



ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION



ELEMENT POWER IRELAND LTD.

**ENVIRONMENTAL IMPACT STATEMENT FOR THE
PROPOSED MAIGHNE WIND FARM, IN COUNTY
KILDARE AND COUNTY MEATH**

VOLUME 2 – MAIN EIS

CHAPTER 16 – TELECOMMUNICATIONS AND AVIATION

MARCH 2015



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16 TELECOMMUNICATIONS AND AVIATION

16.1 Introduction

This chapter has been prepared to examine the potential impact from the proposed Maighne Wind Farm, which is located in Counties Kildare and Meath, on local telecommunications services and aviation. The effects of the proposed development are considered, taking account of mitigation measures to eliminate any anticipated or residual impacts.

16.1.1 Study Area

The site boundary for the proposed Maighne Wind Farm is illustrated in Figure 2.1.0 which is included in the Figures and Drawings Volume 2a. The development consists of the erection of up to 47 no. wind turbines with a tip height of up to 169m, access tracks, a sub-station, borrow pits and associated works, cabling, temporary construction compounds as well as minor alterations to the public road for the delivery of turbines to the site (turbine delivery route).

The proposed turbines are sited (or located) within five wind farm clusters. The clusters are Ballynakill (10 turbines), Windmill (3 turbines), Drehid Hortland (21 turbines), Derrybrennan (2 turbines) and Cloncumber (11 turbines). All clusters are connected via underground medium voltage (MV) cables which run predominately along the public road network linking back to a proposed sub-station on-site at Drehid. Here the power will be converted to AC up to a maximum voltage of 220kV for export to the Irish national grid via high voltage (HV) underground cables to either one of two existing substations located at Woodlands, Co. Meath or Maynooth, Co. Kildare.

16.2 Telecommunications

In the context of wind farm development, electromagnetic interference is the impact of a wind farm on existing telecommunication services resulting in an unacceptable negative impact. The rotating blades of a wind turbine can occasionally cause interference to electro-magnetically-propagated signals. Such interference could, in theory, affect all forms of electromagnetic communications including:

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

Impacts on aviation are considered separately in Section 16.3 of this Chapter.

For the purposes of the telecommunications impact assessment, point-to-point and point-to-multipoint signals are considered, both are used extensively throughout Ireland.

Point to point (or line of sight) is a wireless telecommunications transmission link between two nodes located at specified fixed points. The term telecommunications link relates to the wireless transmission of data via radio frequencies between two fixed points. Telecommunications towers are generally used to transmit and receive signals over large distances. Radio frequency bands above 1 GHz are referred to as microwave radio links and are commonly used by telecommunications operators. These 'links' are used mainly by mobile phone operators, broadcasters and utilities or emergency service providers, to provide transmission networks that are flexible and cost effective.

Point to multipoint refers to the situation where a central node transmits to, and receives from, a number of independent locations. This includes television and radio broadcasting and reception, mobile phones (to the mobile phone mast) and land mobile systems. It is possible that houses in the immediate vicinity of the turbines could require some remedial measures in relation to television reception.

Section 5.10 of the DoEHLG Planning Guidelines on Wind Energy Developments (2006)ⁱ [the guidelines] states that:

"wind turbines, like all electrical equipment, produce electromagnetic radiation, and this can interfere with broadcast communications. The interference with broadcast communication can be overcome by the installation of deflectors or repeaters. Planning authorities should advise the developer to contact the individual broadcasters, both national and local, and inform them of the proposals. A list of the licensed operators is available on the ComReg website at www.comreg.ie. Mobile phone operators should also be advised of the proposed development."

On that basis, consultation was carried out with all known telecommunications operators (TO's) that could potentially be affected by the proposed wind farm. During a lengthy consultation phase lasting over 12 months the majority of the TO's provided the locations of their existing masts and telecommunications links. A comprehensive database of all known telecommunications links in the area was gathered and used to map all known telecommunications links in the vicinity of the proposed wind farm¹.

However, the telecommunications network is constantly evolving and the potential impact of Maighne Wind Farm on local telecommunications signals is difficult to accurately predict for the following reasons:

- The network topology is likely to change significantly in the next few years as result of technological advances including migration towards 4G and the impending 5G
- Network operators are beginning to share services and consolidate the existing network which is likely to lead to an increase in the number of redundant and decommissioned services.

A key objective of the assessment process is to identify turbines in close proximity to existing masts and telecommunication links with a view to relocating turbines that could potentially impact on local telecommunication operations. If a turbine could not be relocated due to other site constraints, further consultation was carried out with the affected TO's to consider the potential impact and agree an appropriate mitigation strategy if required.

It is possible that telecommunication services in the immediate vicinity of the turbines could require mitigation measures to negate any potential impact. Accordingly, the Developer has given an undertaking to cover the cost of implementing the necessary mitigation measures to prevent any degradation of service that is currently provided.

16.2.1 Methodology

This section presents the methodology used in assessing the potential impact from the wind farm on local telecommunications services. The following sources of information were considered in this assessment:

- The design layout of the proposed development
- Published literature as described below
- A desk-based assessment of the existing telecommunications network

The following assessment methodology was applied in this assessment:

- Wide ranging **consultation** with all known telecommunications operators (TO's) that could potentially be affected by the proposed wind farm
- Comprehensive **data gathering** exercise to establish all known telecommunications links in the area
- Preparation of **constraint mapping** using data collected from the TO's, to identify turbines within specified separation distance from existing telecommunications links and masts
- Preliminary **Telecommunications Impact Assessment** (TIA) including the following:
 - Further consultation with affected TO's if necessary to discuss residual impacts, identify critical telecommunications links and agree mitigation strategy. Ripplecom was the only TO that required additional further consultation which is discussed further in section 16.2.9.
- Undertaking by the Developer to implement an appropriate **mitigation strategy**, in conjunction with the relevant TO, to eliminate any anticipated or residual impacts.

¹ Note: this information was provided by the TO's under a non-disclosure agreement to protect the commercially sensitive nature of each operators telecommunications infrastructure and therefore these maps have not been included in this report.

16.2.2 Relevant Guidance

A review of relevant planning and policy documents was undertaken to identify relevant objectives relating to telecommunication. The following documents have been reviewed:

- Sustainable Development: A Strategy for Ireland, Department of the Environment, 1997
- 'Wind Energy Development Planning Guidelines', published by the Department of the Environment, Heritage and Local Government (2006)
- 'Best Practice Guidelines for the Irish Wind Energy Industry', published by the Irish Wind Energy Association (2012)
- Kildare County Development Plan 2011-2017
- Meath County Development Plan 2013-2019
- Telecommunications Antennae and Support Structures – Guidelines for Planning Authorities, Department of the Environment, 1996.

16.2.3 Consultation and Data Gathering

In line with the Best Practice Guidelines, comprehensive consultation was undertaken to provide information on the proposed development to all relevant telecommunications service providers and to discuss concerns and the potential for benefits of the proposed wind farm. Responses relating to telecommunications, which were received following consultations with the relevant bodies, are summarised in Chapter 4 of this EIS.

During a lengthy consultation phase lasting over 12 months, the majority of the TO's provided the locations of their existing masts and telecommunications links. A comprehensive database of all known telecommunications links in the area was gathered and used to map all known telecommunications links in the vicinity of the proposed wind farm.

