APPENDIX 2-1

SCOPING RESPONSES

Niamh McHugh

From: Phoebe Duvall <planning@antaisce.org>
Sent: Tuesday 6 December 2022 11:54
To: Niamh McHugh
Subject: Thank you for your query Re: 220245 - Proposed Lackareagh Wind Farm, Co Clare Scoping

Thank you for your email. Please note that we receive a large volume of correspondence and resources are very limited. As such, we are unfortunately unable to respond to every query, and we ask that you review these frequently asked questions. **If your message is a statutory referral to us per our role as a prescribed body, it will be processed as normal.**

Queries from An Taisce members are prioritised. If you are a member, please reply to the original message with your member number (if you did not include it already). If you wish to become a member, please visit the membership page on our website.

Thank you very much.

--
Phoebe Duvall

Planning and Environmental Policy Officer
An Taisce - The National Trust for Ireland
The Tailors' Hall, Back Lane, Dublin 8, Ireland
Phone: 01 454 1786
www.antaisce.org

Company Reg. No. 12469 | Charity Ref. No. CHY4741 | Charity Regulator No. 20006358
An Taisce is a membership-based charity
Join at www.antaisce.org/membership

Please note that I work Monday through Thursday.

--
An Taisce - The National Trust for Ireland | www.antaisce.org
The Tailors' Hall, Back Lane, Dublin 8, Ireland
Company Reg. No. 12469 | Charity Ref. No. CHY4741 | Charity Regulator No. 20006358
An Taisce is a membership-based charity
Join at www.antaisce.org/membership

Niamh McHugh

From: Roger Woods <rwoods@bai.ie>
Sent: Tuesday 6 December 2022 13:00
To: Niamh McHugh
Subject: RE: 220245 - Proposed Lackareagh Wind Farm Scoping

Hi Niamh

The BAI does not perform an in-depth analysis of the effect of wind turbines on FM networks. However, we are not aware of any issues from existing windfarms into existing FM networks. Also, the proposed windfarms are not located close to any existing or planned FM transmission sites.

Regards

Roger

Senior Executive Engineer
Broadcasting Authority of Ireland
2-5 Warrington Place
Dublin D02 XP29

Tel: 01 6441200
Fax: 01 6441299

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:01
To: Roger Woods <rwoods@bai.ie>
Subject: 220245 - Proposed Lackareagh Wind Farm Scoping

Mr. Woods,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

Niamh McHugh

From: enviroff <enviroff@clarecoco.ie>
Sent: Tuesday 6 December 2022 13:50
To: Niamh McHugh
Subject: RE: 220245 - Informal Scoping Request: Proposed Lackareagh Wind Farm Scoping

Dear Niamh
I wish to acknowledge receipt of your email.

I have forwarded your email to relevant staff for their review and attention.

Regards

Marie O'Neill,
Senior Staff Officer.
Environment Department
Clare County Council, Áras Contae an Chláir, New Road, Ennis, Co. Clare, V95 DXP2
T: 065 6846 204 | **E:** moneill@clarecoco.ie | **W:** www.clarecoco.ie |

COMHAIRLE CONTAE AN CHLÁIR
CLARE COUNTY COUNCIL

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:07
To: enviroff <enviroff@clarecoco.ie>
Subject: 220245 - Informal Scoping Request: Proposed Lackareagh Wind Farm Scoping

Dear Sir/Madam,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

Niamh McHugh

From: congella mcguire <cmcguire@clarecoco.ie>
Sent: Thursday 8 December 2022 16:29
To: Niamh McHugh
Subject: FAO: Heritage Department - Informal Scoping Request, Proposed Lackareagh Wind Farm

Niamh
The relevant person is Shelia Downes and I have sent the e mail to her now.
Congella

From: Planning Office <planoff@clarecoco.ie>
Sent: Tuesday 6 December 2022 14:36
To: congella mcguire <cmcguire@clarecoco.ie>
Cc: Gareth Ruane <gruane@clarecoco.ie>
Subject: FW: FAO: Heritage Department - Informal Scoping Request, Proposed Lackareagh Wind Farm

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From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 14:19
To: Customer Services <customerservices@clarecoco.ie>
Cc: Planning Office <planoff@clarecoco.ie>
Subject: RE: FAO: Heritage Department - Informal Scoping Request, Proposed Lackareagh Wind Farm

Hi,

Thank you for your response.

In regard to my email and the attached documents, as you can see from the subject line this was meant for the attention of the Heritage Department for their comment. Could you please make sure this is sent to that department?

Thanks.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

From: Customer Services <customerservices@clarecoco.ie>
Sent: Tuesday 6 December 2022 12:42
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Cc: Planning Office <planoff@clarecoco.ie>
Subject: RE: FAO: Heritage Department - Informal Scoping Request, Proposed Lackareagh Wind Farm

Dear Niamh,

Thank you for your email today.

I wish to advise that your query has been sent to the Planning Section for their attention and response.

Yours sincerely,

Customer Services Team
Clare County Council, Áras Contae an Chláir, New Road, Ennis, Co. Clare, V95 DXP2
T: 065 682 1616 |Email: customerservices@clarecoco.ie| **W:** www.clarecoco.ie

COMHAIRLE CONTAE AN CHLÁIR
CLARE COUNTY COUNCIL

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:12
To: Customer Services <customerservices@clarecoco.ie>
Subject: FAO: Heritage Department - Informal Scoping Request, Proposed Lackareagh Wind Farm

Dear Sir/Madam,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

Niamh McHugh

From: Planning Office <planoff@clarecoco.ie>
Sent: Tuesday 6 December 2022 13:02
To: Niamh McHugh
Subject: Scoping Document proposed Lackeragh Windfarm

Niamh

We don’t appear to have received the attachment as outlined in your recent email.

Can you resend again to planoff@clarecoco.ie.

Regards

Anne O’Gorman
Staff Officer
Planning Department
Clare County Council, Áras Contae an Chláir, New Road, Ennis, Co. Clare, V95 DXP2
T: 065 6846381 | **E:** aogorman@clarecoco.ie | **W:** www.clarecoco.ie

COMHAIRLE CONTAE AN CHLÁIR
CLARE COUNTY COUNCIL

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Your Ref: 220245 Lackareagh Wind Farm
Our Ref: **G Pre00325/2022** (Please quote in all related correspondence)

19 January 2023

MKO
Tuam Road
Galway
H91 VW84

Via email: nhmchugh@mkoireland.ie

Proposed Pre Planning Development: Windfarm consisting of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation near Kilbane, Co. Clare

A chara

I refer to correspondence received in connection with the above. Outlined below are heritage-related observations/recommendations co-ordinated by the Development Applications Unit under the stated heading.

Nature Conservation

These observations are intended to assist you in relation to identifying potential impacts on European sites, other nature conservation sites, and biodiversity and environmental protection in general, in the context of the current proposal. The observations here are not exhaustive, and are made without prejudice to any recommendation that may be made by this Department in the future. Data collected and surveys carried out in connection with this proposed development may raise other issues that have not been considered here.

The Department notes the scope of ecological surveys set out in the EIAR scoping document provided by MKO, and recommends the following;

- Bird surveys for all species should cover bird usage and facilitate assessment of potential collision risk, habitat loss, barrier effect and displacement for these species and should be based around the daily and seasonal activity patterns of the species being surveyed. Survey work should cover year-round site use and should cover a minimum of two years to allow for an accurate determination of site usage. There are breeding Peregrines roughly 1km East of Broadford – the nest site is 3.8km from the boundary of the proposed development. Hinterland surveys should include breeding raptor surveys, including roost watches, surveys for nocturnal species and other species-specific surveys as appropriate. Vantage point surveys should be done in a

manner that ensures sufficient data is collected to allow an assessment of the importance of all the flight paths into, out of and between sites and assess migratory movements. Consequently, the Department recommends that a visibility analysis of topography and vegetation is used in the selection of vantage points for ornithological surveys. Technological solutions should also be considered in conjunction with VPs surveys to ensure sufficient data is compiled for assessment. Results for species need to be referenced back to the overall populations and their dynamics as, in some cases even a small risk to a population of a species could be considered significant. Cumulative impact on birds from all windfarms in the area needs to be assessed and the data from surrounding sites needs to be considered in the assessment.

