Repowering Ireland

How we stay global leaders in onshore wind energy

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Table of Contents

FOREWORD

Between now and the end of 2030 Ireland may lose around a fifth of our total installed onshore wind energy capacity.

This is because, as this new report from one of Ireland's leading planning and environmental consultancies MKO shows, more than 850 MW of Irish wind farms will reach the end of their planning permissions or will have to be decommissioned between now and the end of the decade.

This means more carbon emissions, higher electricity prices and even greater dependence on imported fossil fuels. At a time when we should be accelerating towards our Climate Action Plan targets we face the real possibility of effectively stalling and even going backwards.

The team at MKO has identified two key solutions.

Simply because a wind farm's planning permission has come to an end does not mean it cannot continue producing power. Ireland's oldest wind farm is 32 years old this year and still producing power.

We need to make it easier for wind farm owners to extend the duration of their planning permissions and, in the new Wind Energy Guidelines to be published before the end of the year, ensure the same problem does not arise in future.

There is simply no reason, in the middle of twin climate and energy crises, to decommission operational wind farms because of planning restrictions, unsupported by evidence, imposed decades ago.

But every wind farm will eventually reach a point where it needs to be decommissioned and this is where the second solution comes in.

Repowering means that, when the original turbines are taken down to be recycled, new, modern, turbines are installed in their place. This means all of the existing grid infrastructure can be reused at a location where the local community is already familiar with the technology.

In Barnesmore, Co Donegal, for example there is a project with planning permission to repower an existing 15 MW wind farm with 25 turbines and replace it with 13 turbines capable of generating 60-70 MW. Fewer turbines, more power.

But repowering projects is not simple. Many of these existing wind farms are in locations that, since they were built, have been rezoned as unsuitable for wind energy by local County Councils.

Others are in, or close to, areas that are now designated as Special Protected Areas.

This report from MKO sets out a series of policy recommendations for Government which would help to address these challenges and to more easily facilitate the repowering of existing wind farms.

We strongly recommend that the Government – and particularly the departments of Housing, Local Government and Heritage, and Environment, Climate and Communications– play close attention to what is set out here.

The Irish planning process continues to be the greatest barrier to the decarbonisation of our electricity system and to our country's energy independence.

The slow rate of approvals for new projects means that, unless the proposals from MKO are given the seriousness and the priority they deserve, we face the very real likelihood that by the late 2020s we will be connecting fewer wind farms than we will be shutting down.

This report makes clear, if that scenario arises, it will not be by accident. It will be because of a conscious failure to take heed of the warnings set out in this report and to respond with the urgency required.

We cannot afford to stall. We cannot go backwards. Together, Government and industry, must work to find solutions, to change policy and to rapidly roll-out the renewable energy needed to provide the Irish people with the clean, affordable, secure energy they need.

Noel Cunniffe
CEO
Wind Energy Ireland

EXECUTIVE SUMMARY

This Repowering Ireland report presents research on the planning considerations of repowering Ireland's operational wind farms. The research was commissioned by Wind Energy Ireland and prepared by MKO.

Despite the emphasis on developing new wind farms to meet the binding renewable energy and climate action targets for 2030 and beyond to 2050, there has been no comprehensive industry-wide analysis assessing the potential loss of currently installed wind energy generating capacity from the Irish electricity system.

The research had five main tasks:

1. ***Determining*** *the lifespan of planning permissions for operational wind farms to estimate the number of Megawatts (MW) that will be decommissioned in the coming years, in the absence of repowering.*
2. ***Analysing*** *spatial policies and planning obstacles for repowering existing wind farms based on local authorities' wind energy strategies.*
3. ***Assessing*** *the repowering potential of five reference wind farm projects to compare with current installed capacities.*
4. ***Reviewing*** *the draft wind energy planning guidelines (WEGs) to identify issues and opportunities relating to the repowering of existing wind farms.*
5. ***Identifying*** *challenges associated with repowering wind farms located within or adjacent to Special Protection Areas designated under the EU Birds Directive, and proposing a strategy aligned with EU directives and policies on the conservation and restoration of protected species, and the continued expansion of renewable energy.*

Overall, this research provides valuable insights into the planning considerations, challenges, and potential strategies for repowering Ireland's operational wind farms. The research found that of the 4,347 MW of wind farms connected by Q3 2023, 854 MW will have to be decommissioned by 2030 and 2,488 MW by 2040, unless they are repowered or extended.

The analysis of spatial planning policy across the local authority areas identifies the locations of existing operational wind farms and their underlying planning policy for wind energy development. The analysis shows that of the 4,347MW of operational wind farms, 26% (1,123MW) are located in areas in which wind energy developments are not favoured, 10% (446MW) are located in areas currently without any policy classification, which poses a challenge for their repowering potential. Only 65% are located in favoured areas, despite the fact that all existing wind farm locations previously being deemed appropriate for wind energy development when planning permission was first granted in previous decades.

A repowering capacity analysis of five sample wind farms showed that applying present-day design, planning and environmental constraints would result in a reduction of 35% in the installed capacity of the repowered projects, compared to the existing capacity.

The research also reviews the current draft wind energy planning guidelines (WEGs) and highlights particular challenges associated with repowering existing projects where the current draft WEGs do not differentiate in any way between the design requirements for existing projects requiring life extension or repowering, and new greenfield projects. The research proposed some recommendations for the draft wind energy guidelines to better facilitate the repowering of existing wind farms, such as allowing for flexible noise and shadow flicker requirements, removing the x4 tip-height setback for extension of life projects, and adopting a presumption in favour of repowering projects in the permit-granting procedure.

The research also highlights the particular challenges associated with the repowering of operational wind farm projects in Special Protection Areas (SPAs) designated for the protection of hen harrier under the EU Birds Directive. This is particularly relevant given the research established that there is 732MW of wind energy generating capacity currently installed within the hen harrier SPAs, and a further 347MW installed within five kilometres of these same SPAs. The research also suggested a strategy for repowering wind farms in SPAs for hen harrier, which involves assessing the impacts on the conservation objectives of the SPAs, and exploring the possibility of proceeding through the Imperative Reasons of Overriding Public Interest (IROPI) route, drawing on the recent EU policies that classify renewable energy projects as being in the overriding public interest.

This research establishes that there is a combined and cumulative threat that could result in the potential loss of the currently installed the Irish wind energy generating capacity. The research established that 854MW will reach the end of their permitted lifespans or anticipated operating lives by 2030, 1,569MW does not currently have favourable planning policy support, existing projects could lost up to 35% of their current installed capacity when present-day planning, environmental and design constraints are applied, and 1,080MW is located in or within five kilometres of a Special Protection Area.

1. INTRODUCTION

The pressing need to decarbonise the Irish economy and reduce emissions has come more sharply into focus with each passing year as the worsening effects of climate change have become evident and we quickly approach a point of climate breakdown. In recent years, the urgency has been highlighted all stakeholders through the Government's Climate Action Plans (CAP), the most recent of which Climate Action Plan 2024 was published in December 2023.

The most recent and previous CAPs, sets out a roadmap to the delivery on Ireland's climate ambition. It aligns with the legally binding economy-wide carbon budgets and sectoral ceilings that were agreed by Government in July 2022 following the Climate Action and Low Carbon Development (Amendment) Act 2021. The Act commits Ireland to a legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030.

Despite the focus on developing new wind farms to meet binding targets for 2030 and beyond to 2050, the potential loss of installed wind energy generating capacity from the Irish electricity system has not yet been assessed in any industry-wide analysis. Wind energy generating capacity may be lost from the electricity system when existing wind farm reach the end of their permitted or operational lifespan, if it were not possible to repower or replace the existing turbines. To date, it had not been possible to know what wind energy generating capacity might be lost from the electricity system, when, and how it might be possible to substitute the existing capacity with new replacement capacity.

MKO has been commissioned by Wind Energy Ireland to undertake research on the planning considerations of the repowering of the existing, operational wind energy developments currently connected to the electricity network in Ireland. The research had five distinct research tasks, as outlined below.

1. ***Planning permission durations*** *– Establish the duration of the lifetime of planning permissions on all existing operational Irish wind farms in order to quantify the number of megawatts (MW) that will have to be decommissioned, and the year of decommissioning, in the absence of repowering.*

2. ***Spatial policy analysis*** *– Identify existing operational wind farms and the underlying planning policy for wind energy development as derived from the local authorities' wind energy or renewable energy strategies. Analyse how many of the existing operational wind farms benefit from favourable policy support for wind energy development which would facilitate the repowering of the projects, and how many have a planning policy obstacle to navigate as part of their effort to repower. The analysis will identify the number of individual wind farm projects and the number of megawatts in the various policy classification categories, e.g. Acceptable In Principle, Open To Consideration, Not Normally Permissible, etc.*

3. ***Sample repowering capacity analysis*** *- Taking five existing operational wind farm projects as reference sites, and applying present-day site design, planning and environmental constraints, quantify the likely repowering megawatt potential on each site, to allow comparison with existing installed capacities and maximum export capacities (MEC). The analysis will allow an estimation to be made across the sample projects and extrapolated across the entire operational installed wind turbine fleet, on whether repowering will result in an increase, reduction, or retention of the current MEC.*

4. ***WEGs review and recommendations*** *– Review of current draft wind energy planning guidelines (WEGs) to highlight particular challenges associated with re-powering existing projects where current draft WEGs do not differentiate in any way between the design requirements for existing projects with powering our new greenfield projects.*

Having highlighted the issues with the current draft WEGs with regards to repowering, propose suggested amendments to better provide for the repowering of projects in the WEGs.

5. ***Repowering in SPAs*** *– Highlight the particular challenges associated with the repowering of the operational wind farm projects in the Special Protection Areas (SPAs) designated for the protection of hen harrier under the EU Birds Directive. Suggest a strategy to guide the repowering of the wind farm projects located within or adjacent to SPAs, taking account of the requirements under the EU Habitats and Birds directives that such projects demonstrate they are required for Imperative Reasons of Overriding Public Interest (IROPI). The suggested strategy would draw on the recent European Commission RePowerEU policy and updated Renewable Energy Directive (RED III), which classifies projects as being in the overriding public interest.*

This research provides a detailed analysis of the data collection processes for each item, as appropriate. It highlights the potential limitations and identifies the key findings and/or recommendations for each section. In order to effectively communicate data, various tables and graphs have been created as visual aids.

Definitions

This research report primarily relates to the repowering of wind farms, but also refers to the extension of life. For the purpose of this research, both are defined as follows:

Repowering: *The renewing of existing operational wind farms through the full or partial replacement of wind turbines and associated equipment for the purposes of replacing capacity or increasing the efficiency or capacity of the wind farm.*

Extension of Life: *Extending the permitted lifespan of an existing operational wind farm beyond the period originally granted planning permission, without any changes to the installed wind turbines and while keeping the external layout of the wind farm unchanged.*

Either the repowering of, or the extension of life of an existing operational wind farm would constitute development, requiring planning permission under the Planning and Development Act, 2000 (as amended).

2. PLANNING PERMISSION DURATIONS

Research Task: ***Establish the duration of the lifetime of planning permissions on all existing operational Irish wind farms in order to quantify the number of megawatts (MW) that will have to be decommissioned, and the year of decommissioning, in the absence of repowering.***

2.1 Introduction

The Government target to have 9GW of onshore wind energy installed by 2030 as provided for in the Climate Action Plan 2023, and being carbon neutral by 2050, assumes an ever-upward trajectory for the amount of wind energy connected to the Irish grid. In reality, over the time horizon to 2030, 2040 and beyond, existing wind farms will reach the end of their permitted or operating lifespans. This will require even more new wind farms to be built, or the existing fleet of operational wind farm projects to be repowered over the coming years and decades, over and above what might already have been considered as being required to meet the 2030 and 2040 targets.

In this research task, the lifespan of all of Ireland's operational wind farms has been established to allow for an estimation of the total megawatts of generating capacity that will have to be decommissioned each year up to 2030, and over the coming decades. This analysis provides a forecasted year of decommissioning for each wind farm, based on planning permission expiry dates or likely project operational lifespans. The section below sets out the methodology for data collection and the key findings of this process.

2.2 Methodology

An extensive data collection exercise was undertaken to create a single list of operational wind farm projects with associated planning permission information, including planning permission durations.

An initial list of 318 "projects" was compiled from the following two lists of connected wind farm grid connections, compiled by the Transmission System Operator (TSO) Eirgrid, and the Distribution System Operator (DSO) ESB Networks.

1. *TSO Connected Renewable Generation lists (correct as of 01/10/2022), as compiled by Eirgrid*[1]
2. *DSO Connected-Energised Wind Generators lists, up to 11th October 2023, as published by ESB Networks*[2]

The initial 318 projects were then reduced to 279, with the omission of the following wind farm grid connections which were not carried forward for further analysis:

- 1 offshore wind farm project;
- 28 projects less than 1MW in Maximum Export Capacity (MEC), not part of a larger wind farm;
- 10 projects consisting of single wind turbines, not part of a larger wind farm.

The remaining 279 projects were in fact, 279 individual grid connections. In the majority of cases, an individual grid connection has been used to connect a wind farm to the electricity grid. In other cases, multiple grid connections have been used to connect wind farms, either in single-phase or multi-phase wind farm developments. In single-phase developments, multiple grid connections were often combined to facilitate the connection of a single wind farm project to the distribution or transmission

[1] *https://www.eirgridgroup.com/customer-and-industry/general-customer-information/connected-and-contracted-generators/*
[2] *https://www.esbnetworks.ie/new-connections/generator-connections-group/generator-statistics*

networks. In multi-phase developments, multiple grid connections were often used at different times to connect different phases of projects, often with many years between the different grid connections being used to connect different phases of projects.

The 279 grid connections can be subdivided into a number of categories, as follows:

- **Category 1** - 168 grid connections utilised in individual wind farm projects, with each wind farm having an associated and individual planning permission, totalling 3,109.072MW.
- **Category 2** - 20 grid connections used in 9 single-phase wind farm projects, with each wind farm utilising multiple grid connections with the same grid connection date, and relying on a single wind farm planning permission, totalling 245.23MW.
- **Category 3** – 19 grid connections used in 9 single-phase wind farm projects, with each wind farm utilising multiple grid connections with the same grid connection date, but relying on more than one wind farm planning permission, totalling 212.757MW.
- **Category 4** – 8 grid connections used in 4 multi-phase wind farm projects, with each wind farm utilising multiple grid connections with different grid connection dates, and relying on a single wind farm planning permission, totalling 136.4MW
- **Category 5** – 64 grid connections used in 28 multi-phase wind farm projects, with each wind farm utilising multiple grid connections with different connection dates, and each grid connection relies on an independent planning permission, totalling 643.68MW. Although these 28 multi-phase wind farms utilise 64 grid connections, they are 64 individual wind farms, each with an standalone grid connection and planning permission.

The initial 318 grid connections from the TSO/DSO lists, having initially been reduced to the 279 grid connections that are analysed in this research, are utilised across 254 operational wind farm projects, as illustrated in the below Figure 2.1 graphic.