The following TO's have provided information regarding existing telecommunication links in the area:

- | | |
|--|--------------------|
| • RTÉ | • Eircom |
| • Meteor Mobile Communications Ltd. (Mosaic) | • UPC Ireland Ltd |
| • O ₂ Ireland (Mosaic) | • Ripplecom |
| • Vodafone (Netshare) | • ESB Telecoms |
| • Three (BT Communications Irelands Ltd) | • TowerCom Ltd |
| • Exigent | • Tetra |
| • BT Communications Irelands Ltd | • Aptus Broad Band |
| • Irish Broadband/Imagine | |

16.2.4 Constraints Mapping

MapInfo Professional, a geographic analysis application, was used to map and process the telecommunications data. Turbines in close proximity to existing masts and links which could potentially impact on existing telecommunication services could be identified for further assessment. The information was provided by the TO's under a non-disclosure agreement to protect the commercially sensitive nature of each operators telecommunications infrastructure and therefore these maps have not been included in this report. An extract from the constraints map in the vicinity of Derrybrennan cluster is shown in Figure 16.1 for demonstration purposes.

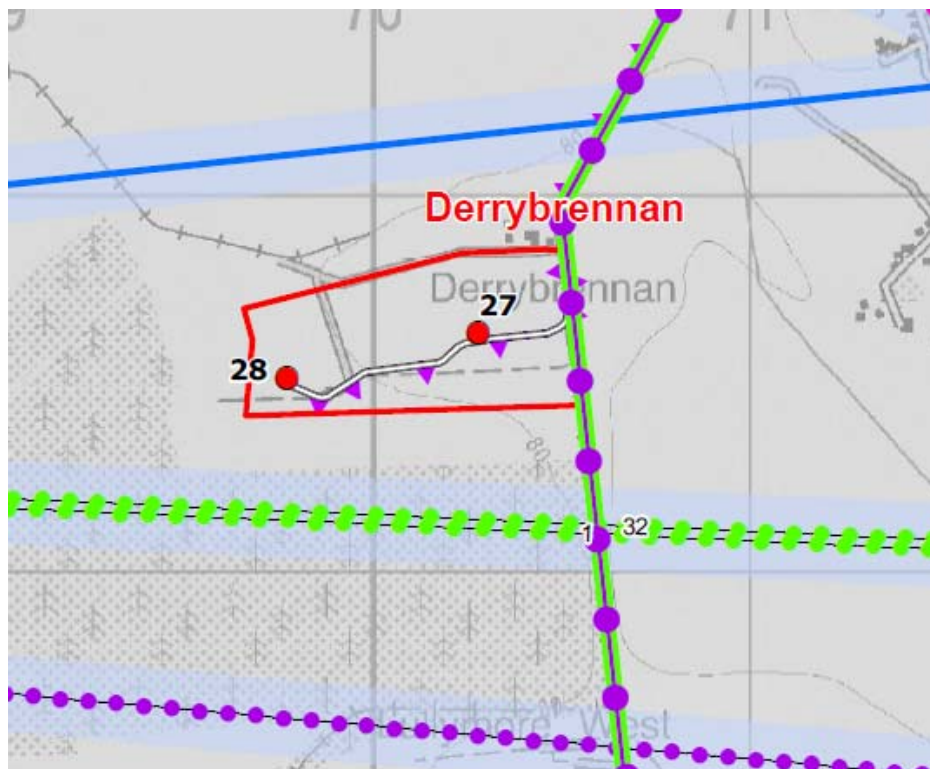


Figure 1: Telecommunications Corridor

16.2.5 Characterising the impact by separation distance

In many cases, impacts can be sufficiently characterised and mitigated implementing a separation distance and ensuring the area is free from wind turbines. The separation distance required depends on the specific parameters of each telecommunication signal. Following detailed discussion with the TO's, a separation distance was selected of 100m to all known telecommunications links and 250m to a telecommunication mast, from the centre of a proposed turbine. Turbines that achieve this separation distance are considered unlikely to cause interference. Turbines situated within this area were either relocated or identified for further assessment. The developer aspired to relocate turbines to achieve the separation distance, but in certain cases this was not viable due to other site constraints. All service providers with telecommunication links within 100m of a turbine were contacted to establish whether or not their services would be potentially impacted by the proximity of the turbine(s).

16.2.6 Elevation Criteria

Section 5.10 of the guidelines acknowledge that wind turbines can interfere with broadcast communications and that *"the interference with broadcast communication can be overcome by the installation of deflectors or repeaters."*

Section 7.15 of the guidelines *"Conditions regarding measures to be taken to minimise interference with the transmission of radio and television signals, air and sea transport communications and other transmissions systems in the area may be necessary."*

Where electromagnetic interference is difficult to predict, conditions may require the developer to consult with the service provider concerned and undertake remedial works to rectify any interference caused."

It is acknowledged that the proposed wind farm development will have the potential to cause interference with local telecommunications services. Accordingly, a mitigation strategy has been prepared in conjunction with the TO's, to ensure that local telecommunications are not adversely affected by the development of Maighne Wind Farm.

16.2.7 Receiving Environment

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

Following consultation with the various TO's, it has been established that there are a number of telecommunication towers within a 20km radius of the study area boundary. There are however no telecommunication towers within the study area boundary.

TO's provided details of the telecommunication links under a non-disclosure agreement due to the commercially sensitive nature of the telecommunications network, accordingly details of the telecommunications links in the area are not shown on the maps.

16.2.8 Potential Impacts

The Irish Wind Energy Association (IWEA) 2012 guidelines, "*Best Practice Guidelines for the Irish Wind Energy Industry*", indicate that wind turbines within 20 km of a radio navigation aid have the potential to cause electro-magnetic interference with these signals.

Interference to a communication system can occur in the following:

- Signal scattering as a result of the obstruction presented by the blades, an effect that mimics the presence of a lower power source operating from the location of the wind turbine
- Signal obstruction as it passes through the area swept by the rotating blade or the tower
- Electromagnetic fields associated with the wind turbine generator.

Excavation of the cable trenches and jointing bays for Maighne Wind Farm could potentially damage existing telecommunications cables. Once Maighne Wind Farm is operational, the potential for a negative impact on telecommunications cables is minimal.

Reflection and Signal Scattering

Wind turbines can act as sources of re-radiation producing delayed 'ghost' signals that are modulated in amplitude by the rotation of the blades. Radio waves can be reflected by many surfaces including turbines, reflection can interfere with the quality of the signal.

Signal Obstruction

If an absorbing object such as a wind turbine is placed in the path of a radio wave obstruction can occur, detrimentally affecting the signal detected at the receiver. This is an impact that needs to be avoided in the case of point-to-point links, unless appropriate mitigation measures are provided to negate the impact.

Electromagnetic Fields

The operation of a wind turbine generator, and associated electrical transmission infrastructure, creates an electromagnetic field which can theoretically interfere with telecommunication signals. However, electromagnetic field levels in the vicinity of wind turbines are relatively low and diminish rapidly with distance.

16.2.9 Telecommunications Impact Assessment

In many cases, impacts can be sufficiently mitigated by ensuring sufficient separation distance between the turbine and any telecommunications link or mast. On that basis, the developer aspired to achieve a design layout that met the agreed separation distances from known telecommunication links and masts, but in certain cases this was not viable due to other site constraints.

All turbines achieve the required 250m separation distance from existing masts.

After numerous iterations of the layout, the final preliminary Telecommunication Impact Assessment (TIA) identified there are turbines that do not achieve the 100m separation distance from known telecommunications links. This analysis was carried out using the data received from the TO's during the consultations held with them dating back to 2012. All TO's potentially impacted by the proposed development were contacted in order to establish what potential impacts, if any, there could be to their service. 4 TO's confirmed that a number of turbines could potentially impact their services. These turbines are listed in Table 16.1 and may potentially impact on transmission links operated by the 4 TO's, namely Eircom, Three (operated by BT Communications Ltd), Meteor and Ripplecom. It should be noted however that although a turbine may be within 100m of a known link, it may not necessarily cause interference. Turbines within 100m of a link have been identified for further assessment in advance of construction taking into account potential discrepancies in database information and ongoing changes to the telecommunications network.