- Bat roosts may be present in trees, buildings and bridges. Bat species are protected under the Wildlife Act, 1976 to 2018, and are subject to a regime of strict protection pursuant to the requirements of the Habitats Directive (92/43/EEC) as transposed in Irish law in Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Therefore, damage/disturbance to any such roosts must be avoided in the first instance. While the Minister may grant a derogation licence under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011-2015, a licence can only be granted once a number of strict criteria have been met (see Regulation 54). An assessment of the impact of the proposed wind farm on bat species should be carried out noting recent guidance available, "*Bat and Onshore Wind Turbines: Survey, Assessment and Mitigation, 2019"* published jointly by Scottish Natural Heritage and Bat Conservation Trust and other stakeholders. The Department would like to highlight new research on patterns of bat activity in upland wind farms[1] which indicates it is more appropriate to use 30 day survey periods with static automated detectors, in each season, and in different weather conditions to reduce sampling bias and to accurately determine when the curtailment mitigation is required during the operational phase. This survey should include use of detectors at different heights. Any proposed bat friendly lighting should be proven to be effective and follow up-to-date guidance.

- Wetlands are important areas for biodiversity and ground and surface water quality should be protected during construction and operation of the proposed development. The EIAR should include a detailed assessment of the hydrological impacts on wetlands from the proposed development. Any watercourse or wetland which may be impacted on should be surveyed for the presence of protected species and species listed on Annexes II and IV of the Habitats Directive. For example, these species could include Otter (*Lutra lutra*) which are protected under the Wildlife Acts and listed on Annex II and IV of the Habitats Directive, Salmon (*Salmo salar*), Lamprey (three species in Ireland) listed on Annex II of the Habitats Directive, Freshwater Pearl Mussel (*Margaritifera* species) and White-clawed Crayfish (*Austropotamobius pallipes*) which are both protected under the Wildlife Act and

[1] https://cieem.net/resource/cieem-webinar-patterns-of-bat-activity-at-upland-windfarms-implications-for-sampling-and-mitigation/

listed on Annex II of the Habitats Directive, Frogs (*Rana temporaria*) and Newts (*Trituris vulgaris*) protected under the Wildlife Acts and Kingfishers (Alcedo atthis) protected under the Wildlife Acts and listed on Annex I of the Birds Directive (Council Directive 79/409 EEC). Further to potential impacts on the species listed above, for example, one of the main threats identified in the threat response plan for otter is habitat destruction. A 10m riparian buffer on both banks of a waterway is considered to comprise part of the otter habitat. Therefore, any proposed development should be located at least 10m away from a waterway and should consider movements between waterways and waterbodies by otters.

- Flood plains, if present, should be identified in the EIAR and left undeveloped to allow for the protection of these valuable habitats and provide areas for flood water retention (green infrastructure). If applicable, the EIAR should take account of the guidelines for Planning Authorities entitled "The Planning System and Flood Risk Management" published by the Department of the Environment, Heritage and Local Government In November 2009.

- Peat stability should be assessed where required.

- Marsh fritillary surveys should be carried out as per standard Marsh Fritillary Larval Web Survey methodology.

- Ballygareen wood (which lies along the Ardcloony river) is 1.7km East of the proposed site at the closest point. Ballygareen is considered to be an important site nationally and was listed as one of the top ten woodland sites in County Clare. It is currently being assessed for potential NHA designation.

- Hedgerows and scrub should be maintained where possible, as they form wildlife corridors and provide areas for birds to nest in. Hedgerows provide a habitat for woodland flora, roosting places for bats and Badger setts may also be present. The EIAR should provide an estimate of the length/area of any hedgerow/scrub that will be removed. Where it is proposed that trees or hedgerows will be removed there should be suitable planting of native species in mitigation incorporated into the EIAR. Hedgerows, trees, scrub and uncultivated vegetation (including semi-natural habitats) should not be removed during the nesting season (i.e. March 1st to August 31st), noting the protection afforded under the Wildlife Act 1976-2018.

- The EIAR should also address the issue of invasive alien plant and animal species such as *Rhododendron ponticuum* and Japanese Knotweed, and detail the methods required to ensure they are not accidentally introduced or spread during survey and or construction.

- If applicants are not in a position to state the exact location and details of cable routes at the time of application, then they need to consider the range of options (overhead and underground) that may be used within their assessment. Should the exact height

and rotor diameter of the turbines not be known at EIAR stage then the assessment of impacts must be applicable to a variety of turbine heights and rotor diameters which could be used. This should be made clear in the EIAR.

- All potential cumulative, in-combination and ex situ impacts must be assessed. For example, Carrownagowan Windfarm on the western slopes of Slieve Bearnagh was recently granted permission.

- Complete project details including Construction Management Plans (CMPs) need to be provided in order to allow an adequate EIAR (and appropriate assessment) to be undertaken. CMPS should contain sufficient detail to avoid any post construction doubt with regard to the implementation of mitigation measures, timings and roles and responsibilities for same. Any mitigation needs to be included in detail and if being relied upon to reach conclusions must be proved to be achievable and likely to be effective in any given scenario it is needed. Proof of effectiveness will be required with examples of where similar techniques have been employed previously. Applicants need to be able to demonstrate that CMPs and other such plans are adequate, all mitigation is included and effective and supported by scientific information and analysis and that they are feasible within the physical constraints of the site. The positions, locations and sizes of construction infrastructure and mitigation such as settlement ponds, disposal sites and construction compounds may significantly affect European and other designated sites, habitats and species in their own right and could have an effect for example on, drainage, water quality, habitat loss, and disturbance. If these are undetermined at time of the assessment all potential effects of the development on the site are not being considered.

- Such developments, given their scale and duration, can be an opportunity for ecological enhancement. Enhancement measures have been included in similar projects in Ireland. However, any proposed enhancement measures must have sufficient information to be implemented effectively. It is suggested that a Habitat Management Plan (HMP) or Ecological Design Strategy (EDS) is carried out, outlining specific enhancement measures to be undertaken, the timescale for implementation, objectives to be achieved and ecological monitoring requirements.

- The National Biodiversity Action Plan aims to conserve and restore Ireland's biodiversity. A key objective of the plan is to achieve no net contribution to biodiversity loss arising from development projects occurring within the lifetime of the plan. The EIAR should outline how the project will avoid a net loss of biodiversity.

- In order to carry out the AA screening, and/or prepare a Natura Impact Statement (NIS), information about the relevant European sites including their conservation objectives will need to be collected. Details of designated sites and species and conservation objectives can be found on http://www.npws.ie/. Site-specific, as opposed to generic, conservation objectives are now available for many sites. Each

conservation objective for a qualifying interest (QI) is defined by a list of attributes and targets and is often supported by further documentation. Where these are not available for a site, an examination of the attributes that are used to define site-specific conservation objectives for the same QIs in other sites can be usefully used to ensure the full ecological implications of a proposal for a site's conservation objective and its integrity are analysed and assessed.

General guidance and useful references;

- EU Guidance on Wind Energy Developments and Natura 2000.
- The Departmental Wind Energy Planning Guidelines.
- Windfarms on Peatland (2008-2010) Mires and Peat volume 4.
- Best Practice guidance for Habitat Survey and Mapping by George F Smith, Paul O'Donoghue, Katie O'Hora and Eamon Delaney, 2011. The Heritage Council.
- Pearce-Higgins, James W., Stephen, Leigh, Langston, Rowena H. W., Bainbridge, Ian P. and Bullman. Rhys (2009). "The distribution of breeding birds around upland wind farms". Journal of Applied Ecology, 46,1323-1331.
- Johnson, Gregory D. and Arnett Edward 8. "A Bibliography of Bat Fatality Activity and Interactions with Wind Turbines" (June 2004 updated February 2010) Bat Conservation International.
- Pearce-Higgins, James W., Stephen, Leigh, Douse, Andy, and Langston, Rowena H. W. (2012). "Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multisite and multi-species analysis". Journal of Applied Ecology. 49.386-394.
- Rodrigues, Let ai, (2014). "Guidelines for consideration of bats in wind farm projects". Eurobats Publication Series NO.6 UNEP and Eurobats.
- The Departmental guidance document on Appropriate Assessment which is available on the NPWS web site at https://www.npws.ie/protected-sites/guidance-appropriate-assessment-planning-authorities
- The EU Commission guidance entitled "Assessment of plans and projects significantly affecting Natura 2000 sites, Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC" which can be downloaded from http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.
- Bat Conservation Ireland (2012) Wind Turbine/Wind Farm Development Bat Survey Guidelines. Version 2.8, December 2012.
- Drewitt, Allan Land Longston Rowena H. W. (2006) "Assessing the impacts of wind farms on birds". Ibis 148. 29-42.
- CJEU and Irish case law should also be consulted.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority/ies, in the role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send further communications to the Development Applications Unit (DAU) at **manager.dau@npws.gov.ie**.