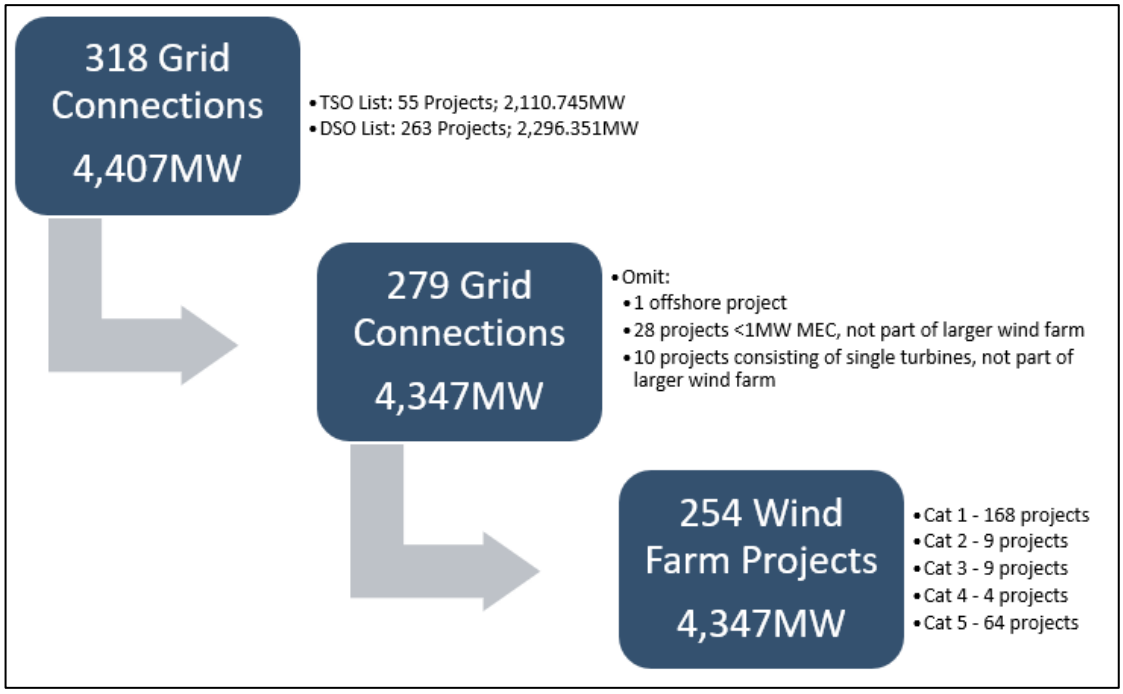


Figure 2.1. Scope of research

A comprehensive desktop search was conducted using planning permission databases of local authorities and An Bord Pleanála to determine the permitted periods for the operational wind farms.

It was not possible to establish planning permission information for seven of the 279 grid connections used across 254 wind farm projects, due to planning files being unavailable or inaccessible on the online planning portals. Information requests were made to the various local authorities to request the historical planning files of individual projects that were not unavailable following the desktop search. The seven wind farm projects whose permitted lifespan could not be determined due to missing planning files are older wind farms dating back to the 1990's.

The five categories of wind farm projects, derived from the TSO and DSO lists of 279 connected generators are utilised across 254 wind farm projects. The 279 grid connections used across the 254 wind farms had total a maximum export capacity (MEC) of 4,347.303 megawatts (MW) that were operational and connected to the transmission or distribution systems up to Q3 2023. For the purposes of this research, the 279 grid connections are considered as individual projects, and have been taken forward for further analysis given that each one has a unique ID as its grid connection reference number with a specific MEC. The grid connection rather than the project planning permission was chosen for further analysis because an MEC or generating capacity for each grid connection is provided on the TSO and DSO lists, whereas an MEC or installed capacity is not easily determined from the planning records available.

The above-detailed efforts resulted in a detailed dataset being created containing information on over 97% of the operational wind farm projects included in this research. This includes essential data to determine the operational period of each wind farm including the following:

- The date on which a final grant of planning permission was issued.
- The date of connection to the electricity grid.
- The permitted operational lifespan of the wind farm, as per its planning permission, if applicable. In many cases, operational lifespans are not specificied in the planning permissions granted.
- The anticipated date of decommissioning, based on the permitted operational lifespan.
- The Maximum Export Capacity (MEC) in MW.

Figure 2.2 shows the locations of the wind farms included in this research analysis

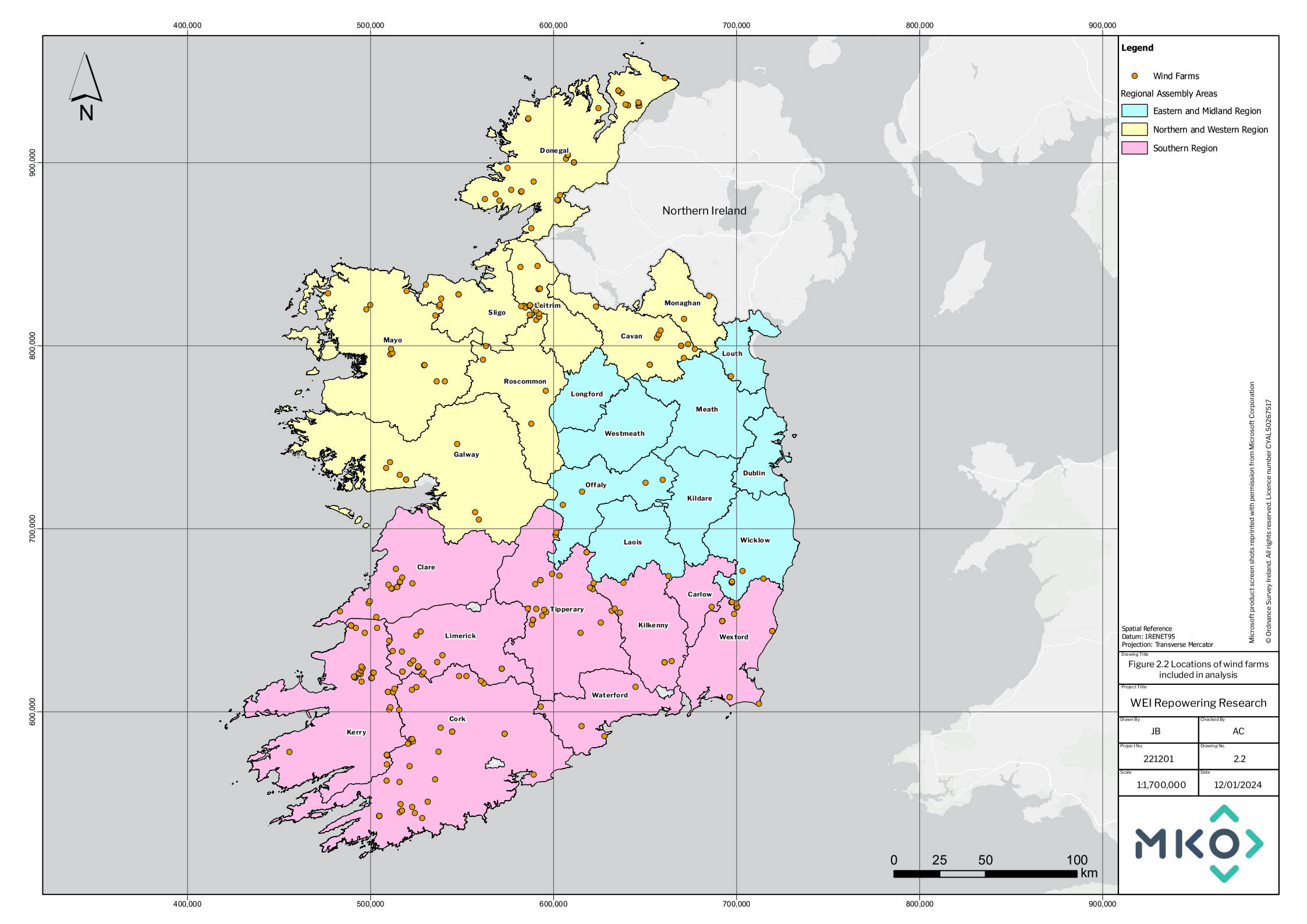
2.3 Results

2.3.1.1 Planning Permissions By Decade

Of wind farm projects operational and connected to the transmission or distribution systems up to Q3 2023 via the 279 grid connections analysed in this research:

- 23, accounting for 185.72MW or 4.3% of the Q3 2023 total, were granted planning permission between up to and including 1999.
- 156, accounting for 2,082.874MW or 47.9% of the Q3 2023 total, were granted planning permission between 2000 and 2009 inclusive.
- 98, accounting for 1,936.659MW or 44.5% of the Q3 2023 total, were granted planning permission between 2010 and 2019 inclusive.
- 2, accounting for 142.05MW or 3.3% of the Q3 2023 total, were granted planning permission from 2020 onwards.

The number of projects granted planning permission in each decade and related MW (MEC) capacity represented graphically in Figure 2.3 below.



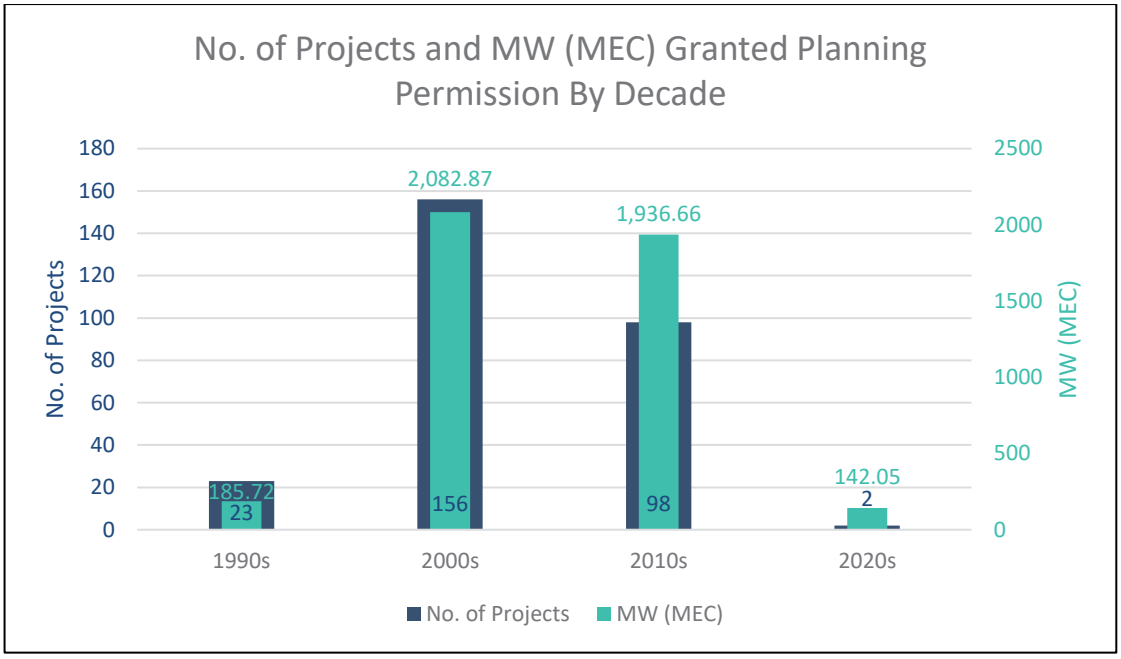


Figure 2.3. Number of projects and MW (MEC) granted planning permission by decade

The date of a grant of planning permission does not necessarily correlate with the date a wind farm projects was constructed and began to export electricity. It can often take many years from when the wind farm was granted planning permission, to when the project commences construction and is later energised and enters commercial operations by exporting electricity. The delays can arise for many reasons, such as legal challenges to the planning permission, the need to permit and build the required grid connection infrastructure, the need to find a route to market for the electricity that will be generated, as well as the financial, legal and technical due diligence, and many other reasons.

2.3.1.1 Duration of Planning Permissions

Unlike the vast majority of other developments for which planning permission is required, most wind farm projects are only granted planning permission for a limited duration. When planning permission is sought for a house, a school, a hospital or the vast majority of other types of developments, the planning permission is granted on a permanent basis. This is not always the case with wind farms. Many applicants seeking planning permission for wind farms voluntarily seek planning permissions of finite durations. Planning permission is often granted for wind farms with conditions attached limiting their durations or permitted operating lifespans. Others, primarily the older permission, do not have a permitted operating lifespan or any conditions attached that require them to be decommissioned after a certain period of time. Notwithstanding the lack of a permitted operating lifespan, as large mechanical machines, wind turbines will inevitably reach the end of their useful operating life and therefore are not permanent developments by their nature.

Figure 2.4 below shows the permitted operational lifespan of the wind farm projects connected via the 279 grid connections analysed in this research. Twenty five-year planning permission durations are the most common, with 89 of the 279 projects or 45.3% of the total MW (MEC) having this permitted duration. The analysis revealed 103 projects, accounting for 26.9% of the total MW (MEC) capacity do not appear to have any defined operational lifespan.

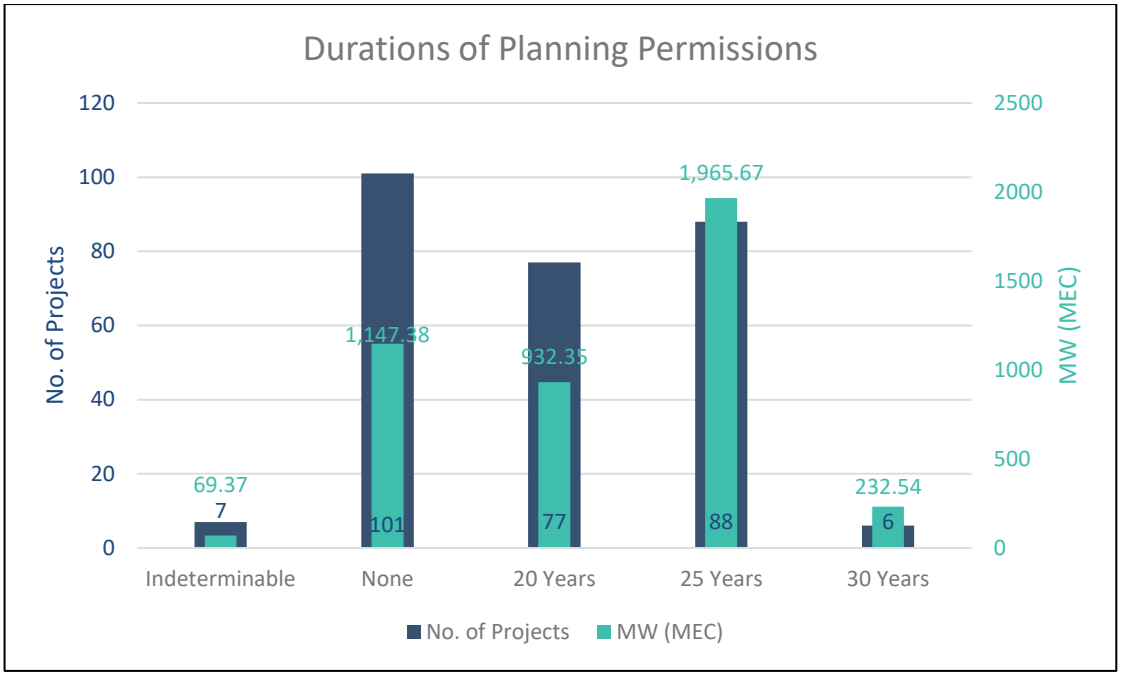


Figure 2.4. Durations of planning permissions for operational wind farms

2.3.1.1 Wind Farm Decommissioning by Year

At the end of the permitted operating lifespan of a wind farm, in accordance with a condition of planning permission, the wind farm must be decommissioned and the turbines removed from the site.

Although there are 101 wind farms without a defined or conditioned operational lifespan defined in their planning permission, for the purposes of this research it has been estimated that these will effectively reach the end of their operating lifespans 25 years after their date of commissioning or first connection to the grid, after which they too will be decommissioned. The same 25 year operating lifespan has been applied to the seven projects whose permitted operating lifespans was indeterminable because it was not possible to access the original planning permission files for the projects. Operational wind turbines may continue to operate beyond the estimated 25 year operating lifespan, as evidenced by the continued operation of the Bellacorrick wind farm, first energised in 1992.

Based on the permitted or estimated operational lifespan of the 279 wind farm projects analysed, Table 2.1 below provides an analysis of the predicted number of wind farms and megawatts of generating capacity (MEC) to be decommissioned each year from 2024-2030, and further out to 2040 in five-year blocks (2031-2035, 2036-2040) and post-2040.