Table 16.1: Turbines within 100m of a Telecommunications Link

CLUSTER	NEAREST TURBINE	SERVICE PROVIDER	UNIQUE LINK ID
Ballynakill	5	Eircom	694
Ballynakill	4	Eircom	694
Ballynakill	1	Three	6273
Windmill	25	Three	3933
Drehid Hortland	14	Meteor	73
Drehid Hortland	16	Meteor	73
Drehid Hortland	21	Ripplecom	6052
Drehid Hortland	23	Ripplecom	6154

Each of the operators that may potentially be affected have been contacted directly for further consultations to evaluate the significance of the impact and to agree appropriate mitigation measures to overcome any potential impacts.

A teleconference was held on 12 November 2014 and scoping correspondence issued later that day to ESB Telecommunications and Mosaic² (O2 and Meteor). A teleconference was held on 13 November 2014 and scoping correspondence issued later that day to Eircom and 2RN. Scoping correspondence was issued to Netshare³ (Vodafone), BT Communications Ltd⁴. (BT and Three) and Ripplecom, Eircom and 2RN on 13 November. These providers were contacted as they have telecommunications links traversing the study area boundary. Further telecommunications were held with ESB Telecommunications, Mosaic, BT, Ripplecom and Eircom on 25 November 2014 to determine the level of impact, if any, the proposed development may have on the telecommunication links and to agree a suitable mitigation strategy to overcome potential impacts identified. A teleconference was held with Eircom on 28 November 2014. A teleconference was held with Mosaic on 18 March 2015 with respect to the Meteor network only. The following key comments were common across all meetings:

- Generally, operators were satisfied that mitigation measures could be put in place to overcome potential interference issues
- Mitigation options may be different for each service affected, depending on the type of service and the level of any interference expected
- All operators were keen to note that there may be discrepancies in telecommunications database information and all information would need to be verified by topographical surveying on site
- A number of the telecommunications operators acknowledged that the network topology is likely to change significantly in the next few years as result of technological advances⁵. Also the fact that some network operators are now sharing sites is likely to lead to an increase in sites being redundant and decommissioned however this is hard to quantify at this stage
- The potentially affected operators have confirmed that they were satisfied that mitigation would require detailed design and post planning is the appropriate time to carry out this work, taking into account potential discrepancies in database information and ongoing changes to the telecommunications network
- A commitment was given that the Developer would be responsible for the cost of implementing the necessary mitigation measures to prevent any degradation of service that is currently provided.

² Mosaic manage the Telefonica (O2) and Meteor networks.

³ Netshare is a joint venture by Vodafone Ireland and H3G Ireland to manage network facilities to both organizations.

⁴ BT Communications Ireland Ltd. manages BT telecommunications in Ireland and the Three Network

⁵ Following on from *Three's* acquisition of O2, *Three* intends to develop, optimise and upgrade their network as part a network investment plan

Ripplecom

Ripplecom have acknowledged the potential for impact from T21 and T23 on the Ripplecom PTP link from Grange to Ardenew. A meeting was held with Ripplecom on 22 December 2014 to discuss potential point to multipoint interference from the proposed development on Ripplecom services. It was agreed that Fehily Timoney and Company would carry out an initial GIS assessment to determine the potential for multipoint interference. A second meeting was held on the 09 February 2015 and it was agreed that the Developer and Ripplecom would work together post planning to mitigate against any potential interference to Ripplecom services to ensure that there will be no impact to their network.

ESB Telecommunications

ESB Network Telecom Services (ESB NTS) carried out the wind turbine analysis in accordance with internal standard practice and a Telecommunications Engineer identified no impacts to their microwave radio network from the proposed Maighne Wind Farm. Emails were sent to ESB Networks regarding the potential impact to SCADA radio in the area. No response was received from ESB Networks with respect to potential impact to SCADA radio in the area as a result of the proposed development which suggests that there is no impact to SCADA radio in the area.

H3Gi (Three)

Three Transmission Engineers, from BT Communications Ireland Ltd. have acknowledged the potential for impact from T1, in the Ballynakill cluster, and from T1, in the Windmill cluster. They are satisfied that mitigation measures can be put in place to overcome any potential interference issues as necessary.

BT (BT Communications Ireland Ltd.)

BT Technology specialist microwave transmission Engineers, from BT Communications Ireland Ltd. have acknowledged that the proposed development will not impact the BT Microwave Network.

Vodafone (Netshare Ireland)

Netshare Ireland were contacted by email on 13 November 2014 and on the 01 December 2014. No response was received by Netshare which suggests that there are no potential impacts to the Vodafone network, however if there is a conflict the Developer has given an undertaking to cover the cost of implementing the necessary mitigation measures to prevent any degradation of service that is currently provided.

O2 (Mosaic)

Mosaic were contacted by phone on the 12 November 2014 and on the 25 November 2014. Email correspondence was sent to Mosaic on the 12 November 2014, 13 November 2014, 25 November 2014, 01 December 2014 and 21 January 2015. No response was received by Mosaic which suggests that there are no potential impacts to the O2 network, however if there is a conflict the Developer has given an undertaking to cover the cost of implementing the necessary mitigation measures to prevent any degradation of service that is currently provided.

Meteor (Mosaic)

Mosaic were contacted by phone on the 12 November 2014 and on the 25 November 2014. Email correspondence was sent to Mosaic on the 12 November 2014, 13 November 2014, 25 November 2014, 01 December 2014 and 21 January 2015. On the 17 March 2015 Mosaic acknowledged the potential for impact from T14 and T16, both within the Dredid Hortland cluster, on the Meteor network. They are satisfied that mitigation measures can be put in place to overcome any potential interference issues as necessary.

Eircom

Eircom Core Networks have acknowledged the potential for impact from T3 and T4, in the Ballynakill cluster. They are satisfied that mitigation measures can be put in place to overcome any potential interference issues as necessary.

Irish Broadband (Imagine) Telecoms

Imagine Transmission Engineers have acknowledged that the proposed development will not affect their network.

UPC Telecoms

UPC have acknowledged that the proposed development will not affect their network.

16.2.10 Potential Cumulative Impacts

There are no other developments in the vicinity with which there is likely to be any significant cumulative impact.

16.2.11 Do Nothing

If the proposed development was not constructed there would be no potential interference to any of the telecommunications transmission links.

16.2.12 Mitigation Measures*Telecommunications*

Sections 5.10 of the guidelines acknowledge that “*electromagnetic interference can be overcome*”. The preliminary telecommunication impact assessment identified the operators with the highest likelihood for impact. Eircom, Three, Meteor and Rippelcom have confirmed potential impact to their services from the proposed Maighne Wind Farm. It was agreed with these operators that there are a number of mitigation options that can be explored to overcome any residual impacts. The following link mitigation measures can be implemented to overcome electromagnetic interference:

1. **Technology Upgrade:** Replacement of the existing telecommunications service equipment with another less affected type
2. **Diverting telecommunications links** - The possibility of diverting telecommunication links to another telecommunications tower in the vicinity can be investigated.
3. **Special Purpose Mitigation Tower** - the possibility of diverting the existing links and consolidating the existing towers to one tower can be explored.
4. **Relocation of telecommunications equipment** - The possibility of moving telecommunication equipment to another telecommunications tower in the vicinity can be investigated.
5. **Fiber-optic communication systems** – The possibility of installing fibre cables underground in conjunction with Wind Farm electricity transmission cables could be explored. The use of underground fibre optic cable in lieu of telecommunication links would avoid the wind farm interference effects
6. **Wind Turbine Tower** – To mitigate interference the turbine tower could be utilised as a transmitter/receiver (hop point).
7. **Combination** – The possibility of providing a mix of the above could be explored.