Is mise le meas**,**

Malcolm Hillis
Development Applications Unit
Administration

Niamh McHugh

From: Housing Manager DAU <Manager.DAU@npws.gov.ie>
Sent: Tuesday 6 December 2022 15:34
To: Niamh McHugh
Subject: RE: 220245 - Proposed Lackareagh Wind Farm Scoping

Our Ref: G Pre00325/2022 (Please quote in all related correspondence)

A Chara

I acknowledge receipt of your recent consultation.

Please note Development Applications Unit (DAU) is the coordinating unit for the Department of Housing, Local Government and Heritage, coordinating responses/submission from National Parks and Wildlife Service, National Monuments Service, Architectural Heritage and Underwater Archaeology Unit.

All Correspondence to be issued and from DAU.

In the event of observations, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU).

The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested.

If you have not heard from DAU and wish to receive an update, please email manager.dau@npws.gov.ie.

Regards
Malcolm

Malcolm Hillis
Executive Officer
—
Aonad na nIarratas ar Fhorbairt
Development Applications Unit
An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

Oifigí an Rialtais
Government Offices
Bóthar an Bhaile Nua, Loch Garman, Contae Loch Garman, Y35 AP90
Newtown Road, Wexford, County Wexford, Y35 AP90

—
www.tithiocht.gov.ie
www.housing.gov.ie

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:30
To: Housing Manager DAU <Manager.DAU@npws.gov.ie>
Subject: 220245 - Proposed Lackareagh Wind Farm Scoping

Dear Sir/Madam,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

An Roinn Iompair
Department of Transport

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO

Tuam Road

Galway

H91 VW84

22nd December 2022

Your Ref: 220245

Re: EIA Scoping Document for the Proposed Lackareagh Wind Farm, Kilbane, Co. Clare.

Dear Niamh,

The Department of Transport makes the following comments on the Lackareagh Wind Farm development located at west of Killaloe in County Clare.

It should be noted that the department considers the construction involved in providing this development and especially, the connection cables to the national grid may have effects on both the environment and the Regional and Local Road network.

Where the developer proposes the placement of any cables (or additional cables) in one or more trenches within the extents of the (regional and local) public road network, it is necessary to consider the following:

- Their presence within the public road could significantly restrict the Road Authority in carrying out its function to construct and maintain the public road and will likely add to the costs of those works.
- Their installation within the lands associated with the public road may affect the stability of the road. In particular where the road is a “legacy road” (where there is no designed road structure and the subgrade may be poor or poorly drained) the design needs to take account of all the variable conditions and not be based on a sample of the general conditions.
- The possible effect on the remaining available road space (noting that there may be need to accommodate other utilities within the road cross-section in the future).
- The necessity to have the power in the cables switched off where the Road Authority considers this necessary in order to carry out its function to construct and maintain the public road.

The department considers it important that the examination of the proposal should include consideration of the following:

- Examination of options other than the routing of cables along the public road,
- Examination of options for connection to the national grid network at a point closer to the wind farm in order to reduce the adverse impact on public roads.
- Details of where within the road cross section cables are to be placed so as to minimise the effect on the Roads Authority in its role of construction and maintenance,
- Examination of details of any chambers proposed within the public road cross section so as to minimise the effect on the Roads Authority in its role of construction and maintenance and,
- Rationalisation of the number of cables involved (including existing electric or possible future cables) and their diversion into one trench, in order to minimise the impacts on the road network and the environment along the road boundary (hedgerows).

The department considers the following should be considered when applying conditions to any approval.

1. A condition requiring the specific approval of the local authority to the detail of the final route of cables through the public road space. If during construction there is a need to deviate from the detailed design then the approval of the local authority would again be sought. This would assist in minimising the impact on the public road.
2. A condition requiring the developer to comply with all appropriate standards and, inter alia the Guidelines for Managing Openings in Public Roads, 2017 in order to ensure orderly development.
3. A condition requiring that the location of the cables would be recorded as exactly as possible (maybe using BIM type technology) so as to facilitate the further use of road space for utilities and the maintenance/construction of the public road by the Roads authority. This record should be lodged with the local authority and with the ESB Networks for retention on their records.
4. A condition requiring the developer to route cables away from bridge structures and specifically preventing the developer from attaching cables to road bridges. This would allow for the future maintenance of bridges without interruption of the electricity supply along the cables.
5. A condition requiring the developer to notify the Roads Authority of the owner of the cables (Owner) and the controller (Power Controller) of the power transmitted along the cables. In addition, the condition should require Owner and Power Controller to notify the Roads Authority of any change in ownership of the cables or change of Power Controller transmitting power along the cables. In all instances the Owner and Power Controller should be required to maintain an agreed contacts list with the Roads Authority.

Yours sincerely,

Central Policy, Coordination and Reform
An Roinn Iompair
Department of Transport
Lána Líosain, Baile Átha Cliath, D02 TR60
Leeson Lane, Dublin, D02 TR60
T +353 (0)1 604 1177
gcu@transport.gov.ie www.gov.ie/transport

Niamh McHugh

From: planning applications <planning.applications@failteireland.ie>
Sent: Thursday 15 December 2022 08:27
To: Niamh McHugh
Subject: RE: 220245 - Proposed Lackareagh Wind Farm Scoping
Attachments: Fáilte Ireland EIAR Guidelines.pdf

Hello Niamh,

Thank you for your email and letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

Please see attached a copy of Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA, which you may find informative for the preparation of the Environmental Impact Assessment for the proposed project. The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

Regards,

Yvonne

Yvonne Jackson
Product Development-Environment & Planning Support | Fáilte Ireland

88-95 Amiens Street, Dublin 1, D01 WR86
M +353 (0)86 0357590

Fáilte Ireland

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From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:32
To: planning applications <planning.applications@failteireland.ie>
Subject: 220245 - Proposed Lackareagh Wind Farm Scoping

Dear Sir/Madam,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

Fáilte Ireland
National Tourism Development Authority

EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects

An tÚdarás Náisiúnta Forbartha Turasóireachta
Áras Fáilte, 88–95 Sráid Amiens
Baile Átha Cliath 1
D01 WR86
Éire

National Tourism Development Authority
Áras Fáilte, 88 - 95 Amiens Street
Dublin 1
D01 WR86
Ireland

Phone 1890 525 525
or +353 1 884 7700
Email info@failteireland.ie
www.failteireland.ie

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1. Introduction

Tourism is a growing sector and substantial part of the Irish Economy. It contributes to both urban and rural economies in every part of the country. The impact and interaction of tourism with the environment is complex and the assessment of environmental impacts is of utmost importance to creating a sustainable tourism economy and protecting the natural resources that are so often a tourism attraction.

The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

This guidance document has been prepared by Cunnane Stratton Reynolds on behalf of Fáilte Ireland to update their EIA guidelines in line with changes in legislative requirements.

2. Background to this Document

Tourism is one of the largest and most important sectors of the economy, providing employment for approximately **260,000 people**, an economic contribution of **€8.4 billion**, and exchequer revenue of **€1.78 billion** in 2018, which helps fund other key public services.

In 2018 Ireland welcomed **10.6 million overseas visitors.**

Fáilte Ireland is the National Tourism Development Authority. Fáilte Irelands role is to support the tourism industry and work to sustain Ireland as a high-quality and competitive tourism destination. They provide a range of practical business supports to help tourism businesses better manage and market their products and services.

Fáilte Ireland also work with other state agencies and representative bodies, at local and national levels, to implement and champion positive and practical strategies that will benefit Irish tourism and the Irish economy.

Fáilte Ireland promotes Ireland as a holiday destination through a domestic marketing campaign (DiscoverIreland.ie) and manage a network of nationwide tourist information centres that provide help and advice for visitors to Ireland.

Tourism related projects cover a broad range of plans, programmes and developments, from the Wild Atlantic Way to a single hotel conversion. These guidelines apply to projects involving or impacting upon tourism. A tourism plan, strategy or programme where it is part of the statutory plan making process under the Planning and Development Acts (as amended), may be more appropriately assessed by a Strategic Environmental Assessment (SEA) as discussed in the next section.

It should be borne in mind that EIA is required where there is anticipated to be a significant impact on the environment, where tourism projects are of a prescribed type or meet thresholds identified below.

