substation will be left in situ. As the Proposed Substation does not comprise any components exceeding 45 m height there are no operational or left in situ related impacts on aviation interests as a result of the operation of the Proposed Substation

Mitigation Measures

Following consultation with the IAA in 2018 and further consultation with the DoD in 2024 lighting requirements for turbines should be conditioned as follows:

1. Single turbines or turbines delineating corners of a wind farm should be illuminated by high intensity obstacle strobe lights.
2. Obstruction lighting elsewhere in a wind farm will be of a pattern that will allow the hazard to be identified and avoided by aircraft in flight.
3. Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum specifically at or near 850 nanometres (NM) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light. Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment.
4. Provide as-constructed co-ordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.
5. Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection.

As with any tall structure development, the potential impact to aviation is that of an obstacle. Aviation 'Rules of the Air' provide guidance to pilots on how to remain clear of obstacles and the distances required to remain clear.

The proposed development, whilst present within MOA4, does not present as an impact to Air Corps operations given the freedom of aircraft to access the airspace below 4500ft without permission. Access without notification presents a higher degree of risk to Air Corps operations than that of the proposed development, which is a fixed location which is notified (formally published) and lit.

The mitigation is addressed through promulgation of the obstacle environment through the Irish Integrated Aeronautical Information Publication. In addition, the obstacles will be lit to conform to aviation standards and the additional night vision requirement from the DOD. It must be noted that night vision requirements are a common requirement and therefore the solution is readily available.

Residual Impacts

A professional aviation consultant has undertaken an aviation assessment and determined that there will be no significant impact from the proposed turbines on air traffic in the vicinity of the site given the relevant small-scale nature of the project in the context of the overall available airspace and with the implementation of mitigation measures. Therefore no residual impacts are likely to occur.

17. INTERACTIONS OF THE FOREGOINGS

This Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying levels of significance.

Direct, indirect, cumulative and interactive impacts were considered during the siting of turbines to minimise impacts on landscape and visual, population and human health, geology and slope stability, biodiversity, hydrology, water quality, material assets, shadow flicker and archaeology, architecture and cultural heritage.

Interactions and inter-relationships after the optimisation of the layout design with respect to the various aspects of the environment are identified. Table 17.1 below provides a matrix showing the key interactions and inter-relationships between key environmental aspects of the proposed development that were considered in the EIAR.

Table 17-1: Summary of Interactions Between Key Environmental Aspects

	Air Quality & Climate	Noise & Vibration	Biodiversity	Land, Soils & Geology	Hydrology & Water Quality	Population, Human Health & Material Assets	Shadow Flicker	Traffic & Transport	Archaeological, Architectural & Cultural Heritage	Landscape & Visual	Telecommunications & Aviation
Air Quality & Climate			■	■		■		■			
Noise & Vibration			■			■		■			
Biodiversity	■	■		■	■	■		■			
Land, Soils & Geology	■		■		■	■		■			
Hydrology & Water Quality			■	■		■		■			
Population, Human Health & Material Assets	■	■	■	■	■		■	■	■	■	■
Shadow Flicker						■					
Traffic & Transport	■	■	■	■	■	■			■		
Archaeological, Architectural & Cultural Heritage						■		■			
Landscape & Visual						■					
Telecommunications & Aviation						■					

■ Interaction or inter-relationship □ No Interaction or inter-relationship

18. REFERENCES

[1] http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1633,en.pdf

[i] http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1633,en.pdf

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