Mitigation options may be different for each service affected, depending on the type of service and the level of any interference expected. Each unique mitigation solution will be subject to detailed design in advance of construction.

The operators have confirmed that they were satisfied that mitigation would require detailed design and post planning is the appropriate time to carry out this work, taking into account potential discrepancies in database information and ongoing changes to the telecommunications network.

The Developer has given an undertaking to cover the cost of implementing the necessary mitigation measures to prevent any degradation of service that is currently provided. This approach is consistent with the guidelines and satisfactory to the relevant operators that may be affected.

16.2.13 Television and Radio Reception

It is possible that houses in the immediate vicinity of the turbines could require some remedial measures in relation to television reception. In practice, such measures are not difficult to implement, are relatively inexpensive and if necessary will be undertaken by the developer in conjunction with 2rn (formally RTÉ NL).

2RN were consulted during the pre-planning stage, a standard protocol agreement between the developer and 2RN has been prepared and will be signed prior to the commencement of the development. The signed protocol is included in Appendix N1 of Volume 3 EIS Appendices. Analogue TV has been replaced by Digital TV since October 2012 which is less susceptible to interference from wind turbines. In any event, the developer has given a commitment to correct any deterioration in television and radio signal reception should they arise.

16.2.14 Residual Impacts

The implementation of the proposed mitigation strategy will ensure that local telecommunications are not adversely affected by the development of Maighne Wind Farm.

16.3 Aviation

16.3.1 Introduction

The potential effects of wind turbines on aviation interests have been widely publicised. There are two dominant scenarios:

- Physical Obstruction: turbines can present a physical obstruction at, or close to, an aerodrome or other aviation activity site; and
- Radar/Air Traffic Services: turbine induced clutter appearing on a radar display can affect the safe provision of air traffic services as it can mask an unidentified aircraft from the air traffic controller and / or prevent the controller from accurately identifying aircraft under his control. In some cases, radar reflections can affect the performance of the radar itself.

The potential for the development to have an effect on aviation interests has been considered, either in terms of Air Traffic Control (ATC) radars or flight operations, of the Irish Aviation Authority (IAA), the Department of Defence (DoD) and Clonbullogue Aerodrome. There were no other affected Aviation Stakeholders identified. The results of the Aviation Impact Assessment (AIA) are provided in full in Technical Appendix Q.

16.3.2 Scope of Assessment

Study Area

Aviation Stakeholders were identified in accordance with the guidance published in the Irish Aviation Authority (IAA) *Aerodrome Licensing Manual* (IAA, 2014a), the IAA draft *Policy on Land Use and Planning and Offshore Development* (IAA, 2014b) and the UK Civil Aviation Authority (CAA) Civil Air Publication (CAP) 764, *Policy and Guidelines on Wind Turbines* (CAP 764, 2013), with the suggested anticipated extents of effect utilised as a minimum during assessment. The recommended consultation zone within the vicinity of an aerodrome with a surveillance radar facility is 30 kilometres (km), with a range of up to 17 km recommended for a non-radar equipped licensed aerodrome.

However, it is acknowledged that objections from beyond the recommended Aviation Stakeholder consultation distances can occur, and this has been taken into consideration.

The assessment has been informed by the results of a desk-based study (Desk Study) and with reference to the existing and extensive evidence base regarding the effects of onshore wind farm development.

Consultation

The assessment identifies those radars or systems and practices, which have the potential to interact with the development. Those with no identifiable interaction are not taken through to the assessment phase. The following Table highlights those systems and Aviation Stakeholders which are considered to be potentially effected and hence, whom the Applicant has sought to engage through consultation.

Table 16.2: Consultation Responses

Consultee	Summary of Response	Comments
IAA	<p>Letter received 04.12.2014 indicating no objection is raised to the proposed development, following appropriate notice prior to construction and an agreed scheme of aviation obstacle lighting.</p> <p>No impact is anticipated in terms of the operations of Dublin Weston Airport or Dublin International Airport.</p> <p>The Applicant is advised to ensure any turbines are sufficiently clear of Clonbullogue Aerodrome.</p>	<p>The Applicant will comply with the requested development notification and aviation lighting; specific requirements will be informed through the on-going consultation process.</p> <p>All proposed turbines are located beyond the Clonbullogue safeguarding and consultation zones.</p>
DoD	<p>Initial meeting with Air Corps in January 2013 introduced the sites. No issues or objections were raised at that meeting other than a request for built locations of turbines to be supplied to the Air Corps for their records.</p> <p>At a subsequent meeting in May 2014 with the DoD where concerns were raised in terms of the Air Corp's operations at Casement Aerodrome was stated in relation to a '<i>loss of VFR [Visual Flight Rule] navigability in the area</i>', with a number of DoD defined safeguarding requests.</p> <p>In response to the scoping report the DoD indicated that effects may include:</p> <p><i>"- Creation of choke points in uncontrolled airspace;</i> <i>- Turbulence affecting smaller aircraft and helicopters;</i> <i>- Cumulative effect of multiple developments."</i></p> <p>Extensive consultation has been undertaken to address the DoD's concerns. Osprey, on behalf of the Applicant, has completed an AIA (Appendix Q), identifying appropriate industry standard mitigation solutions.</p>	<p>Four DoD consultation meetings and numerous DoD telephone conferences held; however, justification of the DoD <i>safeguarding</i> requirements is still awaited.</p> <p>Following consultation, to address the DoD's concerns, adjustments included removal of a significant number of turbines and in some cases full wind farm sites of the original development and a reduction in the maximum tip height (from 185m to 169m) of the remaining turbines.</p> <p>Additional mitigation options identified by the assessment include:</p> <ul style="list-style-type: none"> • Notification and Pilot Familiarisation; and • Aviation Obstruction Lighting. <p>These solutions are compliant with industry standards and their application is in-line with previous mitigation requirements for obstacles within the area.</p>

16.3.3 Policy, Legislation & Guidance

The Aviation Industry and the provision of Air Navigation Services are regulated through extensive legislation, with the mechanism for wind energy development enabled through the consenting system and in accordance with regulatory guidance. The following policy and guidance documents were considered during the baseline definition and assessment activities:

- (IAA, 2014a) Irish Aviation Authority: Aerodrome Licensing Manual;
- (IAA, 2014b) Irish Aviation Authority; Policy on Land Use and Planning and Offshore Development (Draft for public consultation);
- (ICAO, 2013) International Civil Aviation Organisation, Convention on International Civil Aviation; Annex 14, Aerodromes;
- (UK CAA, 2013) UK Civil Aviation Authority CAP 764: Policy and Guidelines on Wind Turbines;
- (IAA, 2006) Irish Aviation Authority Statutory Instruments; S.I 215 of 2005, Obstacles to Aircraft in Flight Order;

- (IAA, 2004) Irish Aviation Authority Statutory Instruments; S.I 72 of 2004, Rules of the Air Order 2004;
- (IAA, 1999) Irish Aviation Authority Statutory Instruments; S.I 423 of 1999, En-route Obstacles to Air Navigation.