Where Natura 2000 Designated Sites are potentially affected by tourism development Appropriate Assessment must be carried out by the appropriate authority in accordance with Article 6(3) of the EU Habitats Directive.

3. Legislation and Statutory Guidance

Environmental Impact Assessment is a procedure that ensures that the environmental implications of decisions are taken into account before planning based decisions are made. The assessment results in a report, called an Environmental Impact Assessment Report (EIAR).

Legislation

These guidelines are produced under current EIAR legislative requirements, having regard to Directive 2011/92/EU (known as 'Environmental Impact Assessment' – EIA Directive), as amended by Directive EU 2014/52 which came into effect in May of 2017. These requirements were transposed into Irish Law on 1 September 2018 as most of the provisions of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) came into effect. The principle of both Directives is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation.

Statutory Guidance

In response to the changes to the EIAR requirements under Directive EU 2014/52, the Environmental Protection Agency (EPA) developed Draft guidelines on the information to be contained in Environmental Impact Assessment Reports in August 2017. At the time of this document the guidelines have not been adopted from draft.

In addition to the EPA statutory guidance, the Department of Housing has produced Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment in August 2018.

The process of EIA is set out in the EPA EIAR Guidelines, which this document should be read in conjunction with and used as supplementary guidance to. The process for ascertaining whether an EIAR is required is known as ‘screening’ and the process to determine the breath and scope of an EIAR is known as ‘scoping’. Guidance on this can be found in Section 3.2 of the EPA Guidelines.

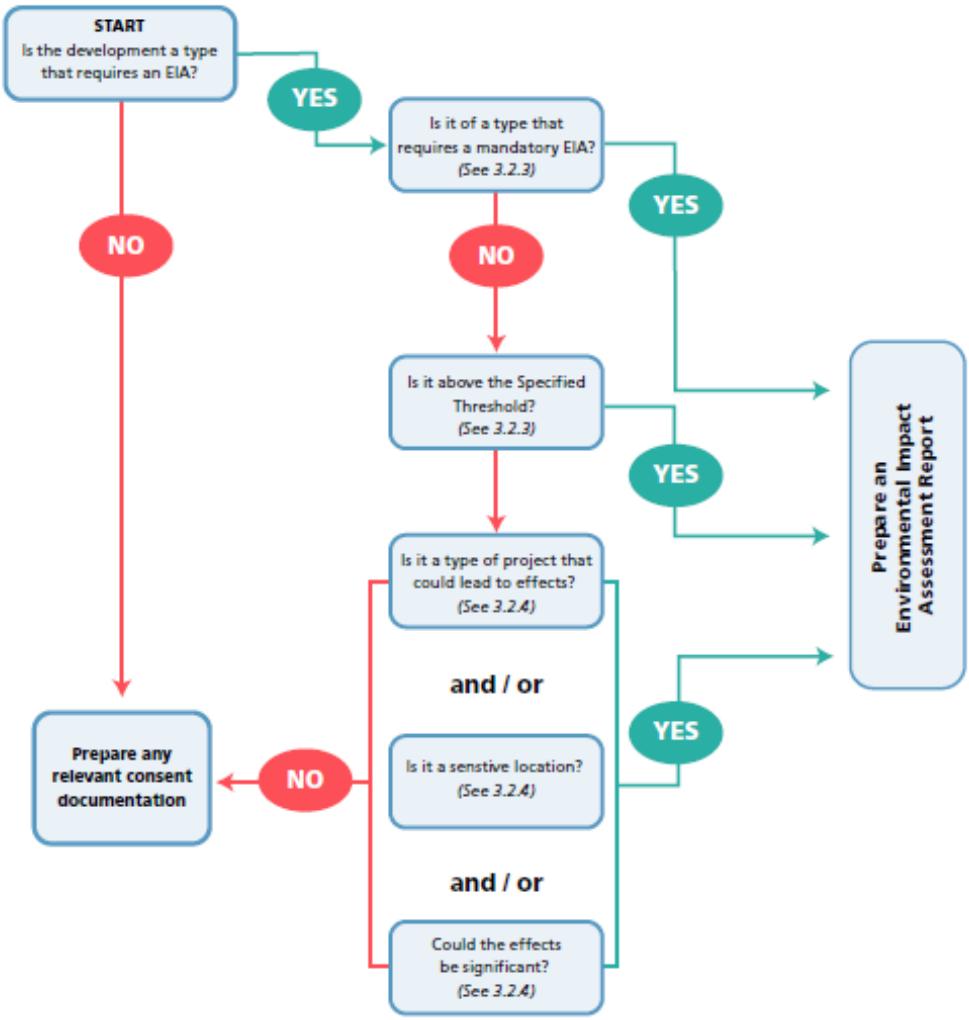
Screening

Through EIAR Screening, developments are either considered as requiring an EIAR due to the project type or because they exceed a threshold level. The screening process begins by establishing whether the proposal is a ‘project’ as understood by the Directive (as amended).

The prescribed development types and thresholds are set out in Annex I and II of the EIA Directive as transposed into Schedule 5 of the Planning and Development Regulations 2010-2018 (as amended). Development which do not exceed these thresholds but may require an EIAR are called sub threshold. Sub-Threshold considerations are outlined in Schedule 7 of European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) as transposed from Annex III of the Directive. The Guidelines on Environmental Impact Assessment Reports note that projects at first glance may not appear to come under the Schedule

but on closer examination when the process is further examined, they may do so because of the sensitivity or significance of the receiving environment etc. Sub threshold developments require an EIAR if they are likely to have significant environmental impacts and must undergo assessment for likely significant impacts through an EIAR screening report. The contents of a screening report for subthreshold development are contained in Annex III of the EIA Directive.

Figure 1: EIAR Screening Process



(Taken from Fig 3.2 of the EPA Guidelines)

Tourism locations should be identified as sensitive receptors in screening assessments for particular impacts, depending on scale and sensitivity, as they would in a full EIAR. Section 6 below can act as guidance for Screening Reports as well as for full EIAR.

The screening process for considering where an EIAR is necessary, is summarised below in Figure 1 (excerpted from Figure 3.2 of the EPA Guidelines).

Strategic Environmental Assessment (SEA) is a more strategic level of environmental assessment that examines plans, policies, objectives and programmes specifically rather than projects. For some tourism developments it may be more appropriate that they be examined through SEA, while individual projects or specific proposals are likely to be more assessed through EIAR. If a project is part of a plan, programme or policy/objective assessed by SEA there will still be a requirement for an EIAR for that development.

Scoping an EIAR is an opportunity to look at the breadth of issues and ensure that any areas of possible significant impact are assessed. Identifying sensitivities and stakeholders should take account of tourism facilities and consider Fáilte Ireland in scoping requests where necessary.

4. Assessing Tourism

There is no legal definition of 'tourism' in Irish legislation. The UNWTO definition of sustainable tourism is *"Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"* . This is widely accepted as a key definition of tourism as we move to a more sustainable future.

Tourism assessments are frequently carried out by economic consultants and by specific tourism consultants. It is always advisable, particular for tourism projects, that suitably qualified and experienced personnel are used to determine the impact of tourism related projects or to assess the impact of more general proposals on a tourism asset identified in a particular location. There is a requirement for EIAR under current legislation to contain a statement of competency within all EIAR documents, including screening and scoping reports.

Projects which involve a tourism element

Tourism projects are wide ranging and diverse. While there are some projects which cater to tourism and are easily identified as such - Hotels, Museums, etc. there are other projects where tourism is a key service or element, but which may not be immediately obvious - forest trails, community facilities and others. EIAR conducted for developments containing tourist elements should be completed in accordance with the current guidance from the EPA.

Projects which include a tourism element have potential particular environmental effects which differ from a non-tourism development. These impacts can be intermittent, event related, inconsistent, dependent on weather, temporal, temporary or seasonal. This is considered within the prescribed environmental topics for EIAR outlined in Section 7 below.

Projects which may have an impact upon tourism

While tourism projects may be diverse, the projects which can impact tourism are considerably more wide ranging, from large infrastructural developments to local energy developments. Disruption to or suppression of a tourist resource or amenity can have very local or more strategic impacts, directly or indirectly- for example energy projects in a rural area can have both a negative and positive impact in different regards. There can be temporary, periodic or even seasonal impacts occurring during construction or operational periods.