*Table 2.1. Number of wind farms and megawatts to be decommissioned from 2024-2040 and beyond (*all figures for years shown rounded to nearest whole number*)*

Year(s)	Number of wind farms to be decommissioned	MEC in megawatts (MW) to be decommissioned	Cumulative MEC in MW to be decommissioned
2024	19	139	139
2025	15	247	386
2026	6	68	455
2027	0	0	454
2028	6	54	509
2029	16	212	721
2030	14	133	854
2031-2035	69	899	1,753
2036-2040	56	735	2,488
Post 2040	78	1,859	4,347
Total	279	4,347	

The anticipated decommissioning dates do not factor in the possibility of the new planning permission being granted to extend the permitted operating lifespan of the wind farm project. It will be for each individual project to determine whether it is possible to do so, and whether the project will be able to comply with the planning and environmental requirements at the time to have a reasonable chance of successfully extending the permitted operating lifespan. Such "extensions of life" are possible, to add three, five or possibly even ten years to the originally permitted operating lifespan, but the originally turbines will inevitably have to be decommissioned at some point in the future when it becomes cost prohibitive to keep operating them.

2.3.1.1 Wind farm decommissioning by region

With the country's three Regional Assemblies set to take on a more prominent role in the coming years in translating national renewable energy targets to a regional and county level through the upcoming Renewable Electricity Spatial Policy Framework (RESPF) and Regional Renewable Energy Strategies (RRES), it is important to assess what regions stand to lose the most existing wind farm generating capacity so that it can be provided for in the regional spatial planning for future wind energy development.

Table 2.2 below shows the total estimated MW loss as a result of wind farm decommissioning, for each of the three Regional Assembly areas in Ireland out to 2040 and beyond.

Figure 2.5. Regional assembly areas

Table 2.2. Total estimated MEC in MW due to be decommissioned in each Regional Assembly area from 2024-2040.

Year	MEC (Max Export capacity) in MW due to be decommissioned per Regional Assembly area		
	Northern and Western Region	Southern Region	Eastern and Midland Region
2024	82	57	-
2025	17	227	3
2026	6	62	-
2027	-	-	-
2028	30	24	-
2029	109	101	2
2030	84	39	9
2031-2035	303	562	34
2036-2040	137	518	79
Post 2040	749	962	139
Total	1,520	2,553	274

All figures for years shown rounded to nearest whole number

2.3.1.1 Forecast reduction in installed capacity

The Government target to have 9GW of onshore wind energy installed by 2030 as provided for in the Climate Action Plan 2023, and carbon neutrality by 2050, assumes an ever-upward trajectory for the amount of wind energy connected to the Irish grid. In reality, over the time horizon to 2030, 76 wind farms will reach the end of their permitted or estimated operating lifespans. Between 2031 and 2040, a further 125 wind farms will reach the end of their permitted or estimated operating lifespans.

Notwithstanding the intention to continue to add new onshore wind energy generating capacity over the coming years and decades, some of the existing installed generating capacity will begin to reach the end of its permitted or estimated operating lifespan.

The following Figure 2.6 graph illustrates the anticipated reduction in installed generating capacity of wind farms between 2024 and 2040, based on the projects' maximum export capacity, as presented in Table 2.1. The total maximum export capacities of the projects analysed in this research, 4,347 MW of the wind farms connected up to Q3 2023, is taken as the starting point. This analysis is solely focusing on existing connections of wind farms and does not take into account any future additions to the installed capacity during the period of 2024-2040, which it is accepted will occur. The information presented in the graphs below are presented as if no additional wind farms will be connected to the national grid during the aforementioned period.

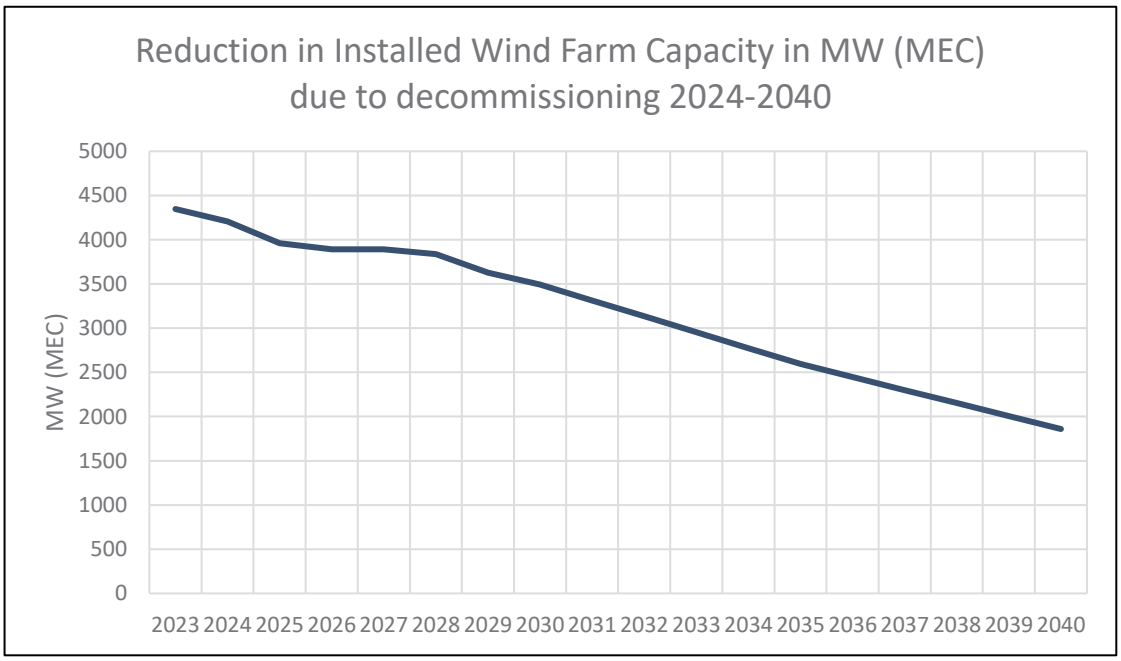


Figure 2.6 Reduction in installed wind farm capacity in MW (MEC) due to the decommissioning of existing operational wind farms from 2024-2040. Figures based on annual estimated reductions 2024-2030, and straight-line annual reductions for periods 2031-2035 and 2036-2040.

Figure 2.7 shows the estimated reduction in the total generating capacity (MEC) of wind farms across the three regional assembly areas, due to be decommissioned from 2024-2040.

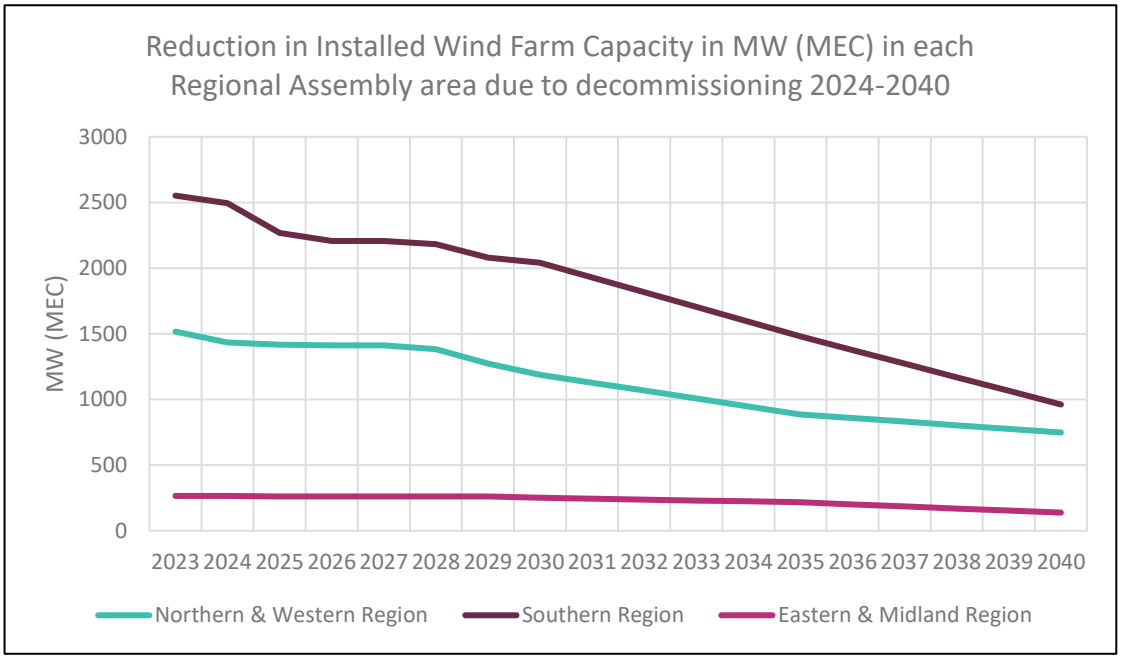


Figure 2.7 Reduction in installed wind farm capacity in MW (MEC) across the three Regional Assembly areas due to the decommissioning of existing operational wind farms from 2024-2040. Figures based on annual estimated reductions 2024-2030, and straight-line annual reductions for periods 2031-2035 and 2036-2040.

2.4 Key Findings

The key findings of the research to establish the duration of the lifetime of planning permissions on all existing operational Irish wind farms in order to quantify the number of megawatts (MW) that will have to be decommissioned, and the year of decommissioning, in the absence of repowering, are as follows:

- A total of 279 wind farms, representing an MEC of 4,347MW were analysed as part of this research megawatts were operational and connected to the transmission or distribution systems up to Q3 2023. The 4,347MW of projects analysed accounts for 98.6% of all wind farm connected to the Irish electricity transmission or distribution networks.
- The wind farm projects connected by Q3 2023 were granted planning permission from 1991 to 2017.
- The permitted operating lifespans of most wind farms is defined in their planning permission, but 103 projects, representing 1,168MW, have no defined permitted operating lifespans, but will inevitably have to be decommissioned when it becomes cost prohibitive to keep operating them.
- Of the wind farms with a defined operating lifespans:
    - 77 projects, representing 932MW or 21% of the total MW have a permitted operating lifespan of 20 years;
    - 88 projects, representing 1,965MW or 45% of the total MW have a permitted operating lifespan of 25 years;
    - 6 projects, representing 232MW or 5.3% of the total MW have a permitted operating lifespan of 30 years.

- A total of 201 wind farms will be decommissioned between 2024-2040, resulting in a total estimated reduction of 2,488MW of installed capacity (maximum export capacity). Of the 2,488MW:
    - 854MW will be decommissioned up to and including 2030;
    - 899MW will be decommissioned between 2031 and 2035 inclusive;
    - 735MW will be decommissioned between 2036 and 2040 inclusive.

- The 2,488MW of installed capacity due to be decommissioned by 2040, is distributed disproportionately across the three Regional Assembly areas as follows:
    - Southern Region – 1,591MW (64%)
    - Northern & Western Region – 769MW (31%)
    - Eastern & Midlands Region – 128MW (5%)

3. SPATIAL POLICY ANALYSIS

Research Task: ***Identify existing operational wind farms and the underlying planning policy for wind energy development as derived from the local authorities' wind energy or renewable energy strategies. Analyse how many of the existing operational wind farms benefit from favourable policy support for wind energy development which would facilitate the repowering of the projects, and how many have a planning policy obstacle to navigate as part of their effort to repower. The analysis will identify the number of individual wind farm projects and the number of megawatts in the various policy classification categories, e.g. Acceptable In Principle, Open To Consideration, Not Normally Permissible, etc.***

3.1 Introduction

Section 9 of the Planning and Development Act 2000 (as amended) requires planning authorities to make developments plans for the functional area of the authority, every six years. The development plans are required to set out the overall strategy of the authority for the property planning and sustainable development of the area. The majority of planning authorities now incorporate renewable energy strategies, or in some cases dedicated wind energy strategies, into their development plans. Such strategies typically identify mapped areas, where wind energy developments would be considered most appropriate, less appropriate or no appropriate.

There is a high degree of variability in the age, quality and ambition of the wind energy strategies that form part of planning authorities' development plans. Despite all of the international, European and national climate change and renewable energy related policies calling for more renewable energy to be deployed and facilitated, the policy support for wind energy has been undermined in the development plans of many local authorities in recent years. This backsliding on wind energy policy has resulted in many areas where wind farms would have been previously built and where they are still operating, now being deemed to less suitable or not suitable at all for further wind energy development. Policies deeming such areas to now be less suitable or unsuitable will present a particular challenge when it comes to attempting to extend the permitted operational lifespan of existing wind farms, or repower the sites with newer wind turbines.

In this research task, the policy classifications in the individual local authority areas have been mapped for the entire country, and consolidated into favourable, unfavourable or unclassified areas. Having done so, and having already mapped the locations of the 279 wind farms mapped earlier in this research, is has been possible to quantify the number of megawatts across the existing wind farms in the various policy areas, to give an insight into the obstacle or opportunity that the existing policy would present for the repowering of those existing wind farms.

3.2 Methodology

The developments plans, renewable energy strategies or wind energy strategies of all the Irish county council planning authorities were reviewed to source the current relevant policies and maps relating to wind energy development. The development plans for the urban and city planning authorities were not included in the research due to the lack of wind farms and lack of space to accommodate wind energy developments of any scale. The map and policy data that was reviewed came in several different formats, either as vector shapefiles for use in a Geographical Information System ("GIS") computer software, raster image format or from the actual original policy document.

The map data from the strategies was processed using GIS software tools to create a single, consolidated map of wind energy policies across all planning authority areas. The locations of the 279 wind farms analysed as detailed in Section 2 above were also mapped in GIS software. All the existing wind farms were assigned a single centre point, and assigned the corresponding wind energy policy classification using the all-Ireland wind policy dataset described above.

In addition to providing the existing policy classification as per the relevant development plan, a further consolidation of policy has assigned a simplified policy classification of 1) Favoured, 2) Not favoured, and 3) Unclassified, was assigned to each area mapped in any of the planning authority development plans or wind energy strategies.

3.3 Results

The various classifications and different terminologies used to identify favoured and unfavoured, suitable and unsuitable areas of the different counties for wind energy development, are outlined in Table 3.1 below.

Table 3.1 Wind energy policy classifications on a county-by-county basis

County	Wind Energy Designations				
Carlow	Viable Wind Speed, >7.6m/s, Uplands - not normally permissible		Viable Wind Speed, >7.6m/s		
Cavan	No Policy				
Clare	Strategic Areas	Acceptable in Principle	Open for Consideration	Not Normally Permissible	
Cork	Acceptable in Principle	Open for Consideration	Normally Discouraged		
Donegal	Open for Consideration	Acceptable in Principle	Not Normally Permissible		
Dublin	No Policy				
Galway	Strategic Areas	Open for Consideration	Not Normally Permissible		
Kerry	Potential Repowering Areas		Not Normally Permissible		
Kildare	Acceptable in Principle	Open for Consideration	Not Normally Permissible		
Kilkenny	Acceptable in Principle	Open for Consideration	Not Normally Permissible		
Laois	Preferred Areas	Open for Consideration	Not Open for Consideration		
Leitrim	Available Areas		Viable Wind Speed, >7.6m/s		
Limerick	Preferred	Open for Consideration	Unsuitable		
Longford	Preferred	Non Preferred	Buffer Zones		
Louth	Preferred	Open to Consideration	No Go Areas		
Mayo	Priority Areas	Tier 1 – Preferred (Large Wind Farms)	Tier 2 - Preferred (Cluster of turbines)	Tier 2 – Open for Consideration	Unclassified
Meath	No Policy				
Monaghan	No Policy				
Offaly	Preferred Areas	Open for Consideration	Not Open for Consideration		
Roscommon	Most Favoured	Less Favoured	Not Favoured		
Sligo	No Policy				
Tipperary	Preferred Areas	Open for Consideration	Not Open for Consideration		
Waterford	Preferred Areas	Open for Consideration	Exclusion		
Westmeath	Low Capacity for Wind Energy		No Capacity for Wind Energy		
Wexford	Favoured	Open for Consideration	Not Favoured		
Wicklow	Preferred Areas	Open for Consideration	Exclusion		

Of the 26 counties whose plans and strategies were reviewed and mapped, 19 have identified the parts of the county deemed to be most favoured, less favoured or not favoured for wind energy development. Some have used two-point classification systems, some three-point, and some four-point classification systems for the assignment of policies to delineated areas.