Other data sources and guidance considered under the Desk Study to review the baseline environment include the following:

- (IAIP, 2014) Irish Integrated Aeronautical Information Publication;
- (CAA VFR, 2014) CAA Visual Flight Rules Chart;
- (UK NATS, 2013) UK National Air Traffic Services (NATS), Aeronautical Information Circular (AIC) P067/2013.

16.3.4 Methodology

This section presents a summary of the results of the desk-based AIA undertaken by Osprey Consulting Services Limited (Osprey) on behalf of the Applicant. Osprey is a specialist technical company providing a highly credible, informed and independent consultancy services, operating exclusively on aviation projects with over 300 years of combined aviation experience. All of the Osprey team worked in operational or influential stakeholder roles before joining the company. Osprey' services have been developed to apply across the broad spectrum of challenges met by the aviation market including airspace management and safety cases through to regulatory support, specialist studies and due diligence.

Osprey accept that the most logical approach to understanding the impact of wind farms on aviation infrastructure is from a safety perspective. One of the UK's leading aviation consultancies, Osprey is a member of the leading renewable energy trade body in the UK, RenewableUK (previously British Wind Energy Association) and over the last 9 years, has assisted over 700 wind farms in addressing issues on aviation, and in 2014 alone were proud to see 6,200 MW of our projects gain planning consent. These wind farms would generate enough electricity to power 3.5 million homes per year.

Osprey are an experienced team, with company employees having held either an operational aviation role, or joined from influential positions within Government, the UK CAA or RenewableUK. Osprey is experienced in assessing the potential impact of wind farms on aviation activities in terms of both civil and military aviation operations; a strong civil/military ethos permeates the team, over 80% of which are ex-military.

The Assessment identified potentially affected Aviation Stakeholders, determined the magnitude of any effects and outlined the potential options that would mitigate the effects of the development on the operations of identified Aviation Stakeholders where required. The AIA is contained in full in Appendix Q.

Desk Study

The AIA is a systematic review of the charts and data available through the Irish IAIP (2014), as well as utilisation of CAA Visual Flight Rules charts (CAA VFR, 2014). Potential Aviation Stakeholders were identified, the physical obstruction and / or radar effects to these receptors, and then subsequently the significance of effect was evaluated.

The operational effect pays heed to, but is not limited to, consideration of: the orientation of approach and departure routes, physical safeguarding of aircraft operations, types of aircraft utilising an aerodrome, airspace characteristics and flight procedures as published in the Irish IAIP (2014).

Evaluation Criteria

Sensitivity/Importance/Value

Significance criteria for aviation effects are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of the wind turbines.

Table 16.3: Effect Magnitude Criteria

Descriptor/ Criteria	Description
High	Receptor unable to continue safe operations or safe provision of air navigation services (radar) in the presence of the wind turbines. Technical and/or operational mitigation of the effect is required.
Medium	Receptor able to continue safe operations but with some restrictions or non-standard mitigation measures in place
Low	Receptor able to continue operations with standard mitigation in place
Negligible	No effect on this receptor

The determined effects have been informed by the results of the Desk Study and additional consultation with reference to the existing evidence base regarding the effects of wind turbines on aviation.

Significance of Effect

Any anticipated effect upon aviation stakeholders which results in restricted operations is considered significant. The following approach identified in Table 16.4 is used and summarises the assessment of significance.

Table 16.4: Significance Evaluation Matrix

Effect Magnitude \ Receptor Sensitivity	High	Medium	Low	Negligible
High	Significant	Significant	Minor Significance	Not Significant
Medium	Significant	Significant	Minor Significance	Not Significant
Low	Significant	Significant	Not Significant	Not Significant

16.3.5 Receiving Environment

Aviation Stakeholders

DoD – Military Operations

Irish Air Corps, Casement Aerodrome

Casement Aerodrome is a military aerodrome located approximately 12.5 km to the southwest of Dublin. The nearest proposed cluster, Drehid Hortland (eastern section of this cluster), is located on a bearing of 287° and at a distance of approximately 24 km from the Aerodrome. Casement Aerodrome serves as the Headquarters and operating base of the Irish Air Corps and due to its critical operation, is determined to be a receptor of high sensitivity.

IAA - Civilian Operations

Dublin Weston Airport

Dublin Weston Airport is located approximately 20 km from the nearest proposed cluster, Drehid Hortland (eastern section of this cluster), on an easterly bearing of 094°. Dublin Weston Airport is considered to be a receptor with high sensitivity; the Airport is operated by Weston Aviation Academy Limited and provides charter flight operations. Dublin Weston Airport further serves as a base for fixed and rotary wing flight training.

Dublin International Airport

Dublin International Airport is located approximately 36 km from the nearest proposed cluster, Hortland, on an easterly bearing of 080°. The Airport is considered to be a receptor with high sensitivity; the Airport provides regular scheduled national and international flight services and operates radar facilities which contribute to the safe provision of air traffic services. Dublin International Airport, operated by the Dublin Airport Authority plc, is Ireland's busiest Airport and therefore despite being located outside the advised consultation zone of 30 km, any effects posed as a result of the development have been assessed.

Clonbullogue Aerodrome

Operated by the Irish Parachute Club, Clonbullogue in County Offaly is located approximately 13 km southwest of the nearest proposed cluster, Derrybrennan, on a bearing of 247°. The licensed Aerodrome is considered a medium sensitivity receptor, and provides services for aircraft operating under Visual Flight Rules (VFR), supporting parachute and skydiving activities.

Airspace

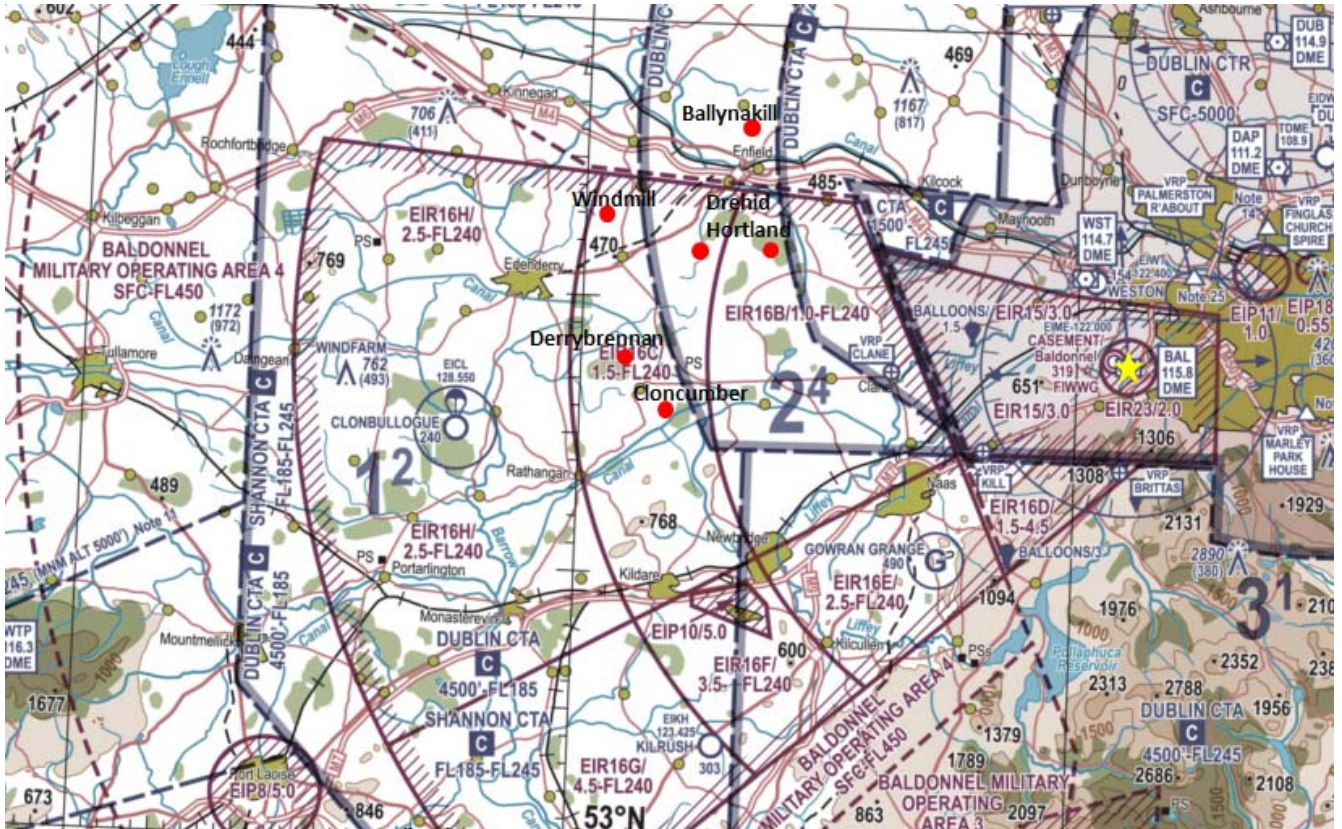
The airspace above the development is classified as follows:

- Class G uncontrolled airspace extends from surface level and subject to a small set of mandatory rules, any aircraft is able to operate within this area and an air traffic service is not compulsory. Pilots operating under Visual Flight Rules (VFR) in Class G airspace are ultimately responsible for seeing and avoiding other aircraft and obstacles;
- Class C controlled airspace of the Dublin Control Area (CTA) is established from various lower designated altitudes, ranging from 3,500 ft above mean sea level (amsl) to 4,500 ft. This controlled airspace exists to provide protection to aircraft operating to and from Dublin International Airport, where air traffic is coordinated by IAA controllers; aircraft must be in receipt of an air traffic service and controllers, using the surveillance systems available, are able to maintain a lateral separation of typically 5 Nautical Miles (NM) between aircraft.

In addition, several volumes of airspace have been defined overhead the development for military operations and training, as shown at Figure 16.2, including:

- Military Restricted Area EIR 16, when active on weekdays between the notified times, is restricted for use by Military aircraft, although civilian aircraft are permitted to enter at the discretion of ATC at Casement Aerodrome. EIR 16 is subdivided into a number of airspace sections, with varying lower and upper limits; details of the relevant EIR 16 sections and the corresponding development sites located beneath, are as follows:
 - EIR 16-B
 - Limits: 1,000 ft amsl – Flight Level (FL) 240 (approximately 24,000 ft).
 - Underlying cluster: Hortland.
 - EIR 16-C
 - Limits: 1,500 ft amsl – FL 240
 - Underlying clusters: Cloncumber, Derrybrennan, Drehid Hotland and Windmill.
- The Restricted Area EIR 16 forms part of a larger Exercise and Training Area, known as Military Operating Area (MOA)-4. This airspace is reserved for military training, including aerobatic and air combat activities. The designated MOA-4 stretches from surface level to FL 450; however, civilian aircraft are able to enter the area at their own discretion, up to but not including 4,500 ft amsl.
- The Ballynakill cluster is located beyond the lateral limits of both the military Restricted Area EIR 16 and MOA-4.

Figure 16.2: Airspace Environment UK Civil Aviation Authority (CAA), VFR Chart North, 500,000, March 2014



Modifying Influences

As a consequence of the nature of aviation operations and the regulations in regards to such activities, significant changes to the receiving environment are not considered likely without extensive public consultation and suitable implementation periods.

16.3.6 Potential Impacts (Visual Flight Rules)

Only those identified Aviation Stakeholders who have the potential to be affected by the proposed development have been taken through to the assessment stage. As stated at Table 16.2 *Consultation Responses*, the IAA has confirmed that any anticipated effects are not significant in terms of civilian operations; as such any effects on the operations of Dublin Weston Airport and Dublin International Airport have been identified as manageable.

Irish Air Corps, Casement Aerodrome

Construction Phase

The infrastructure required in the construction process of the development may present a physical obstruction and effect the operations of VFR aircraft, as detailed following.

Operational Phase

Appropriate charting and aviation lighting will satisfy national and international aviation notification requirements; in particular, the IAA Aerodrome Licensing Manual, the IAA Policy on Land Use and Planning and Offshore Development (Draft for public consultation), the ICAO Convention on International Civil Aviation; Annex 14, Aerodromes and IAA Statutory Instruments S.I 215 of 2005, Obstacles to Aircraft in Flight Order, S.I 72 of 2004, Rules of the Air Order 2004 and S.I 423 of 1999, En-route Obstacles to Air Navigation. It is noted that the DoD has requested additional safeguarding criteria in reference to Aerodrome range and non-published training areas. There are no formally published procedures or legal requirements which justify these requests and such requirements are not stipulated in any IAA or Eurocontrol safeguarding criteria; attention is drawn to the full assessment provided Appendix Q. The consultation detailed at Table 16.2 sought to determine the validity of these additional safeguarding requests; this engagement did not reveal any DoD justification for the requirements. Therefore, the proposed development have been considered against the regulated IAA criteria and industry standard and accepted best practice.

Aerodrome Safeguarding

The IAA stipulates guidance for aerodrome operations in relation to obstacles, defining certain areas of an aerodrome's local airspace to assess the significance of existing or proposed obstacles (IAA, 2014a). For Casement Aerodrome, the maximum lateral extent of the IAA's required safeguarding is 15 km from the Casement Aerodrome Reference Point (ARP). Assessment has revealed all development turbines are located significantly beyond this range, as shown at Figure 16.3.

MOA-4

Four of the proposed clusters are located within the lateral confines of MOA-4, Class G airspace, with the Ballynakill cluster located to the north, outside the designated Area.

Class G uncontrolled airspace can be entered and transited without ATC clearance and subject only to a small set of mandatory rules (IAIP, 2014). Aircraft operating in the Class G airspace of MOA-4 may be in receipt of an Air Traffic Service (ATS); however, pilots are ultimately responsible for their own terrain and obstacle clearance and in line with International Civil Aviation Organisation (ICAO) standards, the Low Flying Rule states that aircraft shall not be flown closer than 500 ft vertically or laterally, to any person, vehicle, obstacle or structure (IAA, 2004).

Restricted Area EIR 16

The proposed wind turbines at all clusters will not breach the military EIR 16 Restricted Area.

However, the DoD raised concerns in terms of the potential creation of choke points in this Class G uncontrolled airspace. Civil VFR pilots may seek to operate below EIR 16, but are able to enter EIR 16 when active, with prior permission from Casement ATC (IAIP, 2014). Aircraft operating below EIR 16 and choosing to route directly over the turbines may be vertically restricted (eastern section of Drehid Hortland) or operating in a reduced airspace volume (Cloncumber, Derrybrennan, western section of Drehid Hotland and Windmill) to avoid penetrating the base of EIR 16; however, there is no formal requirement or published procedure for aircraft to overfly the development, aircraft may manoeuvre around the obstacle. Additionally, the Applicant has undertaken extensive consultation and site re-design to address any potential DoD airspace constriction concerns, as detailed at paragraph 16.3.8. Pilots operating under VFR in the Class G airspace are responsible for their own terrain and obstacle clearance, and operate within Visual Meteorological Conditions (VMC), and so are required to remain clear of cloud and in sight of the surface at all times.