According to the Fáilte Ireland Tourism Facts 2018 Report, the most important factors in determining the attractiveness of tourism destinations for visitors to Ireland are;

- Beautiful Scenery and Unspoiled Environment
- Hospitality
- Safety
- Nature, Wildlife and Natural Attractions
- History and Culture
- Pace of Life

These factors used for the promotion of tourism in Ireland are also barometers of sensitivity to change in tourism sensitive or dominant locations where development may have an impact upon the tourism asset. The potential for development to impact these sensitivities, and the environmental criteria under which they can be considered, are identified in section 7 of the guidelines.

5. Guiding Principles of EIAR

As outlined in the EPA Draft EIAR Guidelines, the fundamental principles to be followed when preparing an EIAR, including screening and scoping, are:

- Anticipating, avoiding and reducing significant effects
- Assessing and mitigating effects
- Maintaining objectivity
- Ensuring clarity and quality
- Providing relevant information to decision makers
- Facilitating better consultation.

Environmental assessment should be undertaken in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

6. Consideration of Competency and Qualifications

As per Section 2.5 of the EPA Guidelines, EIAR is required to be completed by 'competent experts'.

Contributors to the preparation of environmental impact assessment reports, including screening and scoping assessments, should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality so that a full and proper assessment can be undertaken.

For tourism related projects, or projects likely to affect tourism assets, competent experts in the area of tourism should be utilised in the environmental assessment.

The competency of all involved in the production of an EIAR or any related report (eg. Screening and scoping) is required to be stated at the beginning of the EIAR report with further details as necessary in each following chapter.

Where tourism projects involve for example heritage or cultural components, input from heritage consultants, conservation architects, or historians may be required.

7. EIAR Requirements

The following are the key requirements for an EIAR under the current guidance. This is not a definitive list and should be read in conjunction with regulations.

- project description;
- assessment of alternatives considered;

- baseline assessment;
- impact assessment;
- cumulative impact
- interaction of impacts
- mitigation.

Project Description

Project descriptions are required to describe the whole project including site, scale, design and key factors. It is important that the EIAR and design team have a consistent understanding of the development description in full. The key requirements are outlined in section 3.5 of the EPA Guidelines however they identify the following;

- the location of the project
- the physical characteristics of the whole project
- the main characteristics of the operational phase of the project
- an estimate, by type and quantity, of the expected residues and emissions

The location of the project should include identifying key sensitive receptors (including tourism receptors). In the operational phase of the project any tourism based, or potentially tourism related activity, should be identified.

Assessment of Alternatives

The assessment of alternatives is a requirement of EIAR

Where tourism projects are location dependent the assessment of alternatives should consider alternative methods and technologies, detail the key considerations culminating in the selection of the design, the reasoning for these and the environmental effect of these decisions. This is particularly important for tourism projects which are often location tied. The developer is expected to consider reasonable alternatives. What is considered reasonable my vary from case to case.

Baseline Assessment

Baseline descriptions are evidence based, current descriptions of environmental characteristics with consideration of likely changes to the baseline environment evidenced in planning histories, unimplemented permissions, and applications pending determination. Baseline assessments should identify any tourism sensitivities in the zone of influence of a development. This zone of influence of a development is highly dependant on its **Context, Character, Significance,** and **Sensitivity**, as outlined in the Draft Guidelines. These characteristics apply to both the development and the environment.

For example, in a tourism context;

The location of sensitive tourism resources that are likely to be directly affected should be highlighted, and other premises which although located elsewhere, may be the subject of in combination impacts such as alteration of traffic flows or increased urban development.

The character of an area from a tourism perspective should be described and the principal types of tourism in the area. Where relevant, the specific environmental resources or attributes in the existing environment which each group uses or values should be stated and where relevant, indicate the time, duration or seasonality of any of those activities.

The significance of the tourism assets or activities likely to be affected should be highlighted. Reference to any existing formal or published designation or

recognition of such significance should be. Where possible the value of the contribution of such tourism assets and activities to the local economy should be provided.

If there are any significant concerns or opposition to the development known to exist among tourism stakeholders and interest groups, this should be highlighted. Identify, where possible, the particular aspect of the development which is of concern, together with the part of the existing tourism resource which may be threatened or impacted.

In addition, the baseline should include any methodologies employed in the study to obtain information, if particular databases are used to locate sensitive receptors they should be acknowledged. In relation to tourism information, the suggested information sources at the end of this document are a non-exhaustive list which may be of assistance in identifying tourism receptors.

Impact Assessment

The topics for consideration of impact are prescribed in the EIA Directive and transcribed into Irish law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Impact assessment should contain the likely significant effects of a development arising from both construction and operation of a development. Advice on describing the effects is contained within the Draft Guidelines and includes the **quality, significance, extent, probability, type** and **duration** of the effect, with particular descriptors for each. In describing effects upon tourism receptors these descriptors should take account of the particular aspects and sensitivities of tourism, for example a temporary annual effect from a development may have different impacts upon tourism if it falls at peak season rather than off-peak.

Impact assessment should be carried out as per EPA guidelines and the best practice for that prescribed topic. It may be considered appropriate to consider impact on tourism assets under the 'material assets' topic below.

Population and Human Health

The consideration of tourism projects within the Population and Human Health is extensive, with impacts ranging from rural employment population impacts of seasonal tourism, to the health impact of air pollution from increased traffic in urban areas.

The impact upon tourism can be considered within this section through the sensitivities of Hospitality, Safety and Pace of Life. Changes in population can impact the perception of pace of life or safety in a particular location. Impacts upon these issues in areas which rely heavily on tourism or have a particular sensitive tourism generator should be considered in this section.

Biodiversity

Particular tourist activities can have a significant impact upon biodiversity. Landscapes which are 'unspoiled' can be attractors of tourism. However, the disturbance to ecology must be managed to minimise impact. Biodiversity is also a tourism asset and should be protected as such from other development and should be provided for in proposals where possible.

Land, Soils and Geology

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however particular activities or facilities which use geological features may have an impact upon soils and geology, such as mountain biking trails, recreational uses of old quarries etc. Indirect impacts such as material use for extensive landscaping and public realm should also be considered.

Water

Tourism uses can be water intense, depending on development type. Recreational use of a surface water feature, water-based leisure centres etc have different impacts to standard development.

Air Quality and Climate

Tourism impact upon air quality is dependent on activity proposed and sensitivity of the location.

Noise and Vibration

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however the impact upon tourism of issues of noise and vibration can be significant. Construction adjoining hotels for example should consider the sensitivity of the development and ensure mitigation is in place.

Material Assets; Traffic and Transport

The different transport patterns associated with tourism activities is a key impact of tourism and should be considered especially for tourism projects. These produce temporal and seasonal changes on the norm and specialist consideration and interpretation should be given. Tourism proposals should, where possible, be well served by public transport and should be accessible by modes other than the car. The impact of traffic on tourism assets can be substantial and can vary in severity according to season, the weather, etc. The impact of construction traffic can be a particular concern in tourism sensitive areas in terms of noise pollution and visual impact. The construction programme of developments should work to avoid peak tourism periods in tourism areas and should consider planned or anticipated tourism events and festivals.

Cultural Heritage

Cultural heritage can be a key component of tourism projects and the impact of tourism on the maintenance of cultural heritage should be given the utmost consideration, whether positive or negative. As a tourism attraction, cultural heritage should be strongly considered in non-tourism developments and the impact upon tourism considered as a potential impact.

Archaeology

Archaeology can be of tourism interest and can be an attractive or key component of tourism projects. Archaeology can be a tourism attractor but is generally not kept in situ except in key cases which could also be considered under cultural heritage.

Material Assets; Waste Management

Tourism is a resource heavy activity and can impact waste streams and waste segregation. Impacts here should be considered strongly and with knowledge of the variation that arises from the particular tourist activity. Waste and Waste disposal issues can also impact the perception of an unspoiled environment, effecting tourism, which should be considered.

Material Assets

Material assets are utilities and infrastructure. Tourism itself could be considered a material asset as its impact upon the economy and the infrastructure in place to support it is a material consideration in assessing economic impact.

Landscape

The visual impact of a tourism development, especially in locations which are visually sensitive or renowned for their scenic or landscape beauty, should be considered carefully. A

development intended to utilise or enjoy a particular vista or environment should minimise impact upon that environment.

Major Accident and Natural Disaster

There is a requirement for tourist developments to describe expected significant effects on the environment of the proposed development's vulnerability to major accidents and/or natural disasters relevant to it. Where appropriate measures should be identified to prevent or mitigate the significant adverse effects of such accidents or disasters, including resulting from climate change, on the environment and detail the preparedness for the proposed response.