The wind energy policies of the 26 planning authorities were consolidated into three different categories which include:

- **Favoured -** This category covers policy classifications which are considered favourable for wind energy development. Policy classifications covered by this classification include the following;
- Acceptable in Principle
- Open to Consideration
- Preferred Area
- Potential Repowering Areas
- Most Favoured
- Strategic Areas
- Tier 1 – Large Windfarm

- **Not Favoured** - This category covers policy classifications which are considered unfavourable for wind energy development. Policy classifications covered by this classification include the following;
- Not Normally Permissible
- Areas not Open for Consideration
- Areas Unsuitable
- Less Favoured
- Exclusion Area
- Normally Discouraged

- **Unclassified** – This category covers policy classifications which are considered neither favourable or unfavourable for wind energy development. Policy classifications covered by this classification include the following;
- Available
- Unknown
- Consented windfarm
- Viable Wind Speed, >7.6m/s

The simplified policy classification of **1) Favoured**, **2) Not favoured**, and **3) Unclassified,** as assigned to the wind energy policies of the 26 planning authority development plans or wind energy strategies, are outlined in Table 3.2 below. The simplified policy classifications are represented by the colouring assigned to each policy classification in the table, as follows:

Favoured	Not Favoured	Unclassified

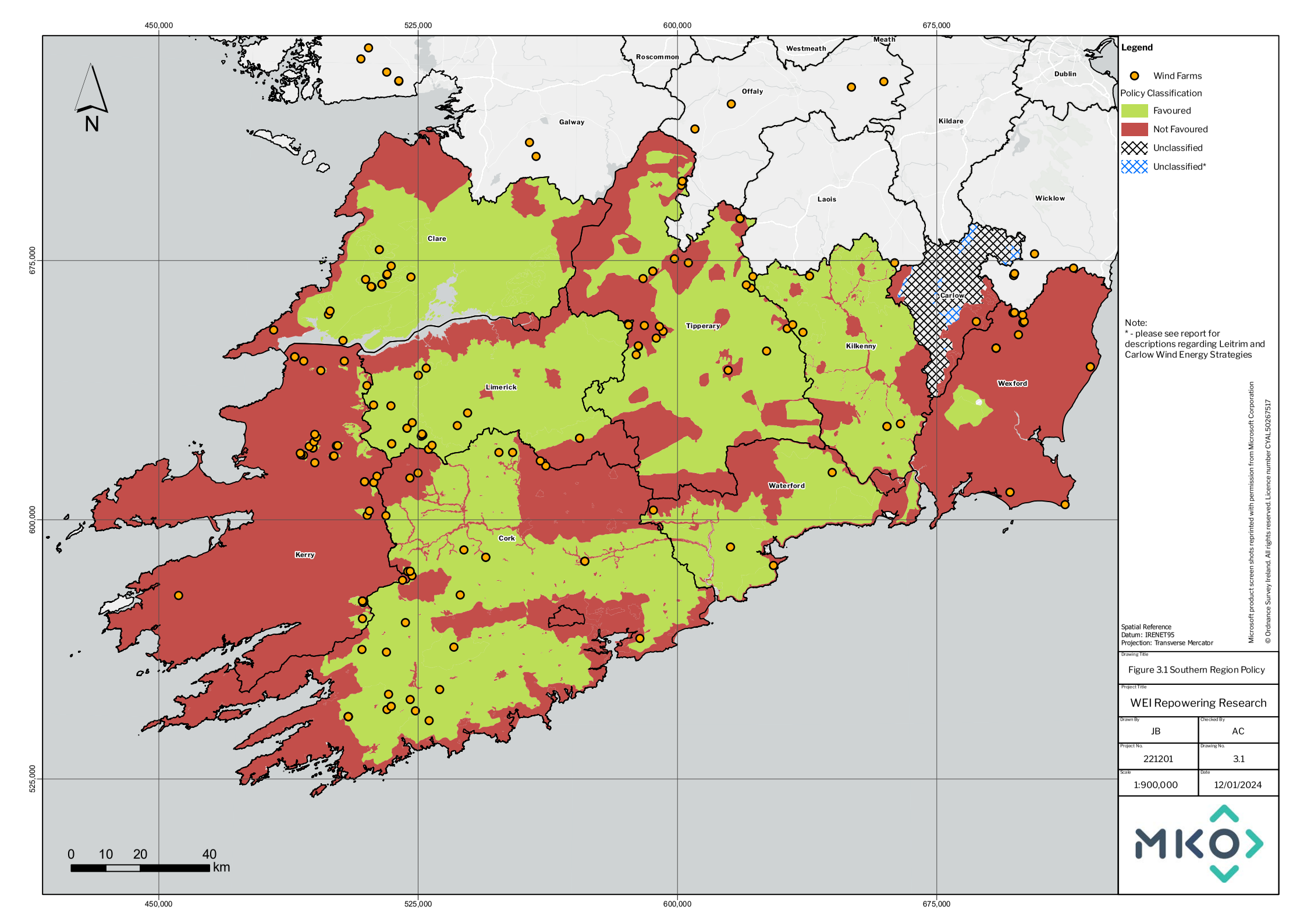
Table 3.2 Simplified wind energy policy classification, represented by colour

County	Wind Energy Designations				
Carlow	Viable Wind Speed, >7.6m/s, Uplands - not normally permissible	Viable Wind Speed, >7.6m/s			
Cavan	Unclassified				
Clare	Strategic Areas	Acceptable in Principle	Open for Consideration	Not Normally Permissible	
Cork	Acceptable in Principle	Open for Consideration	Normally Discouraged		
Donegal	Open for Consideration	Acceptable in Principle	Not Normally Permissible		
Dublin	Unclassified				
Galway	Strategic Areas	Open for Consideration	Not Normally Permissable		
Kerry	Potential Repowering Areas	Not Normally Permissible			
Kildare	Acceptable in Principle	Open for Consideration	Not Normally Permissible		
Kilkenny	Acceptable in Principle	Open for Consideration	Not Normally Permissible		
Laois	Preferred Areas	Open for Consideration	Not Open for Consideration		
Leitrim	Available Areas	Viable Wind Speed, >7.6m/s			
Limerick	Preferred	Open for Consideration	Unsuitable		
Longford	Preferred	Non Preferred	Buffer Zones		
Louth	Preferred	Open to Consideration	No Go Areas		
Mayo	Priority Areas	Tier 1 – Preferred (Large Wind Farms)	Tier 2- Preferred (Cluster of turbines)	Tier 2 – Open for Consideration	Unclassified
Meath	Unclassified				
Monaghan	Unclassified				
Offaly	Preferred Areas	Open for Consideration	Not Open for Consideration		
Roscommon	Most Favoured	Less Favoured	Not Favoured		
Sligo	Unclassified				
Tipperary	Preferred Areas	Open for Consideration	Not Open for Consideration		
Waterford	Preferred Areas	Open for Consideration	Exclusion		
Westmeath	Low Capacity for Wind Energy	No Capacity for Wind Energy			
Wexford	Favoured	Open for Consideration	Not Favoured		
Wicklow	Preferred Areas	Open for Consideration	Exclusion		

Maps of the simplified policy classifications as presented in Table 2.3 above are produced in Figures 3.1, 3.2, 3.3 below, which groups the counties and their simplified policy classification for each of the three regional assembly areas. Figures 3.1, 3.2, 3.3 below also show the locations of the 279 wind farm projects that were operational and connected to the transmission or distribution systems up to Q3 2023.

There may be some slight inaccuracies in the map data due to the large spatial extent of some wind farms and the quality of spatial policy data that was available and used to produce the consolidated mapping. It was beyond the scope of this research to map every turbine in the 279 wind farm projects analysed to identify the underlying policy at each turbine location, and therefore the wind farm centre point location is used to establish the underlying policy for each project.

It should also be noted that Leitrim County Council and Carlow County Council have identified 'Viable Wind Speed >7.6m/s' as a classification in their wind energy policy documents. However, both plans clearly state that this classification does not mean that they have favoured wind energy status, and these areas have therefore been categorised as 'Unclassified' in this exercise.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Wind Farms
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Note:
* - please see report for descriptions regarding Leitrim and Carlow Wind Energy Strategies
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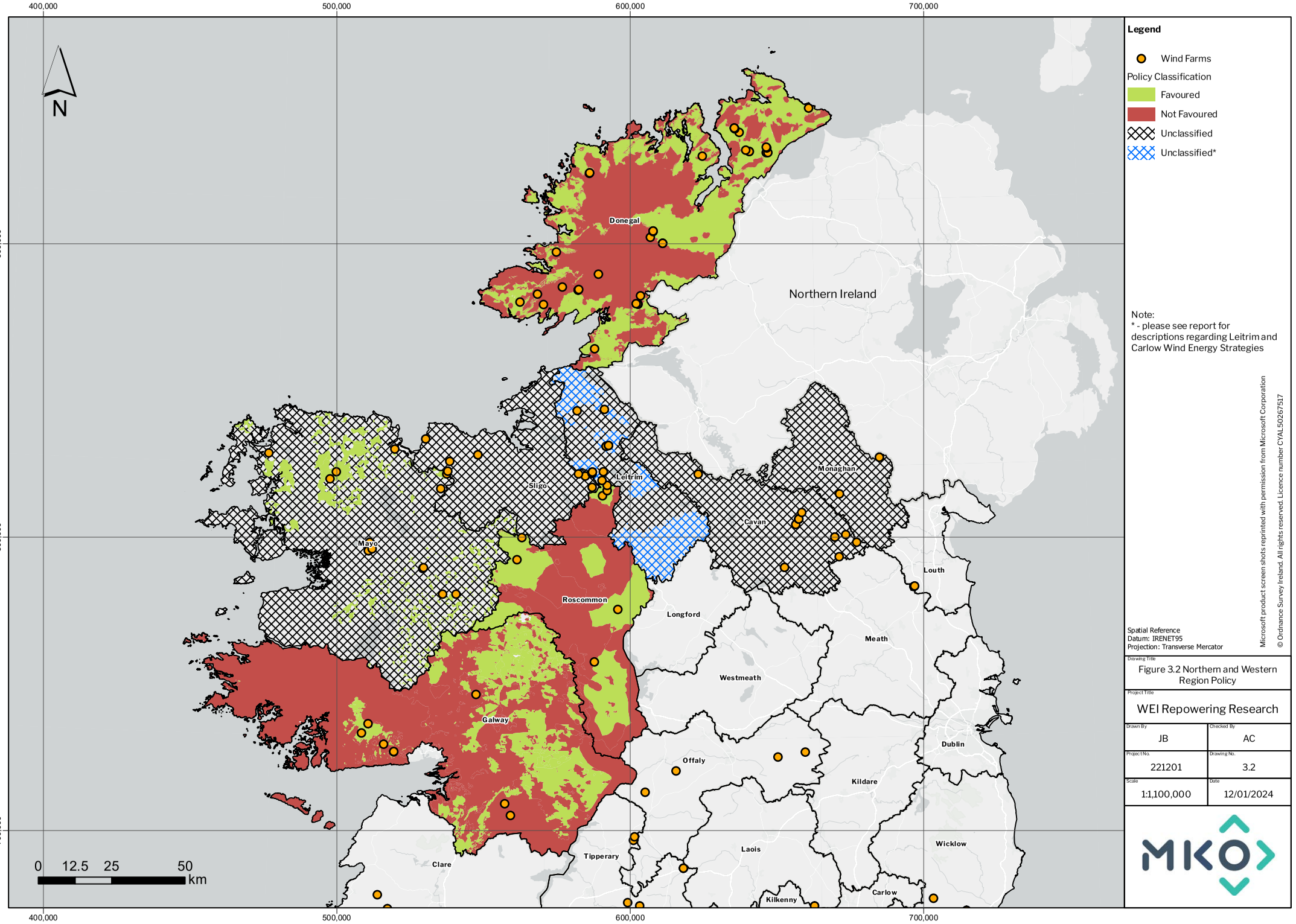
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Wind Farms
Policy Classification
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Unclassified*
Note:
* - please see report for descriptions regarding Leitrim and Carlow Wind Energy Strategies
Spatial Reference
Datum: IRENET95
Projection: Transverse Mercator
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Figure 3.2 Northern and Western Region Policy
Project Title
WEI Repowering Research
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Checked By
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Project No.
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Date
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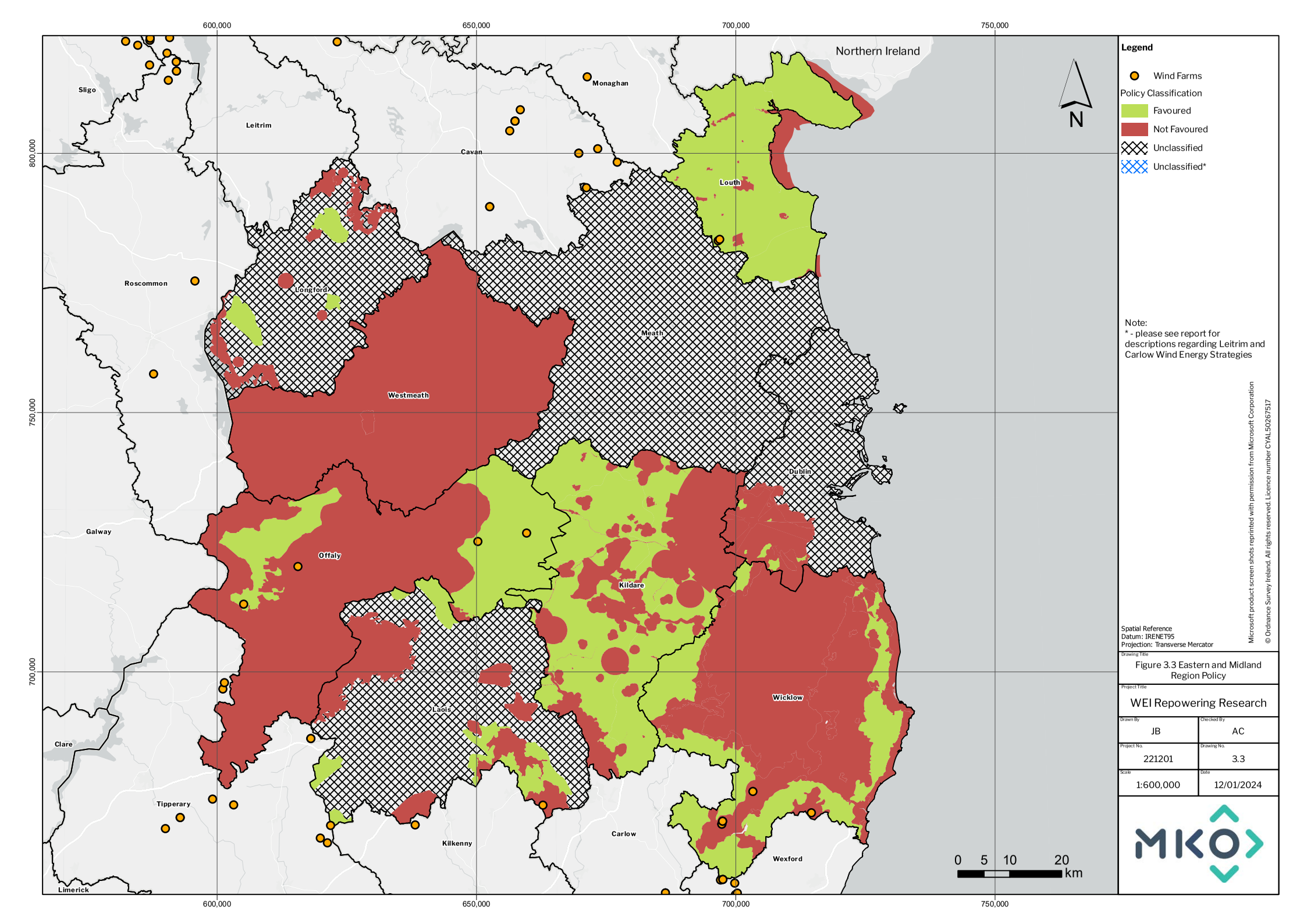
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Legend
Wind Farms
Policy Classification
Favoured
Not Favoured
Unclassified
Unclassified*
Note:
* - please see report for descriptions regarding Leitrim and Carlow Wind Energy Strategies
Spatial Reference
Datum: IRENET95
Projection: Transverse Mercator
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Drawing Title
Figure 3.3 Eastern and Midland Region Policy
Project Title
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3.4 Key Findings

The key findings of the research to identify existing operational wind farms and the underlying planning policy for wind energy development as derived from the local authorities' wind energy or renewable energy strategies, are as follows:

- Of the 279 wind farm projects that were operational and connected to the transmission or distribution systems up to Q3 2023:
  - 169 wind farms, representing 2,778MW are located in Favoured areas.
  - 73 wind farms, representing 1,123MW, are located in Not Favoured areas
  - 37 wind farms, representing 446MW, are located in Unclassified areas.