Summary

Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles that they may encounter within the Class G uncontrolled airspace. During the flight, weather conditions or military exercises may necessitate route adjustments, however pilots are ultimately responsible for seeing and avoiding tall structures such as wind turbines.

Appropriate charting and aviation lighting will satisfy national and international aviation notification requirements and minimal effects have been identified in terms of aerodrome safeguarding criteria, MOA-4 and EIR 16. Despite this, it is acknowledged that the introduction of additional physical obstructions into the low-level environment, below 1,000 ft above ground level (agl), has the potential to adversely affect operations. The magnitude of the effect is determined to be medium, the sensitivity of the receptor is high and hence, this effect, should it remain unmitigated, has been assessed as significant.

Appropriate mitigation solutions have been identified which, following implementation, will result in the effect being reduced to not significant; the mitigation solutions are detailed at paragraph 16.3.8.

Decommissioning Phase

The infrastructure required in the decommissioning process of the development may present a physical obstruction and effect operations of VFR aircraft, as previously detailed.

Clonbullogue Aerodrome

Construction Phase

The infrastructure required in the construction process of the development may present a physical obstruction to civil VFR aircraft as detailed following.

Operational Phase

The IAA stipulates guidance for aerodrome operations in relation to obstacles, defining certain areas of an aerodrome's local airspace, to assess the significance of existing or proposed obstacles (IAA, 2014a). For Clonbullogue Aerodrome, the maximum lateral extent of the IAA's required safeguarding is 2.7 km from the Clonbullogue ARP. All proposed turbines are located beyond this range (section 16.3.5), as shown at Figure 16.2, satisfying national aviation requirements.

VFR pilots are legally obliged to plan their flying activities in advance and to be familiar with and avoid by 500 ft, any en-route obstacles that they may encounter within the Class G uncontrolled airspace. However it is acknowledged that the introduction of structures, such as wind turbines, may present a physical obstacle to flight. Therefore, the magnitude of the effect is determined to be medium, the sensitivity of the receptor is medium and hence, this effect has been assessed as significant. Appropriate mitigation solutions, to reduce this significance, have been identified and are detailed following at paragraph 16.3.8.

Decommissioning Phase

The infrastructure required in the decommissioning process of the development may present a physical obstruction to VFR aircraft, as previously detailed.

16.3.7 Potential Impacts (Instrument Flight Rules)

The DoD's concerns have been raised in terms of the potential effects on the Irish Air Corps' VFR operations only, within the vicinity of Casement Aerodrome, as detailed at Table 16.2. The DoD have not raised an objection in terms of Instrument Flight Rules (IFR) operations. However, for completeness, any potential effects on IFR obstacle clearance requirements have also been assessed (Appendix Q).

Irish Air Corps, Casement Aerodrome

Construction Phase

The infrastructure required in the construction process of the development may present a physical obstruction and effect the operations of IFR aircraft operating within the vicinity of Casement Aerodrome

Operational Phase

The eastern section of the Drehid Hortland cluster (T40-T46) is located within the vicinity of the Casement published Instrument Approach Procedures for Runway 11. However, assessment indicates that should IFR traffic be operating in the vicinity of this site, the Casement Approach Procedures will route aircraft such that the required 1,000 ft IFR obstacle clearance is maintained (Appendix Q); no impact is anticipated due to the proposed development.

However, analysis of the Casement Aerodrome Radar Vectoring Approach Chart and the associated 3 NM Primary Surveillance Minimum Altitude Area (SMAA) Buffer (PSB), indicates that IFR traffic may be operating in the area of the aforementioned site at a minimum attitude of 1,800 ft. The proposed Drehid Hortland cluster (T40-T46) turbines may impact in terms of the required 1,000 ft IFR obstacle clearance, by approximately 100 ft (rounded up to the nearest hundred, which is standard aviation practice).

Additionally, the Cloncumber and western section of the Drehid Hortland cluster (T11-T23) are located within the 3 NM PSB, with the Derrybrennan site located on the Buffer boundary. Subject to a full formal site survey, the proposed sites also have the potential to impact the required 1,000 ft IFR obstacle clearance, by approximately 100 ft (rounded up to the nearest hundred). Appropriate mitigation solutions to resolve this issue have been identified and are detailed following at paragraph 16.3.8.

Decommissioning Phase

The infrastructure required in the decommissioning process of the development may present a physical obstruction to Casement Aerodrome IFR aircraft, as previously detailed.