Interaction of Effects

Where two or more environmental impacts combine or interact they should be considered under the prescribed topics. It is best practice to provide a table of interactions within an EIAR or EIAR Screening Report.

Mitigation

Mitigation should follow the hierarchy of minimisation in descending order of preference- Avoid, Reduce, Remedy

Avoid sensitive tourism resources- such as views, access and amenity areas including habitats as well as historical or cultural sites and structures.

Reduce the exposure of sensitive resources to excessive environmental impact

Reduce the adverse effects to tourism land uses and patterns of activities, especially through interactions arising from significant changes in the intensity of use or contrasts of character or appearance.

Remedy any unavoidable significant residual adverse effects on tourism resources or activities.

Mitigation measures must be measurable and achievable within the bounds of the project.

Cumulative Impact

The cumulative impact is that of the project combined with any known likely project which will interact or compound an environmental impact.

Transboundary Impact

Transboundary impacts should be included in EIAR. In the case of tourism, especially international travel, the transboundary impacts may not be proximate to the EIAR site.

8. Sources of information on Tourism

Information available online

Fáilte Ireland

Fáilte Ireland offers detailed research analysis and insights into the Irish Tourism Industry. The National Tourism Development Authority has a portfolio of research across a number of areas including facts an figures, briefing papers and reports and visitor feedback. The Fáilte Ireland website has a dedicated research library which can be accessed here

Tourism Ireland

Tourism Ireland is responsible for marketing the island of Ireland overseas as a holiday and business tourism destination. Tourism Ireland publishes a range of research documents including; visitor facts and figures, seasonal updates and industry insights which are accessible here

Local Authorities

Local Authorities are an invaluable source of information. They produce tourism strategies and audits of tourism assets within their jurisdiction. Local authorities will also produce landscape and seascape studies. Protected views and prospects as well as the record of protected structures and other designated protected buildings are contained within the Statutory Development Plans.

Regional Authorities

Regional Authorities can also be consulted on high level strategic tourism and potential Regional Spatial and Economic Strategies (RSESs) should be consulted.

Central Statistics Office

The Central Statistics Office (CSO) is Ireland's national statistical office and their purpose is to impartially collect, analyse and make available statistics about Ireland's people, society and economy. The Tourism and Travel Section of the Central Statistics Office is the major source for tourism statistics in Ireland and is updated regularly.

MKO
Tuam Road
Galway
H91 VW84

5th December 2022

Re: **Scoping Request for the proposed Lackareagh Wind Farm near Kilbane, Co. Clare.**

Dear Sir/Madam,

The following are the comments from this Division in relation to the proposed development:

If the proposed development will involve the felling or removal of any trees, the developer must obtain a Felling License from this Department before trees are felled or removed. A Felling Licence application form can be obtained from **Felling Section, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford**. Email: felling.forestservice@agriculture.gov.ie or Web gov.ie - Tree Felling Licences (www.gov.ie)

A Felling Licence granted by the Minister for Agriculture, Food and the Marine provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and/or to thin a forest for silvicultural reasons. The Act prescribes the functions of the Minister and details the requirements, rights and obligations in relation to felling licences. The principal set of regulations giving further effect to the Forestry Act 2014 are the Forestry Regulations 2017 (S.I. No. 191 of 2017).

The developer should take note of the contents of **Felling and Reforestation Policy** document which provide a consolidated source of information on the legal and regulatory framework relating to tree felling; gov.ie - Tree Felling Licences (www.gov.ie) As this development is within forest lands, particular attention should be paid to deforestation, turbulence felling and the requirement to afforest alternative lands.

In order to ensure regulated forestry operations in Ireland accord with the principles of sustainable forest management (SFM), as well fulfilling the requirements of other relevant environmental protection laws, the Department (acting through its Forest Service division) must undertake particular consultations, and give certain matters full consideration during the assessment of individual Felling Licence applications. This includes consultation with relevant bodies, the application of various protocols and procedures (e.g. Forest Service Appropriate Assessment Procedure), and the requirement for applicants on occasion to provide further information (e.g. a Natura Impact Statement).

Consequently, when the Forest Service is considering an application to fell trees, the following applies:

1. The interaction of these proposed works with the environment locally and more widely, in addition to potential direct and indirect impacts on designated sites and water, is assessed. Consultation with relevant environmental and planning authorities may be required where specific sensitivities arise (e.g. local authorities, National Parks & Wildlife Service, Inland Fisheries Ireland, and the National Monuments Service);

2. Where a tree Felling Licence application is received, the Department will publish a notice of the application before making a decision on the matter. The notice shall state that any person may make a submission to the Department within 30 days from the date of the notice. The notices are published online at: gov.ie - Felling Licence Applications (www.gov.ie)

3. Third parties that make a submission or observation will be informed of the decision to grant or refuse the licence, and on request, details of the conditions attached to the licence, the main reasons and considerations on which the decision to grant or refuse the licence was based, and where conditions are attached to any licence, the reasons for the conditions. Both third parties and applicants will be also informed of their right to appeal any decision within 14 days to the Forestry Appeals Committee. Felling Licence decision are published online at: gov.ie - Felling Licence Decisions (www.gov.ie)

It is important to note that when applying to **a Local Authority**, or **An Bord Pleanàla**, for planning permission where developments are:

a) subject to an EIA procedure (including screening in the case of a sub-threshold development) and any resulting requirement to produce an EIAR; and/or

b) subject to an Appropriate Assessment procedure (including screening) and any resulting requirement to a Natura Impact Statement (NIS); and

c) the proposed development in its construction or operational phases, or any works ancillary thereto, would directly or indirectly involve the felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species,

1. that there is a requirement inter alia under the EIA Directive for an overall assessment of the effects of the project or the alteration thereof on the environment to be undertaken, including the direct and indirect environmental impact of the project;

   and

2. pursuant to Article 2(3) of the EIA Directive, the Department of Agriculture, Food and the Marine strongly recommends that, notwithstanding the fact that a parallel consent in the form of felling licence may also have to be applied for, any EIAR and/or NIS produced in connection with the application for planning permission to the Local Planning Authority or An Bord Pleanàla, should include an assessment of the impact of and measures, as appropriate, to prevent, mitigate or compensate for any significant adverse effects direct or indirect identified on the environment arising from such felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species.

3. Please note that there must be absolute spatial consistency between the felling licence areas submitted to DAFM (second authority) and all related planning documents submitted to the first authority in respect of the felling area(s)

Yours sincerely,

_____

Catherine Boyce
Felling Section
Department of Agriculture, Food and the Marine
Johnstown Castle
Co Wexford

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Geological Survey Ireland's Publicly Available Datasets Relevant to Planning, EIA and SEA processes

following European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018
(S.I. No. 296 of 2018)