- Of the 4,347MW of wind farms that were operational and connected to the transmission or distribution systems up to Q3 2023:
  - 64% are located in Favoured areas.
  - 26% are located in Not Favoured areas
  - 10% are located in Unclassified areas.

- A total of 110 existing wind farms, accounting for 1,569MW or 36% of the total national capacity researched, do not have favourable planning policy support via the county-level wind energy policies to facilitate their replacement and repowering at the end of their permitted or operational lifespan, despite these locations previously being deemed appropriate for wind energy development when planning permission was first granted for the projects in previous decades.

Figure 3.4 below displays a graph of the number of megawatts that is estimated to be in each category

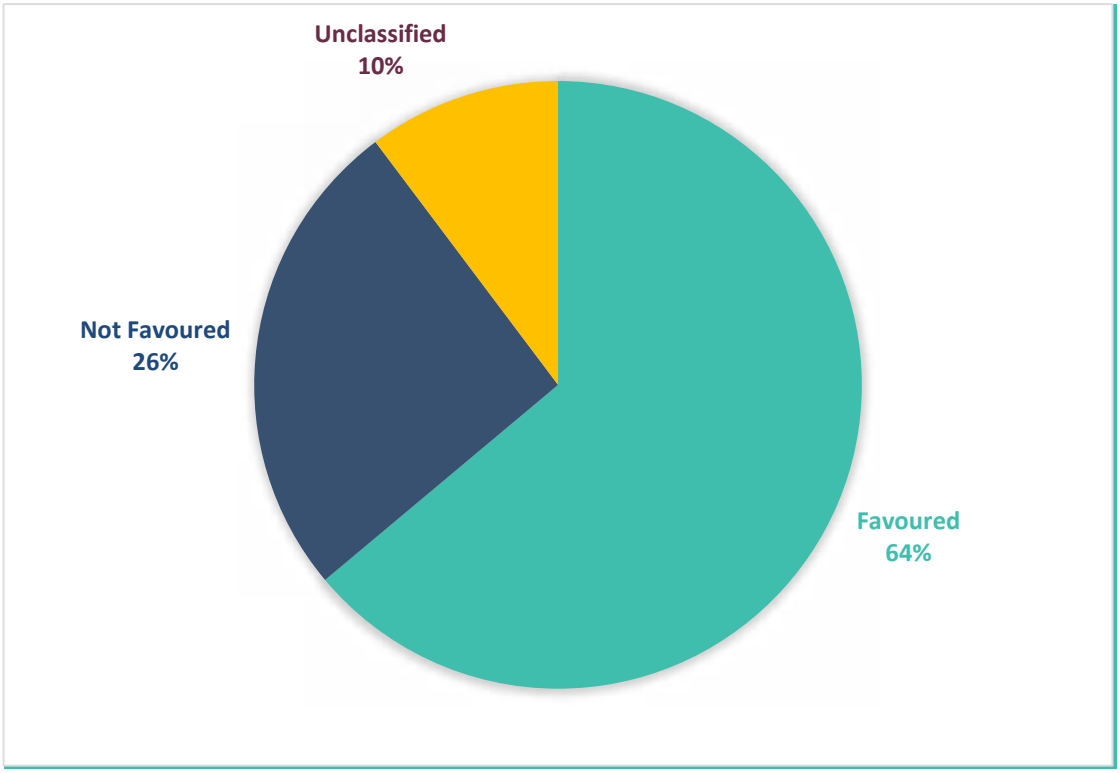


Figure 3.4 Proportion of existing wind farm generating capacity (MEC) in simplified wind energy policy classifications

4. REPOWERING CAPACITY ANALYSIS

Research Task: ***Taking five existing operational wind farm projects as reference sites, and applying present-day site design, planning and environmental constraints, quantify the likely repowering megawatt potential on each site, to allow comparison with existing installed capacities and maximum export capacities (MEC). The analysis will allow an estimation to be made across the sample projects and extrapolated across the entire operational installed wind turbine fleet, on whether repowering will result in an increase, reduction, or retention of the current MEC.***

4.1 Introduction

With 279 wind farms, accounting for 4,347MW analysed in this research and connected by the end of Q3 2023 total, and many of the older projects already being considered for repowering, there is general industry expectation and anticipation that it will be possible to at least retain the same installed capacity, if not increase it, as a result of repowering.

Following international trends, it is anticipated that the vast majority of existing wind farms will attempt to repower at the end of their permitted or operational lifespans in order to continue to make use of the site's established electricity grid infrastructure and proven wind resources.

With the Government target to have 9GW of onshore wind energy installed by 2030, and 854MW (or 19.6%) of the 4,347MW currently operational wind farms due to reach the end of their permitted or operational lifespans by 2030, it is important to establish if repowering will result in an increase, reduction, or retention of the current installed capacity.

In this research task, five existing wind farms of varying ages and sizes, were assessed for their repowering potential. Present-day planning, environmental and project design criteria and constraints were applied to the five operational wind farms, to assess what their installed capacity might be if they were to be repowered now or in the future, using the present-day criteria and constraints. This allows for a comparison of the repowering potential of the five projects with the existing installed capacity, and the likely increases or decreases in installed capacities to be extrapolated across the existing operational fleet of wind farms.

4.2 Methodology

Five operational wind farm sites projects selected for repowering and redesign analysis as detailed in Table 4.1 below. The wind farms selected range in scale from 6 turbines to 38 turbines in size, and were developed over four decades from the 1990's, 2000's, 2010's and 2020's. The selected projects have been anonymised for the purposes of this research, and although detailed mapping has been produced to establish the repowering potential of each project, the maps are not included as part of this report in order to respect the commercial independence and anonymised status of the projects.

Table 4.1 Details of operational wind farm projects used in repowering capacity analysis

Project	Current No. of Turbines	Current MW capacity (MEC)	Date Permitted	Date Connected
Wind Farm 1	14	11.9MW	Q3 2000	Q3 2002
Wind Farm 2	38	114MW	Q3 2016	Q2 2020
Wind Farm 3	6	13.8MW	Q3 2010	Q2 2017
Wind Farm 4	21	6.45MW	Q1 1991	Q4 1992
Wind Farm 5	32	48MW	Q1 2002	Q4 2009

A constraints-led exercise was conducted to determine the viable area for repowering of the selected wind farms, based on present-day design considerations relating to wind farm project design, planning constraints and environmental constraints. The constraints identified included dwellings, surface watercourses, archaeological sites or recorded monuments, overhead transmission lines, local roads, designated ecological areas and other existing wind farms.

For the purposes of this analysis, the project design for the repowering of the existing projects included turbines measuring 185 metres in tip height and 160 metres in rotor diameter. The turbine dimensions were selected following a review of wind farm planning permission applications and strategic infrastructure development (SID) pre-application determinations submitted to An Bord Pleanála or local authorities since 2022. Applications for turbines of 185 metres and above, are now commonplace, as illustrated in Table 4.2 below.

Table 4.2 Planning applications or SID determination applications relating to new wind farm projects since 2002

Project Name	County	Planning Reference	Application Date	No. of Turbines	Turbine Tip Height (m)
White Hill	Carlow	315365 (SID)	19/12/2022	7	180
Fahy Beg WF	Clare	23/148, ABP 317227	30/05/2023	8	180
Knockshanvo	Clare	315797 (SID Pre-App)	15/02/2023	9	185
Maam Cross	Galway	23/60051, ABP 316309	18/04/2023	6	185
Cooloo WF	Galway	316466 (SID Pre-App)	25/04/2023	9	180
Killoshulan WF	Kilkenny	314186 (SID Pre-App)	27/07/2022	13	175
Freneystown	Kilkenny	317589 (SID Pre-App)	14/07/2023	8	185
Coolglass WF	Laois	313375 (SID Pre-App)	20/04/2022	13	Up to 180
Sheskin South	Mayo	315933 (SID)	01/03/2023	21	200
Oweninny 3	Mayo	316178 (SID)	31/03/2023	18	200
Devlin / Knockanarragh	Meath	314271 (SID Pre-App)	02/08/2022	8	180
Garryhinch WF	Offaly	315157 (SID pre-App)	22/11/2022	10-14	200-220
Cush WF	Offaly	313778 (SID Pre-App)	13/06/2022	11	200
Annagh WF	Cork	217246, ABP 315652,	27/01/2023	6	175
Gortyrahilly	Cork	314602	09/09/2022	14	179-185
Ballinagree WF	Cork	312606	28/01/2022	20	179-185
Carrigdangan	Cork	215372, ABP 313261	07/04/2022	3	176.5
Cloghercor WF	Donegal	316025 (ABP Pre-App)	10/03/2023	19	185-200
Ballynagare	Kerry	211441, ABP 313007,	10/03/2023	7	170
Glenard WF	Donegal	316025 (SID)	04/02/2022	15	173
Knockroe WF	Tipperary	21/1502, PL92.315176	22/11/2022	7	150-160
Ballivor WF	Westmeath	316212 (SID)	05/04/2023	26	200
Achonry WF	Sligo	317477 (SID Pre-App)	30/06/2023	8	150
Umma More	Westmeath	316051 (SID)	10/03/2023	9	185
Dyrick Hill WF	Waterford	316051 (SID)	06/06/2023	12	185

Industry-standard planning and environmental project design criteria were applied, in addition to the requirements of the Draft Wind Energy Guidelines 2019 (WEGs), when developing potential project layouts for the five selected projects. The following design constraints, buffer zones and setback distances as outlined in Table 4.3 below were applied in the repowering and redesign analysis.

Table 4.3. Planning and environmental constraints and buffer zones used in repowering capacity assessments

Constraint	Buffer	Constraint Rationale
Dwellings and other properties	740m	Siting of proposed turbines adhered to the 4 times tip height set-back distance explicitly set out by the draft WEGs.
Watercourses	50m	A 50-metre buffer was applied to the siting and design of the proposed turbines and related infrastructure to avoid potential impacts on these receptors and water quality.
Archaeological sites or monuments	100m	A 100-metre buffer was applied to all archaeological sites and monuments present to avoid any direct physical impact.
Overhead electricity transmission lines	525m	Based on EirGrid's Policy on Wind Turbine Clearance to Overhead Lines
Local Roads	88m	Draft WEGs require blade length plus 10% setback from motorways, national and regional roads.
Designated ecological areas	100m	Best practice industry standard based on ecological sensitivity, but certain site-specific characteristics may require more or allow less.
Existing wind farms	720m	Based on x4.5 the proposed rotor diameter, to ensure clear wind flow between turbines on adjacent sites.

For each of the five wind farms that were subject to the repowering and redesign analysis, a series of three maps have been prepared, as detailed below.

1. Existing Layout – showing the positions of the existing individual turbines within the operational wind farm sites.
2. Constraints – showing the design, planning and environmental constraints outlined in Table 4.2 above, and the remaining unconstrained "potential viable area" in which it is considered feasible to locate turbines in a repowered wind farm layout.
3. Repowering Potential – showing indicative positions of wind turbines in a repowered wind farm layout seeking to make maximum use of the potential viable area, while taking account of the necessary separation distances between individual turbines.

On each Existing Layout map, a wind farm site boundary 150 metres outside the outermost existing turbines was indicated as the site boundary. The original planning application boundary may have been different to the lands that were available to design and accommodate the original project, and both may be different to the lands that could potentially be included in a larger or smaller repowering project, depending on the willingness of the landowners to accommodate a repowered wind farm for a further 25-35 years. With all these known unknowns, the assumed wind farm site boundary 150 metres outside the outermost existing turbines is considered an accurate proxy for the purposes of this repowering research.

On each Constraints Maps, the constrains were identified from a desk study exercise only, and no site visits were undertaken to verify the accuracy of the data use to identify constraints, or the suitability of

the industry-standard buffer zones from each identified constraint. Site specific considerations will often require larger buffer zones from constraints, or in some cases smaller buffer zones may be acceptable. There may also be other site-specific constraints that could only be identified by site visits and surveys, which are not accounted for in the constraints maps and the remaining potential viable areas that have been identified.

On each Repowering Potential map, every effort has been made to maximise the potential of the remaining viable areas which are unconstrained. The potential of these areas is maximised by attempting to locate as many turbines as possible in the viable areas. Turbines must be located a certain distance apart to minimise turbulence between turbines and maximise energy yield from every turbine. Turbines can be arranged more tightly together in a cross-wind direction and must be located further apart in a downwind direction, resulting in ellipse-shaped buffers zones around each turbine. However, to use the ellipse-shaped buffers would require the prevailing wind direction to be known, which was not known for the selected sites. Therefore, in the absence of site-specific wind direction data, circular separation buffer zones were used, measuring 4.5 times the rotor diameter. For the purposes of the other constraints, a 185-metre high turbine with a 160-metre rotor diameter has been used. Therefore the required separation distance used between turbines is 160m x 4.5, or 720-metres. Each Repowering Potential shows the each potential repowered turbine location as a point, with a surrounding circular buffer zone with a radius of 720-metres. The circular buffer zone of one turbine should not overlap with the point of any other turbine.

A design constraint used in some of the Constraints Maps is existing adjacent turbines outside the selected sites, where they exist. The same turbine separation distances are used from existing turbines outside the site, as are used for siting each potential repowered turbine. Although the turbines outside the selected sites may be much smaller in size than the 185-metre (height) and 160-metre (rotor diameter) dimension used in the repowering analysis, any repowered turbines would have to maintain an appropriate separation distance from any other existing turbines outside the repowered site. The 720-metre buffer zone circles applied to adjacent, off-site turbines, often overlap significantly. In reality, these turbines are often much smaller and would not require a 720-metre buffer zone between each other, but would require such a buffer zone from any newly repowered turbine on the subject sites being assessed in this repowering analysis

The installed capacity of each repowered wind turbine has been estimated at 6MW, based on the sizes of turbines used in the repowered site layouts and the generating capacities of such sized turbines currently available from turbine manufacturers.

The maps produced have not been included as part of this report in order to respect the commercial independence and anonymised status of the projects.

4.3 Results

This analysis allowed for an estimation to be made across the five selected projects on whether repowering would result in an increase, reduction, or retention of the current installed capacities on these sites. These results are based on the repowered turbines having a 6MW rated generating output. The results are indicated in Table 4.4 below. A graph of the results is also provided in Figure 4.1.