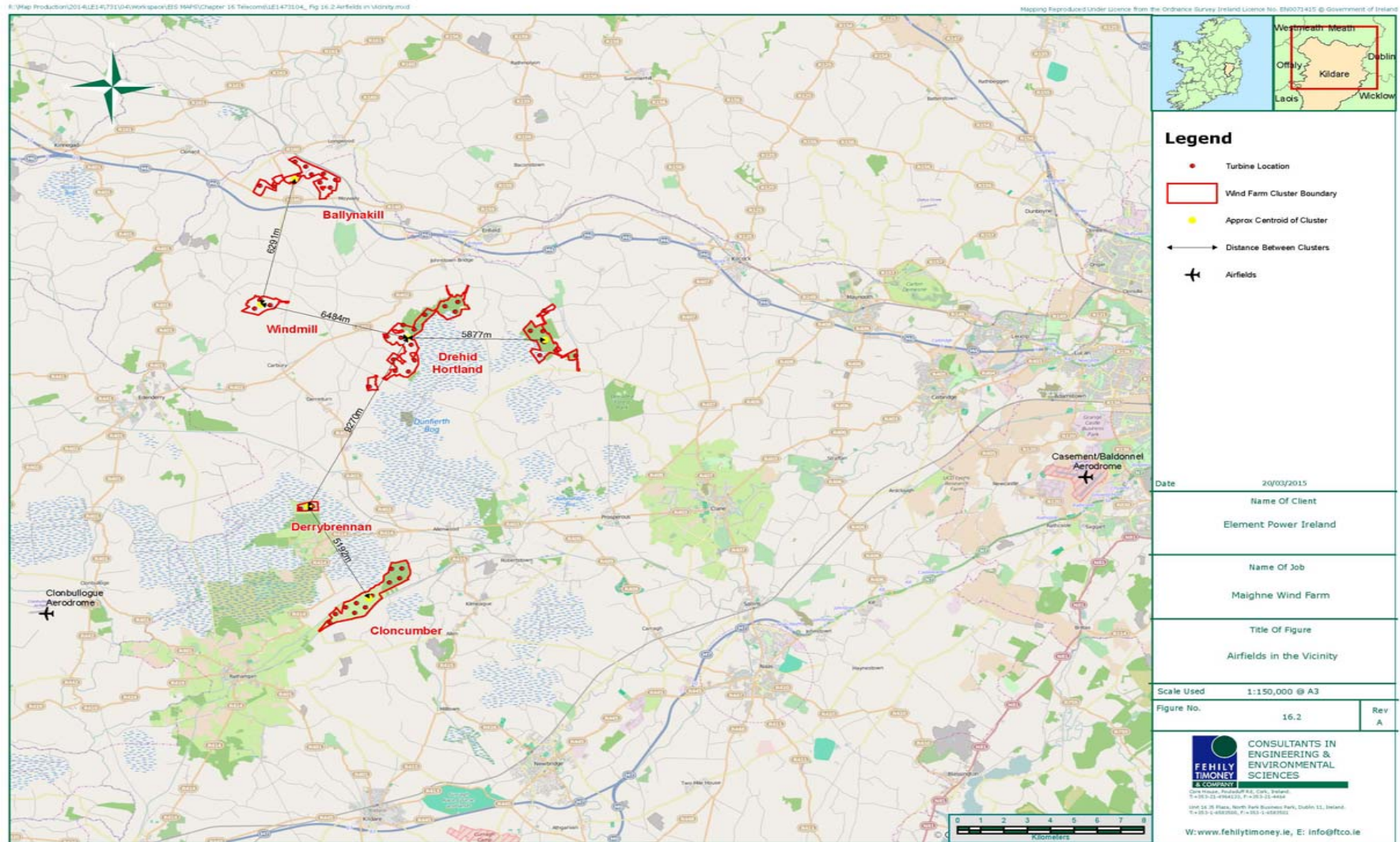


Figure 16.3: Airfields in Vicinity of Site

16.3.8 Mitigation Measures

Irish Air Corps, Casement Aerodrome

Construction Phase

Construction of the development, including turbines and the assembly infrastructure, may present a physical obstruction to VFR aircraft. The following mitigation solutions, as outlined within the Operational Phase, are further applicable to the Construction Phase.

Operational Phase

Design Evolution

Significant consultation has been undertaken with the DoD, as detailed at Table 16.2. Following this engagement, the Applicant has sought to address potential concerns through design consideration. The proposed cluster layouts have evolved significantly in terms of a substantial reduction in turbine number (removed a number of turbines including a number of entire clusters) and a lowering of turbine tip height (the project originally considered 185m tall turbines but are now proposed at 169m), with the aim to address all concerns raised by the DoD and minimise any possible cumulative effects to a minor significance and hence manageable level.

VFR Mitigation Solutions

To further mitigate the identified VFR effects, in addition to the site re-design as detailed, and reduce the potential effects to not significant, the accepted industry standard solutions of appropriate notification and the implementation of aviation lighting are considered applicable.

- **Notification and Pilot Familiarisation:** Appropriate notification of the developments within both civilian and military aviation publications would alert pilots to the turbine locations and parameters, aiding in flight planning. The Applicant will comply with notification recommendations in accordance with the IAA guidance contained within S.I 215 (IAA, 2006) and S.I 423 (IAA, 1999). Notification of Air Corps and Garda pilots operating at Casement Aerodrome could replicate IAA guidance and form part of any pre-exercise briefing.
- **Aviation Lighting:** Existing tall structures within MOA-4 are lit with aviation obstacle lighting, and depicted on aviation charts and documentation. Therefore aviation obstacle lighting similar to the requirements to those presently implemented in the area, conforming to industry standards to aid in-flight acquisition, is appropriate for the proposed development. The turbines are anticipated to be lit with IAA required medium intensity obstruction lighting (IAA, 2014a). The Applicant will comply with the DoD and IAA requirement specifics.

As detailed, it is Osprey's expert and considered opinion that the implementation of the suggested solutions will mitigate the VFR effects of the proposed development to a not significant effect and the DoD's VFR operations will continue unaffected in the presence of the development.

IFR Mitigation Solutions

It is noted that the DoD's initial concerns were related to a VFR impact only, as detailed at Table 16.2 and other effects were only ascertained through continued consultation. Should a full site survey confirm a consequence on Casement Aerodrome's IFR operations as a result of the effect on the surveillance radar vectoring altitude, this effect can be resolved through raising the minimum vector altitude (by 100 ft).

Decommissioning Phase

Decommissioning of the development, including both the turbines and the associated infrastructure, may present a physical obstruction to VFR aircraft. The above outlined mitigation solutions will remain in place and operational until the clusters have been fully decommissioned.

Clonbullogue Aerodrome

Construction Phase

Construction of the development, including turbines and the assembly infrastructure, may present a physical obstruction to VFR civil aircraft. The following mitigation solutions, as outlined within the Operational Phase, are applicable to the Construction Phase.

Operational Phase

The implementation of the previously identified VFR Mitigation Solutions of appropriate notification and aviation lighting will ensure that Clonbullogue Aerodrome's related VFR operations within the vicinity of the cluster are not significant. The implementation of the aforementioned solutions will enable effective flight planning and ensure pilots maintain the required 500 ft VFR legal obstacle clearance, reducing the potential effects to aviation to a manageable level.

Decommissioning Phase

Decommissioning of the cluster, including both the turbines and the associated infrastructure, may present a physical obstruction to VFR civil aircraft. The above outlined mitigation solutions will remain in place and operational until the clusters have been fully decommissioned.

16.3.9 Potential Cumulative Impacts

Cumulative Effects

There are a number of proposed wind farms at various stages in the planning process within the vicinity of the proposed development. The DoD raised concerns in terms of potential cumulative effects as a result of the proposed development and it is acknowledged that the combined effect of numerous turbines or multiple wind farms can be difficult to mitigate and hence, it is feasible that objections may be made to subsequent developments, in areas where previously proposed wind developments sites have been accommodated.

The Applicant is proposing to develop wind turbines across five wind farm clusters, and there are now significant distances between the individual site external boundaries as shown at Figure 16.2 (an average of 5.2 km), providing adequate space for aircraft to safely operate between the proposed developments maintaining the required 500 ft VFR obstacle clearance. It is noted that there is no formal requirement or published procedure for any of the sites to be directly overflowed and it is the pilots' responsibility to be aware of and avoid obstacles within the Class G airspace. Appropriate charting and aviation lighting will satisfy national and international aviation notification requirements in this regard.

Following the implementation of the identified mitigation solutions at paragraph 16.3.8, the turbines will not be unmanageable to VFR pilots.

Turbulence Consideration

Any potential for wind turbine-induced wake turbulence has been considered through a review of existing policy and relevant research, including the IAA's draft *Policy on Land Use and Planning and Offshore Development* (IAA, 2014b), to address to DoD's concerns as outlined at Table 16.3. Analysis indicates that whilst the effects of turbine-induced turbulence remains under assessment, a significant number of aviation stakeholders continue to operate within close proximity to wind developments (Appendix Q). For example to date, no turbine-induced turbulence related incidents have ever been reported to the UK Civil Aviation Authority (CAA), in over 30 years of operation of a Mandatory Occurrence Report (MOR) system (CAA, 2011) and in the presence of extensive wind turbine development in the UK.

16.3.10 Residual Effects

The implementation of suitable mitigation, namely appropriate site documentation, aviation lighting and raising of the minimum surveillance vectoring altitude, would ensure that the proposed development will not have any significant residual effects on the operations of the identified Aviation Stakeholders.

16.3.11 Statement of Significance

The Applicant acknowledges that the development, prior to detailed consultation with the DoD, and without mitigation, would have a not insignificant effect on the Aviation Stakeholders of the DoD at Casement Aerodrome in terms of introducing structures which may present a physical obstruction.

Extensive consultation, assessment and design evolution (with a reduction in wind turbine numbers as well as lowering of tip heights), has been undertaken to address the raised concerns of the DoD. The design evolution along with the introduction of industry standard mitigation (appropriate notification, aviation lighting and raising the minimum surveillance vectoring altitude), ensures that the effect of the proposed development on DoD operations are not significant.

The introduction of industry standard mitigation, appropriate notification and aviation lighting, ensures that the effect of the proposed development on Clonbullogue Aerodrome are not significant.

This assessment has clearly indicated that appropriate industry standard and accepted best practice mitigation solutions will mitigate the stated effects of the evolved development, such that the development has a not significant residual effect upon civilian and military aviation receptors

16.4 References

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