Geological Survey Ireland Programme	Dataset	Relevant EIA Topic	Coverage	Description / Notes / Limitations	Link to Geological Survey Ireland map viewer
Geohazards	Landslide: National landslide database and landslide susceptibility map	Land & Soil/Climate/Landscape	National	Associated guidance documentation relating to the National Landslide Susceptibility Map is also available.	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b68cf1e4a9044a5981f950e9b9c5625c
Geohazards	Groundwater Flooding (Historic)	Water	Regional	Provide information of historic flooding, both surface water and groundwater. [A lack of flooding presented in any specific location of the map only indicates that a flood has not been detected. It does not indicate that a flood cannot occur in that location at present or in the future]	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc
Geohazards	Groundwater Flooding (Predictive)	Water	Regional	Provides information on the probability of future karst groundwater flooding (where available). [The maps do not, and are not intended to, constitute advice. Professional or specialist advice should be sought before taking, or refraining from, any action on the basis of the flood maps]	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc
Geohazards	Radon Map	Land & Soils/Air	National		http://www.epa.ie/radiation/radonmap/
Geoheritage	County Geological Sites as adopted by National Heritage Plan and listed in County Development Pla	Land & Soils/Landscape	Regional	All geological heritage sites identified by Geological Survey Ireland are categorised as CGS pending any further NHA designation by NPWS.	https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
Geological Mapping	Bedrock geology:	Land & Soils	National	1:100,000 scale and associated memoirs.	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5&scale=0
Geological Mapping	Bedrock geology:	Land & Soils	Regional	1:50,000 scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5&scale=0
Geological Mapping	Quaternary geology: Sediments	Land & Soils	National	1:50,000 scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5&scale=0
Geological Mapping	Quaternary geology: Geomorphology	Land & Soils	National	1:50,000 scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5&scale=0
Geological Mapping	Physiographic units:	Land & Soils	National	Broad-scale physical landscape units mapped at 1:100,000 scale in order to be represented as a cartographic digital map at 1:250,000 scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=afa76a420fc54877843aca1bc075c62b
Geological Mapping	GeoUrban: Spatial geological data for the greater Dublin and Cork areas	Land & Soils	Regional	includes 3D models	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=9768f4818b79416093b6b2212a850ce6&scale=0
Geological Mapping	Geotechnical database	Land & Soils	National	Digitised geotechnical and Site Investigation Reports and boreholes which can be accessed through online downloads	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=a2718be1873d47a585a3f0415b4a724c
Goldmine	Historical data sets including geological memoirs and 6" to 1 mile geological mapping records	land & Soils/Water	National	available online	https://secure.dccae.gov.ie/goldmine/index.html
Groundwater & Geothermal	Groundwater resources (aquifers)	Water	National	Data limited to 1:100,000 scale; sites should be investigated at local scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Groundwater recharge.	Water	National	Data limited to 1:40,000 scale; sites should be investigated at local scale; long term annual average recharge	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Groundwater vulnerability.	Water	National	Data limited to 1:40,000 scale; sites should be investigated at local scale	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Group scheme and public supply source protection areas.	Water	National	Not all PWS / GWS have SPZ / ZOC. Check with IW / coco / NFGWS for private supplies.	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Groundwater Protection Schemes	Water	National	Data is limited to scale of 1:40,000. Data does not include all of the source protections areas	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Catchment and WFD management units.	Water	National		https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	karst specific data layers	water	National	For areas underlain by limestone, includes karst features, tracer test database; turlough water levels (gwlevel.ie).	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Wells and Springs	Water	National	Not comprehensive, there may be unrecorded wells and springs	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Groundwater & Geothermal	Groundwater body Descriptions	Water	National	Not exhaustive; only those in designated SACs; could be other GWDTEs; for more information contact NPWS / EPA / site investigations	https://www.gsi.ie/en-ie/programmes-and-projects/groundwater-and-geothermal-unit/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx
Groundwater & Geothermal	Geothermal Suitability maps	land & Soils/Water	National	Also, Roadmap for a Policy and Regulatory Framework for Geothermal Energy, November 2020	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=9ee46bee08de41278b90a991d60c0b9e
Marine & Coastal Unit	INFOMAR - Ireland's national marine mapping programme; providing key baseline data for Ireland's	Water	National		https://secure.dccae.gov.ie/GSI/INFOMAR_VIEWER/
Marine & Coastal Unit	CHERISH - Coastal change project (Climate, Heritage and Environments of Reefs, Islands, and Headla	Water	Regional		http://www.cherishproject.eu/en/
Marine & Coastal Unit	Coastal Vulnerability Index (CVI).	water /Land & Soils	Regional	Currently the project is being carried out on the east coast and will be rolled out nationally	https://www.gsi.ie/en-ie/programmes-and-projects/marine-and-coastal-unit/projects/Pages/Coastal-Vulnerability-Index.aspx
Minerals	Aggregate potential	Land & Soils/Material Assets	National	Consideration of mineral resources and potential resources as a material asset which should be explicitly recognised within the environmental assessment process	https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=ee8c4c285a49413aa6f1344416dc9956
Minerals	Active quarries	Land & Soils	National		https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=ee8c4c285a49413aa6f1344416dc9956
Minerals	Historic mines	Land & Soils/Cultural Heritage	National	Inventory and Risk Classification 2009. Environmental Protection Agency, Economic Minerals Division and Geological Survey Ireland (DECC).	https://gis.epa.ie/EPAMaps/default?easting=?&northing=?&lid=EPA:LEMA_Facilties_Extractive_Facilities https://www.epa.ie/enforcement/mines/
Tellus	Geochemical data: multi-element data for shallow soil, stream sediment and stream water	Land & Soils	Regional	A national mapping programme	https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=6304e122b733498b99642707ff72f754
Tellus	Airborne geophysical data including radiometrics, electromagnetics and magnetics	Land & Soils	Regional	A national mapping programme	https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=6304e122b733498b99642707ff72f754
Tellus	urban geochemistry mapping (Dublin SURGE project),	Land & Soils	Regional		https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=6304e122b733498b99642707ff72f754

Notes:

1. The maps and data listed above are available on the Geological Survey Ireland map viewer https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

2. Please read all disclaimers carefully when using Geological Survey Ireland data

3. Geological Survey Ireland and Irish Concrete Federation published guidelines for the treatment of geological heritage in the extractive industry in 2008.

An Roinn Comhshaoil,
Aeráide agus Cumarsáide
Department of the Environment,
Climate and Communications

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Niamh McHugh
MKO
Tuam Road
Galway, H91 VW84

15 December 2022

Re: EIA Scoping Document for the Proposed Lackareagh Wind Farm, Kilbane, Co. Clare
Your Ref: 220245
Our Ref: 22/496

Dear Niamh,

Geological Survey Ireland is the national earth science agency and is a division of the Department of the Environment, Climate and Communications. We provide independent geological information and advice and gather various data for that purpose. Please see our website for data availability. We recommend using these various data sets, when conducting the EIAR, SEA, planning and scoping processes. Use of our data or maps should be attributed correctly to 'Geological Survey Ireland'.

With reference to your email received on the 06 December 2022, concerning the EIA Scoping Document for the Proposed Lackareagh Wind Farm, Kilbane, Co. Clare, Geological Survey Ireland would encourage use of and reference to our datasets. Please find attached a list of our publicly available datasets that may be useful to the environmental assessment and planning process. We recommend that you review this list and refer to any datasets you consider relevant to your assessment. The remainder of this letter and following sections provide more detail on some of these datasets.

Geoheritage

A national inventory of geoheritage sites known as County Geological Sites (CGSs) is managed by the Geoheritage Programme of Geological Survey Ireland. CGSs, as adopted under the National Heritage Plan, include sites that are of national importance which have been selected as the very best examples for NHA (Natural Heritage Areas) designation. NHA designation will be completed in partnership with the National Parks and Wildlife Service (NPWS). CGSs are now routinely included in County Development Plans and in the GIS of planning departments, to ensure the recognition and appropriate protection of geological heritage within the planning system. CGSs can be viewed online under the Geological Heritage tab on the online Map Viewer.

The audit for Co. Clare was completed in 2005. The full report details can be found here. **Our records show that there are no CGSs in the vicinity of the proposed wind farm.**

Groundwater

Geological Survey Ireland's Groundwater and Geothermal Unit, provides advice, data and maps relating to groundwater distribution, quality and use, which is especially relevant for safe and secure drinking water supplies and healthy ecosystems.

Proposed developments need to consider any potential impact on specific groundwater abstractions and on groundwater resources in general. We recommend using the groundwater maps on our Map viewer which should include: wells; drinking water source protection areas; the national map suite - aquifer, groundwater vulnerability, groundwater recharge and subsoil permeability maps. For areas underlain by limestone, please refer to the karst specific data layers (karst features, tracer test database; turlough water levels (gwlevel.ie). Background information is also provided in the Groundwater Body Descriptions. Please read all disclaimers carefully when using Geological Survey Ireland data.

The Groundwater Data Viewer indicates an aquifer classed as a 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones' underlies the proposed development. The Groundwater Vulnerability map indicates the range of groundwater vulnerabilities within the area covered is variable. We would therefore recommend use of the Groundwater Viewer to identify areas of High to Extreme Vulnerability and 'Rock at or near surface' in your assessments, as any groundwater-surface water interactions that might occur would be greatest in these areas.

GWClimate is a groundwater monitoring and modelling project that aims to investigate the impact of climate change on groundwater in Ireland. This is a follow on from a previous project (GWFlood) and the data may be useful in relation to Flood Risk Assessment (FRA) and management plans. Maps and data are available on the Map viewer.

Geological Survey Ireland has completed Groundwater Protection Schemes (GWPSs) in partnership with Local Authorities, and there is now national coverage of GWPS mapping. A Groundwater Protection Scheme provides guidelines for the planning and licensing authorities in carrying out their functions, and a framework to assist in decision-making on the location, nature and control of developments and activities in order to protect groundwater. **The Groundwater Protection Response overview and link to the main reports is here: https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/projects/protecting-drinking-water/what-is-drinking-water-protection/county-groundwater-protection-schemes/Pages/default.aspx**

Geological Mapping

Geological Survey Ireland maintains online datasets of bedrock and subsoils geological mapping that are reliable and accessible. We would encourage you to use these data which can be found here, in your future assessments.