Table 4.4 Existing and Predicted MEC Capacity of sample sites if Repowered.

Project	Current No. of Turbines	No. of Repowered Turbines	Current MW capacity (MEC)	Predicted MW capacity if repowered	+/- MW Capacity	% MW Increase / Decrease
Wind Farm 1	14	1	11.9MW	6MW	-5.9MW	-49.6%
Wind Farm 2	38	11	114MW	66MW	-48MW	-42.1%
Wind Farm 3	6	2	13.8MW	12MW	-1.8MW	-13.%
Wind Farm 4	21	4	6.45MW	30MW	+23.55MW	+365.1%
Wind Farm 5	32	2	48MW	12MW	-36MW	-75%

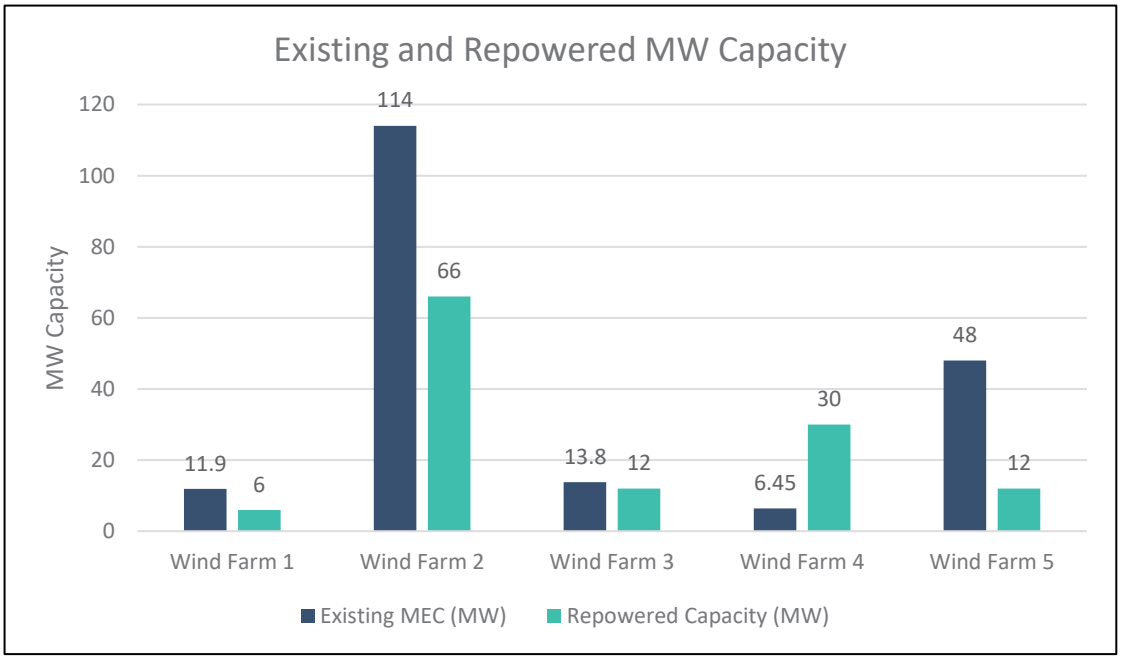


Figure 4.1 Existing and repowered MW capacities across five sample wind farms assessed

These results are summarised as follows

- The repowering of Wind Farm 1 would likely result a capacity **decrease of 5.9 MW, from 11.9MW to 6MW,** which translates to a reduction of 49.6% in its existing capacity.
- The repowering of Wind Farm 2 would likely result in a capacity **decrease of 48 MW, from 114MW to 66MW,** which translates to a reduction of 42% in its existing capacity.
- The repowering of Wind Farm 3 would likely result a capacity **decrease of 1.8 MW, from 13.8MW to 12MW,** which translates to a reduction of -13.04% in its existing capacity.
- The repowering of Wind Farm 4 would likely result a capacity **increase of 23.55MW, from 6.45MW to 30MW,** which translates to an increase of 365.12% in its existing capacity.

- The repowering of Wind Farm 5 would likely result in a capacity **decrease of 36 MW** which translates to a reduction of 75% in terms of its existing capacity.

4.4 Key Findings

The key findings of the research to identify the repowering potential of five existing operational wind farm projects by applying present-day site design, planning and environmental constraints, to estimate whether repowering will result in an increase, reduction, or retention of the current MEC, are as follows:

- Applying present-day design, planning and environmental constraints to the repowering of wind farm sites will most likely result in a reduction in overall installed MW capacities.
- A large majority of existing wind farms will not be able to retain their existing installed MW capacities if repowered, as a result of present-day design, planning and environmental constraints.
- Each of the wind farms assessed for their repowering potential and capacity have their individual particulars and characteristics, and given the small sample size of just five wind farms, it is difficult to draw definitive conclusions from averages of the five projects. Drawing conclusions from the totals of the five projects is considered a more accurate output from the analysis.
- Of the five projects analysed, the total current capacity of 194.15MW would decrease by 68.15MW or 35.1% to 126MW.
- Applying the 35% reduction to the projects consisting of 854MW likely to reach the end of their permitted or operational lifespans by 2030, would see the current installed capacity reduce to 555MW if repowered.
- Applying the 35% reduction to the projects amounting to 2,488MW likely to reach the end of their permitted or operational lifespans up to 2040, would see the current installed capacity reduce by 870MW to 1,617MW if repowered.
- Older wind farms with smaller turbines, which are likely to be amongst those repowered earlier, will likely see a more significant reduction in installed capacities given the smaller sites they would have originally been built on.
- There may be opportunities to extend repowered projects beyond the boundary of the original wind farm site that the repowered project is intended to replace, where unconstrained and potential viable areas extend beyond the original wind farm boundary.

5. WEGs – REVIEW AND RECOMMENDATIONS

Research Task: ***Review of current draft wind energy planning guidelines (WEGs) to highlight particular challenges associated with re-powering existing projects where current draft WEGs do not differentiate in any way between the design requirements for existing projects with powering our new greenfield projects. Having highlighted the issues with the current draft WEGs with regards to repowering, propose suggested amendments to better provide for the repowering of projects in the WEGs.***

5.1 Introduction

The draft Wind Energy Guidelines (WEGs) were first issued for public consultation in December 2020 and are an update to the 2006 Wind Energy Planning Guidelines, which were the subject of a "Focused Review" undertaken in 2013/14 in respect of noise, visual amenity setback and shadow flicker. At the time of writing, the draft WEGs have not yet been adopted and the 2006 guidelines remain in force. The aim of the draft WEGs is to *"strike a better balance between addressing the concerns of local communities in relation to wind farm proposals, whilst maintaining Ireland's ability to deliver on its binding energy policy obligations".* The prevailing view of the wider wind energy industry is that the draft WEGs did not achieve a balance between these two priorities with regards the future management of Ireland's existing wind energy projects.

The draft WEGs have the potential to pose a significant obstacle to repowering and extension of life planning applications on existing wind farm sites. The guidelines potentially introduce stricter noise limits, setback distances and shadow flicker requirements compared to standards in place when consent was originally granted for the current operational project. Separately, the research above also illustrates that there are 110 wind farm, accounting for 36% of the existing wind energy generating capacity, that lack the necessary wind energy policy support for repowering or extension of life planning applications.

In this research task, the key issues of the draft WEGs in relation to the repowering or extension of life of existing operational wind farms are highlighted, and recommendations are put forward for implementation in a future iteration of these draft guidelines.

5.2 Key Issues

5.2.1.1 Noise

The proposed noise guidelines in the draft wind energy guidelines has the potential to cause significant issues for repowering projects. Neither extension of life projects nor repowering projects are explicitly addressed in the draft WEGs. It is understood that the noise aspects of the draft WEGs are undergoing further review. However, in the draft WEGs as published, no distinction is made between entirely new "greenfield" wind farm projects, and extension of life projects or repowering projects where wind farms may have been operating without issue for 20-25+ years.

5.2.1.1 Visual Amenity Setback

The draft WEGs stipulate a *"4 times height to blade tip*" setback from the nearest point of the curtilage of any residential property in the vicinity of a proposed wind farm. This is potentially a significant design constraint for extension of life planning applications for existing wind farms which were developed under different guidelines. In such cases, many more residential properties may have been constructed during the operational life of the wind farm closer to the operational turbines than would have been the case when the wind farm was first permitted and constructed. Through no fault of the

wind farm, it may not be possible to comply with the "x4" setback requirements in seeking to simply extend the operational life of the existing wind farm, if the draft WEGs had to be followed as currently drafted. Residential properties built closer to the existing turbines since the wind farm was first built, were constructed by their owners with the wind turbines in plain sight. If the draft WEGs were to be implemented as currently drafted, more recently constructed properties in the vicinity of wind farms would prevent the permitted lifespan of the wind farm being extended.

5.2.1.1 Shadow Flicker

The draft WEGS have set a stringent zero shadow flicker mandate, along with requiring control and shutdown response regulations that could potentially become the most severe throughout Europe if implemented. Shadow flicker has not proven to be a significant issue across the 379 wind farms that have operated in Ireland for upwards of 30+ years, due to the combination of factors that are required for shadow flicker to occur and the limited duration of any shadow flicker effect experienced in nearby properties. The Irish climate, with many more cloudy days than sunny days per year when the sun simply doesn't shine to cast a shadow, is not conducive to shadow flicker. The limits of a maximum of 30 minutes of shadow flicker per day, or a maximum of 30 hours per year, as stipulated in the 2006 WEGs has been readily adhered to by wind farms through project layout design or shadow flicker control systems.

On more modern turbines, it is possible to limit and/or prevent the occurrence of shadow flicker through the wind farm's SCADA electronic control system, which can be programmed to shut down certain turbines in certain weather conditions likely to result in shadow flicker, for a limited period of time that shadows might be cast on nearby properties. Such shadow flicker control systems are relatively commonplace on modern turbines, but many of the earlier turbines installed in the 1990s, 2000s and early 2010s, would not have such control systems installed, and it may not be possible to install them retrospectively.

With it either being cost prohibitive or simply not possible to retrospectively install shadow flicker control systems on older wind farms, it may be impossible for them to comply with a zero shadow flicker requirement if mandated by updated WEGs and conditioned as part of an extension of life planning permission application. An older wind farm may have operated successfully for 20-25 years and without causing any significant incidence of shadow flicker at adjacent properties. It would be unnecessarily restrictive and punitive to place a zero shadow flicker requirement on such wind farms, particularly where the properties have been constructed after the wind farm was installed.

5.3 Recommendations

The recommendations of this research is as follows:

The DHLGH should incorporate regulations in the WEGs which take a flexible and pragmatic approach to repowering and extension of life applications and consider a more flexible approach on noise, visual amenity setback, and shadow flicker for these projects in light of their strategic importance to the 2030 targets. The following suggested amendments are proposed to the WEGS.

- The updated WEGs should allow for individuals that contribute their land to the wind farm project to agree to higher noise and shadow flicker requirements for repowering and life extension projects. Higher noise and shadow flicker requirements should only be implemented if contributing parties have entered into an agreement with the wind farm developer for such derogations.

- The updated WEGs should allow for existing wind farms to continue to operate under their existing noise thresholds where an extension of life is proposed and planning permission is sought to operate the wind turbines for a longer period than first permitted.

- The updated WEGs should remove the "x4 times height to blade tip" setback requirement for life extension projects and stipulate that the requirement for such projects would be to maintain current setback distances.

- Where houses and/or other properties were newly constructed closer to the wind farm since the wind farm was first granted planning permission, a different wind turbine setback requirement should apply in the updated WEGs. Given the owner/occupier of such properties knowingly constructed or purchased the property after the wind farm was permitted and knew the distance their property would be from the closest wind turbine, the pre-existing turbine tip-height separation distance should continue to apply to any future repowered wind farm adjacent to such properties.

For example, if a wind farm was originally permitted and built with 125-metre turbines located 500-metres from the nearest properties, the nearest properties would be located at a x4 tip-height setback distance from the properties (500m / 125m = 4). If subsequently, a further house was constructed 460-metres from the nearest turbine, a lower x3.6 tip-height setback would apply to that newer property. If the wind farm were to be repowered, the lower setback ratio should apply to that property that was constructed 460-metres from the closest wind turbine. If 180-metre tip-height turbines were applied for as part of a repowering application, applying the x3.6 tip-height setback to that scenario would require the closest turbine to be 648-metres (180m x 3.6 = 648m) from the subject property. The x4 tip-height setback stipulated in the current draft WEGs would apply to all other properties.

- The updated WEGS should be explicit that an extension of life project has a 30 minute per day and 30 hour per year shadow flicker threshold (as opposed to the zero thresholds currently proposed.)

- The WEGs should include a provision which adopts a presumption in favour of granting planning permission for repowering and extension of life projects irrespective of local policy designations.

6. REPOWERING IN SPAs

Research Task: ***Highlight the particular challenges associated with the repowering of the operational wind farm projects in the Special Protection Areas (SPAs) designated for the protection of hen harrier under the EU Birds Directive. Suggest a strategy to guide the repowering of the wind farm projects located within or adjacent to SPAs, taking account of the requirements under the EU Habitats and Birds directives that such projects demonstrate they are required for Imperative Reasons of Overriding Public Interest (IROPI). The suggested strategy would draw on the recent European Commission RePowerEU policy and updated Renewable Energy Directive (RED III), which classifies projects as being in the overriding public interest.***

6.1 Introduction

Special Protection Areas (SPAs) are areas designated under the terms of the EU Birds Directive (2009/147/EC) for the protection of:

- Listed rare and vulnerable species
- Regularly occurring migratory species
- Wetlands especially those of international importance

The particular focus of this research task is the repowering (or extension of life) of wind energy developments that are in SPAs that are designated for the protection of breeding hen harrier (*Circus cyaneus*) as this is where much of the overlap between wind energy and SPAs occurs.

Six such SPAs are designated across Ireland, with some since having been also designated for the protection of other bird species. The designated SPAs cover very large areas, often crossing county boundaries, and are typically in elevated areas which were identified as being most suitable for wind farm development in the earlier years of the wind industry in Ireland, due to the higher wind speeds at higher elevations. The details of the SPAs designated for breeding Hen Harrier are provided in Table 6.1 below.

Table 6.1 Special protection areas designated for breeding Hen Harrier

Site Code	Site Name	County	Land Area (hectares)
IE0004160	Slieve Bloom Mountains SPA	Laois / Offaly	21,771
IE0004161	Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	Limerick / Cork / Kerry	56,610
IE0004162	Mullaghanish to Musheramore Mountains SPA	Cork	4,961
IE0004165	Slievefelim to Silvermines Mountains SPA	Limerick / Tipperary	20,917
IE0004167	Slieve Beagh SPA	Monaghan	3,449
IE0004168	Slieve Aughty Mountains SPA	Galway / Clare	59,407

It is of note that *'The 2022 National Survey of breeding Hen Harrier in Ireland'*[3], the breeding population of the species was found to have declined by one third since 2015, with its range having

[3] *Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., J. Bailey, & O'Toole, L. (2024). The 2022 National Survey of breeding Hen Harrier in Ireland. Report prepared by Irish Raptor Study Group (IRSG), BirdWatch Ireland (BWI), Golden Eagle Trust (GET) for National Parks & Wildlife Service (NPWS). Irish Wildlife Manuals, No. 147. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.*
https://www.npws.ie/sites/default/files/publications/pdf/IWM147.pdf

declined by 27% for the same period. Overall, the SPA populations have declined by more than half (54 %) in the same period.

The populations of five of the SPAs have declined by between 20% and 80% since 2007, when they were identified for designation. In the same period, the population for only one SPA (Slieve Bloom Mountains SPA) has increased (12%). There are no wind farms in this SPA and only two within five kilometres. The report cites wind energy production as being among the pressures and threats facing breeding hen harrier in Ireland.

In addition, the National Parks and Wildlife Service (NPWS) have prepared a *'Draft Threat Response Plan for Hen Harrier 2024 – 2028*[4] for which the consultation period has recently closed. This document also identifies wind energy development as being among the main pressures and threats affecting hen harrier.

However, national and European policy sets ambitious targets for the expansion of renewable energy throughout Ireland and the EU and promotes the large-scale expansion of onshore wind energy. If the targets are to be met, the extension of life and/or repowering of existing wind farms both within and outside Ireland's SPAs will be critical.

Of particular relevance is the REPowerEU[5], launched in May 2022 which was the first EU communication to recognise renewable energy developments as being in the "overriding public interest". REPowerEU was reinforced by the Directive EU 2023/2413 (RED III), adopted on 18th October 2023, which amended the EU's Renewable Energy Directive, and particularly Article 16f, which states:

> *"By 21 February 2024, until climate neutrality is achieved, Member States shall ensure that, in the permit-granting procedure, the planning, construction and operation of renewable energy plants, the connection of such plants to the grid, the related grid itself, and storage assets are presumed as* ***being in the overriding public interest*** *and serving public health and safety when balancing legal interests in individual cases for the purposes of Article 6(4) and Article 16(1), point (c), of Directive 92/43/EEC, Article 4(7) of Directive 2000/60/EC and Article 9(1), point (a), of Directive 2009/147/EC. Member States may, in duly justified and specific circumstances, restrict the application of this Article to certain parts of their territory, to certain types of technology or to projects with certain technical characteristics in accordance with the priorities set out in their integrated national energy and climate plans submitted pursuant to Articles 3 and 14 of Regulation (EU) 2018/1999. Member States shall inform the Commission of such restrictions, together with the reasons therefor."*

The situations described in the preceding paragraphs highlight the potential conflicts between the necessary utilisation or expansion of existing wind energy developments in SPAs to meet the Country's ambitious renewable energy targets and the need to protect and restore the populations of a critically endangered breeding bird species. This potential conflict highlights two of the greatest challenges of our time, the climate and biodiversity crises.

In light of the above, it is imperative that a solution is found that allows both objectives to be met. Innovative and collaborative solutions will be required to achieve the desired outcomes for all parties involved.

Heretofore, two planning permission applications have sought to extend the operational period of existing wind farms within an SPA. In the first, which was refused planning permission, insufficient assessment of impacts on hen harrier to inform the Appropriate Assessment was among the refusal reasons (Taurbeg Wind Farm, Co. Cork; Pl.Ref.No. 16/06366). In the second, An Bord Pleanála

[4] https://assets.gov.ie/280564/9d8def6b-05da-406d-a7d7-2bfdbf28891c.pdf
[5] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

recently granted planning permission for another project (Knockastanna Wind Farm, Co. Limerick Pl.Ref.No. 22/646) after an earlier decision to refuse permission by Limerick City and County Council.

Site-Specific Conservation Objectives (SSCOs) were not available for the relevant SPAs until September 2022 at the earliest. The absence of such detailed objectives created ambiguity for both wind farm applicants and planning authorities in assessing the potential for adverse effects on the SPAs and made it difficult to definitively conclude on the presence or absence of such effects. SSCOs are now available for all the hen harrier SPAs and provide very clear attributes and targets for the protection of the species and it's habitat within the SPAs.

This research task will highlight the particular challenges associated with the repowering of the operational wind farm projects in the SPAs designated for the protection of hen harrier . The quantum of operational wind farms within or in close proximity to the designated SPAs will also be quantified.

Having quantified the number of wind farms and the installed capacities of wind energy potentially at risk if they cannot be successfully retained or repowered, this section of the report discusses various potential mechanisms for repowering within and adjacent to SPAs, whilst addressing the requirements of the EU Habitats Directive. The advice provided first considers the potential to proceed through the Appropriate Assessment process (Article 6(3) of the EU Habitats Directive. It then considers how it may be possible to proceed following a different approach through the Imperative Reasons of Overriding Public Interest (IROPI) route under Article 6(4) of the same Directive.

The advice provided in this research is given with specific reference to the provisions of the SSCOs for the relevant SPAs[6] (which are very similar for the six hen harrier SPAs) and the Conservation Objectives Supporting Document: Breeding Hen Harrier (Version 1. September 2022)[7].

A strategy is suggested to guide the repowering of the wind farm projects located within or adjacent to SPAs, taking account of the requirements under the EU Habitats and Birds Directives.

6.2 Quantifying Capacity within and Adjacent to SPAs

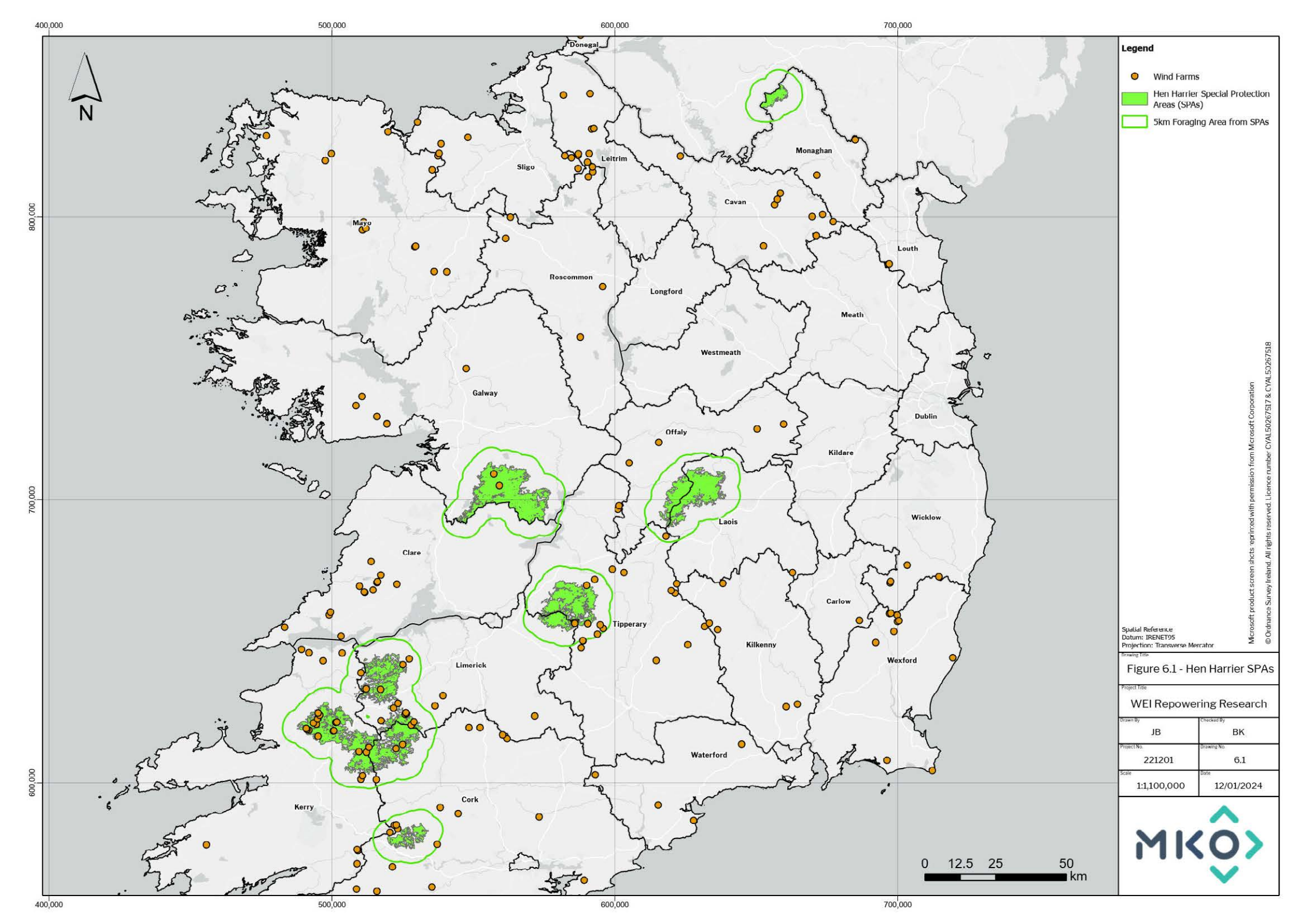
6.2.1 Methodology

To quantify the number and generating capacity of the wind farms located in and in proximity to the Hen Harrier SPAs, the 279 wind farms mapped and classified in earlier research tasks, were mapped relative to the SPAs.

Around each of the SPAs, a five kilometre buffer zone was also drawn. Five kilometres is referred to in site specific conservation objectives (SSCOs) for each SPA as being the distance from the nest site or centre of their territory that breeding pairs predominantly use, though they can travel further. Although the extent of the SPAs was originally determined as the area that lies within 5km of all recorded nest sites, the five kilometre buffer zone shown on Figure 6.1 takes account of the fact the nest sites regularly move, and could have moved towards the edge of the currently designated area, since the SPAs were first designated or the nest sites on which the SPA is based were first recorded.

Using GIS software, intersect queries were used to establish the number of operational wind farms, and the number of megawatts (MEC) both within the SPAs, and within the 5km buffer zone of the SPA boundaries.

[6] https://www.npws.ie/protected-sites/spa
[7] https://www.npws.ie/sites/default/files/publications/pdf/Conservation%20objectives%20supporting%20document%20-%20Breeding%20Hen%20Harrier%20%5BVersion%201%5D.pdf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Wind Farms
Hen Harrier Special Protection Areas (SPAs)
5km Foraging Area from SPAs
Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517 & CYAL53267518
Spatial Reference
Datum: IRENET95
Projection: Transverse Mercator
Drawing Title
Figure 6.1 - Hen Harrier SPAs
Project Title
WEI Repowering Research
Drawn By
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Project No.
221201
Drawing No.
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Date
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6.2.2 Results

The number of operational wind farms within and adjacent (5km) to SPAs in Ireland and the associated number of megawatts are presented in Tables 6.2, 6.3 and 6.4 below. The location of these wind farms relative to the SPAs is shown in Figure 6.1.

Table 6.2 Wind farms located within designated SPAs

SPA Site Name	No. of Operational Wind Farms	MW Capacity (MEC)
Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	29	617.46MW
Slievefelim to Silvermines Mountains SPA	3	48.30MW
Slieve Aughty Mountains SPA	2	67.15MW
Totals:	**34**	**732.91MW**

Table 6.3 Wind farms located within 5km buffer zone of designated SPAs

SPA Site Name	No. of Operational Wind Farms	MW Capacity (MEC)
Slieve Bloom Mountains SPA	2	35.95MW
Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	11	124.23MW
Mullaghanish to Musheramore Mountains SPA	6	107.56MW
Slievefelim to Silvermines Mountains SPA	5	79.99MW
Totals:	**24**	**347.73MW**

Table 6.4 Wind farms located both within and within 5km buffer zone of designated SPAs

SPA Site Name	No. of Operational Wind Farms	MW Capacity (MEC)
Slieve Bloom Mountains SPA	2	35.95MW
Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	40	741.69MW
Mullaghanish to Musheramore Mountains SPA	6	107.56MW
Slievefelim to Silvermines Mountains SPA	8	128.29MW
Slieve Aughty Mountains SPA	2	67.15MW
Totals:	**58**	**1,080.64MW**

6.3 Analysis of Key Issues

6.3.1 Article 6(3) Appropriate Assessment

This research has considered the requirements of either repowering or extending the duration of the operational wind farms within or adjacent to SPAs. It is considered that in many cases, there is the potential for a Competent Authority to conclude that a proposed repowering or extension of life within or immediately adjacent to an SPA, individually or in combination with other plans or projects (even with mitigation) will adversely affect the integrity of the relevant SPA. Given that compensation cannot be relied upon to reach a favourable conclusion under the Article 6(3) process, in these cases, it would

result in a negative assessment of the implications for the site. The reasoning behind this conclusion is provided below.

The overall Conservation Objective for all relevant SPAs reads as follows:

> ***'To restore the favourable conservation condition of hen harrier in [the] SPA, which is defined by the following list of attributes and targets'***

The individual targets and attributes are listed in the site-specific conservation objectives (SSCO) documents and differ only slightly across the six relevant SPAs with certain target figures being specific to a particular SPA. Whilst all the targets and attributes are relevant to this research, the following individual attribute and associated target is highlighted as being of particular relevance.

> ***Attribute:*** *Spatial Utilisation by Breeding Pairs*
>
> ***Target:*** *Restore the spatial utilisation of the SPA by breeding pairs to at least ...* ***(Varies between 68% and 100% depending on the SPA)***
>
> ***Notes:*** *Optimal resilience depends on breeding pairs utilising the SPA to the maximum extent possible. The spatial distribution of breeding pairs is expressed by the proportion of the SPA being used by them. Breeding pairs predominantly use the area within 5km of their nest site or centre of territory, though they can travel further (e.g. Irwin et al., 2012; Arroyo et al., 2014). Thus, the core area used by confirmed pairs can be broadly and generically estimated by calculating the portion that lies within 5km of all recorded nest sites. Ideally, the breeding population should be well dispersed around the SPA. The target range for this attribute for this SPA is informed by the first two national surveys of 1998– 2001 and 2005*

It is of note that the baseline spatial distribution of hen harrier within the SPAs is based on a five kilometre buffer surrounding all known nest sites. SPA boundaries were originally drawn up based on five kilometre territories surrounding nests that were recorded in the first two National Surveys (1998 – 2001 and 2005). This approach is explained in Section 2.3 of the Conservation Objectives Supporting Document: Breeding Hen Harrier (Version 1. September 2022). The baseline of spatial utilisation predates the construction of many of the wind farms (if not the grants of permission for a wind farms). Therefore, the target to restore the spatial utilisation by hen harrier of specific percentages in specific SPAs, is likely to include the spatial area occupied by and surrounding the majority of wind farms within the relevant SPAs and may also extend to the adjacent areas. Therefore, even though a wind farm may have been constructed prior to the designation of the SPA, the baseline conditions to which the SPA must be restored may not include the wind farm. Each wind farm in or within the vicinity of an SPA that is being considered for repowering or extension of life of its planning permission, would have to be considered on a case-by-base basis in terms of whether its original planning permission predated the first hen harrier national survey in 1998-2001. It is likely that only those wind farms that predate the first hen harrier national survey could be considered to be part of the pre-designation baseline.

It is worth noting that the targets for population sizes are also based on the results of the first two national hen harrier surveys (1998-2001 and 2005). This further confirms that the baseline conditions, which are required to be restored (in relation at least to these two attributes) are those recorded in the first two national hen harrier surveys.

In many cases. the restoration of spatial utilisation within SPAs may be limited by the retention or repowering of an existing wind farm. This could prevent the achievement of the minimum percentage restoration of spatial utilisation of the relevant SPA by hen harrier. This is particularly true when considering the cumulative assessment of more than one wind farm within an SPA.

A further consideration is how the targets of the spatial utilisation attribute is linked to the other Conservation Objective attributes. The spatial utilisation target is inextricably linked to the underlying

habitats of the SPA, as hen harriers favour certain habitats over others. Breeding hen harrier favour heath, bog and low-intensity grassland and also utilise young forestry before the canopy closes. The link between attributes is highlighted in The Conservation Objectives Supporting Document: Breeding Hen Harrier, which notes:

> ***"In addition, the 'spatial utilisation of SPAs by breeding pairs' is inextricably linked with the remaining attributes set out in this document e.g. meeting targets set out for the attribute 'extent and condition of heath and bog' will likely help support the target set out for the spatial utilisation by breeding pairs across the network."***

As outlined in the Conservation of Objectives for all relevant SPAs the example 'extent and condition of heath and bog' attribute is defined as follows:

> ***Attribute:*** *Extent and condition of heath and bog and associated habitats*
>
> ***Target:*** *Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.*
>
> ***Notes:*** *Open heath and bog occur in mosaics and often with other semi-natural habitats (e.g. scrub). These habitats can provide important nesting and foraging resources for the breeding population providing they are in suitable condition. Based on the habitat mapping of Moran and Wilson-Parr (2015), the estimated total extent of these habitats in this SPA is xxxha [depending on the SPA]. Qualitative aspects were not assessed by Moran and Wilson-Parr (2015), but some important aspects to consider are the habitats' structure, soil integrity and overall open habitat coherence.*

As breeding hen harrier favour heath and bog these open habitats can act as 'stepping stones' within the large blocks of monoculture commercial forestry that are present throughout the hen harrier SPA network. Without these open habitat 'stepping stones', by chance hen harrier could be excluded from a large proportion of the SPA if all the forestry in a given area matured at the same time. Thus, undermining the spatial utilisation target. While the extent and condition of heath and bog attribute is specifically mentioned as an example in The Conservation Objectives Supporting Document the same supporting function is also true of other attributes such as the *'extent and condition of low-intensity managed grasslands and associated habitats'*. The Hen Harrier Threat Response Plan 2024-2028 identifies the strategic management of open habitats (as undertaken in the Slieve Blooms SPA) as a means of improving breeding success. Restoring the extent and condition of such open habitats (e.g. heath/bog and grassland) is likely to be considered a priority within the SPA network.

It is likely that underlying '*heath and bog and associated habitat'* or '*low-intensity managed grasslands and associated habitats'* habitats could be successfully restored within and surrounding wind farms. However, these restored habitats of the wind farm may not result in favourable habitat for hen harrier due to the presence of turbines and the associated displacement effect (Pearce-Higgins et al., 2009; Ruddock and Whitfield 2007). Therefore, depending on the site-specific habitat characteristics, the existence of a wind farm may undermine the quality of the habitat for hen harrier.

When considering whether to proceed with a repowering or extension of life project within or adjacent to a hen harrier SPA, the following points must be considered on a project-specific and site-specific basis:

1. *Was the wind farm permitted or constructed prior to the first national hen harrier survey in 1998?*
2. *What are the targets for spatial utilisation in the relevant SPA and can they be achieved with the wind farm in place?*
3. *Are any of the other Site-Specific Targets and Objectives unachievable in conjunction with the proposed repowering or extension of life .*

There may be cases where projects can proceed within or adjacent to SPAs via the Article 6(3) Appropriate Assessment process. However, there will likely be many cases where this route will not be possible and an alternative approach following the Article 6(4) IROPI (imperative reasons of overriding public interest) route must be pursued.

6.3.2 Article 6(4) IROPI

In many repowering or extension of life planning applications within or adjacent to a hen harrier SPA, there is potential for a negative outcome to any Appropriate Assessment undertaken under Article 6(3). In such cases, Article 6(4) provides an alternative pathway. The consideration in relation to proceeding via Article 6(4) of Council Directive 92/43/EEC (The EU Habitats Directive) is provided below.

Article 6(4) states:

> *'If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.'*

Article 6(4) has been used on only a few occasions in Ireland and is commonly referred to as IROPI. It has been successfully applied but requires justification as to:

1. *Whether the development can be carried out for* ***imperative reasons of overriding public interest (IROPI).*** *This is a decision made by the Competent Authority, not the developer.*
2. *Is there an absence of alternative solutions?*
3. *Have adequate compensatory measures been applied to ensure that the coherence of the Natura network is protected?*

Each of these three justifications are discussed below.

6.3.2.1 Classification of project as IROPI

Directive EU 2023/2413 (RED III), adopted on 18th October 2023, amended the EU's Renewable Energy Directive and introduced a number of new provisions relating to IROPI and the potential effects of renewable energy projects on species such as hen harrier that are protected under the EU Birds Directive (Directive 2009/147/EC).

The classification of renewable energy projects as being in the overriding public interest, is introduced by way of a new Article 16f, which states:

> *"By 21 February 2024, until climate neutrality is achieved, Member States shall ensure that, in the permit-granting procedure, the planning, construction and operation of renewable energy plants, the connection of such plants to the grid, the related grid itself, and storage assets are presumed as* ***being in the overriding public interest*** *and serving public health and safety when balancing legal interests in individual cases for the purposes of Article 6(4) and Article 16(1), point (c), of Directive 92/43/EEC, Article 4(7) of Directive 2000/60/EC and Article 9(1), point (a), of Directive 2009/147/EC. Member States may, in duly justified and specific circumstances, restrict the application of this Article to certain parts of their territory, to certain types of technology or to projects with certain technical characteristics in accordance with the priorities set out in their integrated national energy and climate plans submitted pursuant to Articles 3 and 14 of Regulation (EU) 2018/1999. Member States shall inform the Commission of such restrictions, together with the reasons therefor."*

In the absence of the classification of renewable energy projects as being in the overriding public interest for the purposes of Article 6(4) of the Directive 92/43/EEC, it would have been difficult to credibly argue that any one wind farm project would have justifiably met the IROPI test. Article 16f, as shown above, creates a strong case for determining that renewable energy plants can be considered IROPI.

Notwithstanding the now-adopted European law, with 732MW of wind energy generating capacity currently installed within the Irish SPAs, and a further 347MW installed within five kilometres of an Irish SPA, the collective 1+GW would be of a scale such that the renewable energy produced would be in the overriding public interest.

A number of further provisions on the RED III Directive EU 2023/2413 clearly indicate the intention of European legislation to consider renewable energy development as appropriate and necessary, even where the potential exists for impacts on protected birds and other species and habitats. These include the following (key text underlined):

Article 16b
Permit-granting procedure outside renewables acceleration areas

2. Where an environmental assessment is required pursuant to Directive 2011/92/EU or 92/43/EEC, it shall be carried out in a single procedure that combines all relevant assessments for a given renewable energy project. When any such environmental impact assessment is required, the competent authority, taking into account the information provided by the project developer, shall issue an opinion on the scope and level of detail of the information to be included by the project developer in the environmental impact assessment report, of which the scope shall not be extended subsequently. Where a renewable energy project has adopted necessary mitigation measures, any killing or disturbance of the species protected under Article 12(1) of Directive 92/43/EEC and Article 5 of Directive 2009/147/EC shall not be considered to be deliberate. Where novel mitigation measures to prevent as much as possible the killing or disturbance of species protected under Directives 92/43/EEC and 2009/147/EC, or any other environmental impact, have not been widely tested as regards their effectiveness, Member States may allow their use for one or several pilot projects for a limited time period, provided that the effectiveness of such mitigation measures is closely monitored and appropriate steps are taken immediately if they do not prove to be effective.

On the basis of the above, it is considered likely that adequate justification could be made that the extension of life or repowering of wind farms within or adjacent to Irish SPAs, is of overriding public interest. There is no consideration of the scale of the development in the above text and therefore a credible case could be made that all renewable energy developments may be considered IROPI regardless of scale, until carbon neutrality is achieved.

6.3.2.2 Alternative Solutions

A credible case could be made relating to the time, biodiversity, carbon and wider environmental benefits accruing from the use of existing infrastructure to produce renewable energy. Any alternatives could be argued to be less desirable as they would likely lead to an overall higher level of environmental impact as they would require the construction of wholly new infrastructure. If it was not possible to repower the existing wind farms located in or adjacent to SPAs, all the existing site road, electricity substation, electricity transmission and other infrastructure that serves and facilitates the existing wind farms, would become redundant. The environmental impact associated with putting that infrastructure in place when the existing wind farms were first built was considered acceptable and the projects were considered to be in the interest of proper planning and sustainable development at that time. Should such infrastructure be made redundant through it not being possible to repower those wind farms, the same infrastructure will have to be constructed anew elsewhere, which makes little

practical sense in the midst of a climate emergency where international, European and national policy are all pointing towards more, not less, renewable energy being required to decarbonise the economy.

6.3.2.3 Compensation

Article 6(4) requires that any adverse effects are fully compensated for. The first step in this process in the context of the repowering of a wind farm in an SPA, would be to fully quantify the effects on the SPA from the repowering. This would be done through surveys and through calculation of area of potential hen harrier habitat lost as a result of the development. In this case, it is particularly relevant to spatial distribution throughout the SPA.

Following the quantification of the impact on the SPA, adequate compensation must be provided to ensure that the overall coherence of Natura 2000 Network is protected. This may be achieved by creating or restoring habitat for hen harrier outside the SPA such that any habitat that is lost as a result of the development is provided for in addition to that which is already available or has potential to be restored within the SPA. For example, this could be achieved through the felling of forestry or implementation of management agreements with local landowners to restore habitat for hen harrier outside the SPA.

It may also be possible to create or restore habitat within the SPA. If proposing to create or restore habitats within the SPA, it would be necessary to demonstrate that any compensation provided in this form would be additional to whatever is already required to fulfil the conservation objectives.

Any compensation measures would need Ministerial approval to fulfil the Article 6(4) process. In practice this is likely to require agreement from the National Parks and Wildlife Service (NPWS) in respect of any mitigation and compensation measures proposed. This will likely require a high level of collaboration and liaison between individual project teams and the NPWS on a project by project level. It will likely also require collaboration at a policy level to ensure that a consistent approach is taken throughout the country.

6.4 Chronology of Actions for Repowering in or adjacent to an SPA

The following text sets out a potential chronology of actions for proceeding with a proposed extension of life or repowering application within or adjacent to an SPA.

When following either route, an EIAR (or equivalent environmental report), Natura Impact Statement (NIS) and all relevant ecological surveys to accompany a planning application must be undertaken.

Following these assessments, if it is concluded that the project can be progressed without resulting in an adverse effect on any European Sites, alone or in-combination with any other plans or projects and taking into account the considerations set out above in this document; then it may proceed following the Article 6(3) route and require the competent authority to carry out an Appropriate Assessment.

However, in many cases the NIS may find that there is potential for an adverse effect on the SPA and will quantify that effect and thus will come to a negative conclusion in respect of Appropriate Assessment. In these cases, a potential chronology is set out below for proceeding via the IROPI route:

1. *A case must be made to the Competent Authority (An Bord Pleanála or local planning authority) that the development constitutes as IROPI and should proceed via Article 6(4).*
2. *It must be demonstrated that there are no alternative solutions.*

3. *Compensation proposals, management/restoration plans must be developed for agreement with the National Park sand Wildlife Service (NPWS).*
4. *Once agreed, the Competent Authority can proceed under Article 6(4) of the Habitats Directive and the project can potentially be approved by way of Ministerial consent.*

The main risks identified with the above procedure include:

- Development may not be determined to constitute an IROPI project by the Competent Authority.
- The Competent Authority may conclude that there are alternative solutions.
- It may not prove possible to agree with the NPWS on the compensation to be provided and the compensation proposals may not be consented by the Minister for Housing, Local Government and Heritage.
- The Article 6(4) IROPI process is a relatively untested procedure in the Republic of Ireland having only been used twice. However there is established precedent for its use in wind farm developments in other European jurisdictions, even prior to the adoption of Directive EU 2023/2413 (RED III).
- The timescale involved in securing permission following the suggested route (or indeed any other route), may not result in a grant of permission in the required timeframe.

6.5 Recommendations

When considering repowering or extending the life of existing wind farms within SPAs that are designated for the protection of hen harrier, the conservation status of the species in Ireland and the steep decline of its breeding population and associated threats and pressures, must be taken into account.

Any wind farm development within or adjacent to any SPA that is designated for hen harrier must demonstrate that it will not result in an adverse effect on the species. As described above, this may be either through the Appropriate Assessment Article 6(3) process or through the Article 6(4) process.

It is our opinion that the repowering or extension of life of wind farms within and adjacent to SPAs that are designated for hen harrier can not only be achieved without resulting in adverse effects on those SPAs but can in fact contribute significantly to the conservation of the species both within and outside the SPA network. It would also contribute significantly and importantly to achieving the national renewable energy targets. The following paragraphs set out our consideration of how this may be achieved.

Whilst each repowering application will need to be considered on a case-by-case basis, it would be beneficial for each development where the application of Article 6(3) has resulted in a negative outcome, to be presumed IROPI unless otherwise demonstrated. This would allow such applications to proceed via the Article 6(4) process, allowing for meaningful compensation to be applied.

Whether proceeding under Article 6(3) or Article 6(4), wind farm developers would have the opportunity to undertake large scale conservation, habitat creation and enhancement in line with those actions that are set out in Section 7 of the hen harrier threat response plan. The wind energy sector could assist in the delivery of strategic measures to conserve hen harrier within SPAs and elsewhere throughout the State. The wind energy sector has the potential to more than compensate for any negative effects it may be having on hen harrier through the application of significantly funded, organised, monitored, strategic and collaborative actions to enhance hen harrier habitat both within and outside SPAs.

The NPWS have the opportunity to effectively regulate and co-ordinate these actions and to ensure that they achieve the desired outcome, which ultimately is to improve the conservation status of hen harrier in Ireland.

The above approach would assist in resolving the identified conflict between two equally valid crises; the need to restore the conservation status of hen harrier as a breeding species; and the requirement to continue to use the existing wind farms within and adjacent to SPAs in order to meet Irelands targets for renewable energy production.

To take advantage of the above opportunity, it must be accepted that the repowering of wind farms within and adjacent to SPAs has the presumption of being of overriding public interest, unless otherwise proven on a case-by-case basis. It will also be necessary to agree the nature and scale of compensation/enhancement that will be required from each repowering development to offset any potential impact they may be having on hen harrier. There is also potential for the compensation/ enhancement associated with the repowering of wind farms to result in net gains for hen harrier ecology and conservation.

This will require confirmation at a Government level to, in principle, facilitate the repowering of the existing wind farm projects located within or adjacent to the Irish SPAs. This will be subject to the normal requirements of proper planning and sustainable development and ensuring that it does not result in adverse effects on the environment that cannot be mitigated or compensated for.

Further, it is considered vital that there is constructive engagement with the National Parks and Wildlife Service at both the local (project specific) and national (policy) levels. It will be necessary for the operators of existing wind farms to be aware of the likely actions that will be required from them to protect and conserve hen harrier at an early stage in planning the future of an existing wind farm project.

There is a significant opportunity for wind farm operators to assist in the implementation of specific hen harrier conservation measures, that may be prescribed in an integrated management plan for each hen harrier SPA, to meet the relevant conservation objectives. Any such management plan would have to reflect, support or build on the provisions and actions that are set out in the Hen Harrier Threat Response Plan. In the absence of an integrated plan for the management of an SPA, typical measures that reflect the actions of the Threat Response Plan, and which are accepted as beneficial for hen harrier, could be compiled into a guidance document or 'tool kit' of compensation/enhancement measures. Such measures could then be implemented on a project-specific basis to deliver defined hen harrier conservation benefits from each wind farm repowering project.

The requirement for collaboration between all relevant stakeholders is reflected in one of the Key Topics identified in the Section 7 of the Hen Harrier Threat Response Plan, which reads:

'Explore opportunities for collaboration to facilitate restoration of the hen harrier SPAs'

In final conclusion, it is clear that there is a pathway by which the restoration of favourable conservation status of hen harrier within SPAs can be significantly aided and facilitated by the repowering of wind farms in the SPAs. The wind energy industry is in a unique position to fund and deliver, significant management interventions to benefit hen harrier. It is clear also that, the repowering or life extension of wind farms within SPAs is not necessarily incompatible with the achievement of favourable conservation status of hen harrier. However, this pathway will require a significant level of collaboration between stakeholders to balance the respective objectives and requirements for renewable energy and nature conservation, resulting in a mutually beneficial outcome. This will require a clear signal from Government that policy on both biodiversity and climate requires the retention or repowering of the existing wind farms within SPAs, while simultaneously ensuring the conservation objectives for hen harrier are achieved.