Please note we have recently launched QGIS compatible bedrock (100K) and Quaternary geology map data, with instructional manuals and videos. This makes our data more accessible to general public and external stakeholders. QGIS compatible data can be found in our downloadable bedrock 100k .zip file on the Data & Maps section of our website.

Geohazards

Geohazards can cause widespread damage to landscapes, wildlife, human property and human life. In Ireland, landslides, flooding and coastal erosion are the most prevalent of these hazards. We recommend that geohazards be taken into consideration, especially when developing areas where these risks are prevalent, and we encourage the use of our data when doing so.

Landslides are common in areas of peat, rock near surface and in fine to coarse range materials (such as glacial tills), areas which are found within the proposed wind farm development area. Geological Survey Ireland has information available on landslides in Ireland via the National Landslide Database and Landslide Susceptibility Map both of which are available for viewing on our dedicated Map Viewer. Associated guidance documentation relating to the National Landslide Susceptibility Map is also available.

Geological Survey Ireland also engaged in a national project on Groundwater Flooding. The data from this project may be useful in relation to Flood Risk Assessment (FRA) and management plans, and is described in more detail under 'Groundwater' above.

Natural Resources (Minerals/Aggregates)

Geological Survey Ireland provides data, maps, interpretations and advice on matters related to minerals, their use and their development in our Minerals section of the website. The Active Quarries, Mineral Localities and the Aggregate Potential maps are available on our Map Viewer.

We would recommend use of the Aggregate Potential Mapping viewer to identify areas of High to Very High source aggregate potential within the area. In keeping with a sustainable approach we would recommend use of our data and mapping viewers to identify and ensure that natural resources used in the proposed wind farm development are sustainably sourced from properly recognised and licensed facilities, and that consideration of future resource sterilization is considered.

Guidelines

The following guidelines may also be of assistance:

- Institute of Geologists of Ireland, 2013. Guidelines for the Preparation of the Soils, Geology and Hydrogeology Chapters of Geology in Environmental Impact Statements.

- EPA, 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Other Comments

Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. The data would be added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector. Data can be sent to the Geological Mapping Unit, at mailto:GeologicalMappingInfo@gsi.ie, 01-678 2795.

I hope that these comments are of assistance, and if we can be of any further help, please do not hesitate to contact me Clare Glanville, or my colleague Trish Smullen at GSIPlanning@gsi.ie.

Yours sincerely,

Dr. Clare Glanville
Senior Geologist
Geological Survey Ireland

Trish Smullen
Geoheritage and Planning Programme
Geological Survey Ireland

Enc: Table - Geological Survey Ireland's Publicly Available Datasets Relevant to Planning, EIA and SEA processes.

An tSeirbhís Sláinte Comhshaoil
Feidhmeannacht na Seirbhíse Sláinte,
Ionad 6, Páirc Ghnó Bothar Chuinche,
Inis, Co. An Chlár.

Environmental Health Service,
Health Service Executive,
Unit 6, Quin Road Business Park,
Ennis, Co. Clare.

☎ **(065) 6706660**

HSE EIA Scoping
Environmental Health Service Submission Report

Date:	11th January 2023
Our reference:	EHIS 2881
Report to:	Niamh McHugh, MKO Consulting
Type of Consultation:	EIA Scoping **ref: 220245**
Proposed development:	Wind Farm Development, Lackareagh Wind Farm, Kilbane, Co. Clare.
Applicant:	EDF Renewables Ireland Limited (EDF Renewables)

Proposed Development: The Proposed Development will comprise approximately 7 no. wind turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, and a permanent anemometry mast, and grid connection to Ardnacrusha 110kV sub station.

General Introduction

The following documents should be taken into consideration when preparing the Environmental Impact Assessment Report:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
https://www.housing.gov.ie/sites/default/files/publications/files/guidelines_for_planning_authorities_and_an_bord_pleanála_on_carrying_out_eia_-_august_2018.pdf

EU publication: Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, EU, 2017
http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

Adoption of the Directive (2014/52/EU) in April 2014 initiated a review of the National Guidance for EIA and the EIAR accompanying a planning application. New guidelines can be seen at:
https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php

The introduction of the new Guidance is supported by a Webinar produced by the EPA and can be found at:
https://www.youtube.com/embed/ejKVFUztxBY

The applicant should also consider the findings of the High Court judgement issued in the judicial review of the Derryadd Wind Farm. (2021 IEHC 390 [20202 No. 557 JR] P. Sweetman v An Bord Pleanála)

Generally the Environmental Impact Assessment should examine all likely significant impacts and provide the following information for each:

a) Description of the receiving environment;
b) The nature and scale of the impact;
c) An assessment of the significance of the impact;
d) Proposed mitigation measures;
e) Residual impacts.

Directive 2014/52/EU has an enhanced requirement to assess likely significant impacts on Population and Human Health. It is the experience of the Environmental Health Service (EHS) that impacts on human health are often inadequately assessed in EIAs in Ireland. It is recommended that the wider determinants of health and wellbeing are considered in a proportionate manner when considering the EIA. Guidance on wider determinants of health can be found at www.publichealth.ie

In addition to any likely significant negative impacts from the proposed development, any positive likely significant impacts should also be assessed.

The HSE will consider the final EIAR accompanying the SID/Planning application and will make comments to An Bord Pleanála/Local Planning Authority on the methodology used for assessing the likely significant impacts and the evaluation criteria used in assessing the significance of the impact.

The Environmental Health Service (EHS) recommends that the following matters are included and assessed in the EIAR

- Public Consultation
- Decommissioning phase of the proposed wind farm
- Siting and location of turbines
- Noise & Vibration
- Shadow Flicker
- Air Quality
- Surface and Groundwater Quality
- Geological Impacts
- Ancillary facilities
- Cumulative impacts

Public Consultation

It is recommend that early and meaningful public consultation with the local community is undertaken to ensure all potentially significant impacts of the proposed windfarm development have been adequately addressed.

All parties affected by the proposed development, **including those who may benefit financially from the project,** must be fully informed of what the proposal entails especially with regard to potential impacts on surrounding areas.

Sensitive receptors and other stakeholders should be identified to ensure all necessary and appropriate mitigation measures are put in place to reduce the likelihood of any complaints about the proposed wind farm development in the future.

With the lifting of restrictions around public gatherings as a result of Covid 19 prevention measures there should be no barrier to holding public consultation events. The Environmental Health Service expects that meaningful public consultation, where the local community is fully informed of the proposed development, will be undertaken. Members of the public should be given sufficient opportunity to express their views on the proposed windfarm development.

The Environmental Impact Assessment Report (EIAR) should clearly demonstrate the link between public consultations and how those consultations have influenced the decision-making process in the EIA.

To assist with the consultation and planning process it is recommended that the applicant develops a dedicated website for the proposed windfarm development. All correspondence, maps, project updates and documentation including the EIAR should be uploaded to the website

The EIAR should state the period of planning permission sought, the length of time construction is estimated to take and if it is anticipated that the windfarm development will be decommissioned and removed or will continue to operate (following any further planning consent) at the end of this period of planning permission (should permission be granted)

Decommissioning

The EIAR should detail the eventual fate of the wind turbines and associated material i.e. will the material be recycled or how will it be disposed of.

Information should also be provided regarding the proposed methodology to be used for the disposal of the materials forming the foundations of the wind turbines.

The EIAR should indicate the proposed future use of the development site at the end of the planning permission period.

Siting, Location and details of Turbines
The EIAR should include a map and a description of the proposed location of each of the proposed wind turbines.
The Environmental Health Service expects that details (height and model) of the turbines to be installed will be available at the time planning permission is sought and will be included in the EIAR.
Details of the foundations for the wind turbine including depth, quantity and material to be used should be included in the EIAR.

Assessment of Consideration of Alternatives
The EIAR should consider an assessment of alternatives. The EHS recommends that alternative renewable energy options to on- shore wind farms should be assessed as part of the EIAR.
Noise & Vibration
The potential impacts for noise and vibration from the proposed development on all noise sensitive locations must be clearly identified in the EIAR. The EIAR must also consider the appropriateness and effectiveness of all proposed mitigation measures to minimise noise and vibration.
A baseline noise monitoring survey should be undertaken to establish the existing background noise levels. Noise from any existing turbines in the area should not be included as part of the back ground levels.
In addition, an assessment of the predicted noise impacts during the construction phase and the operational phase of the proposed windfarm development must be undertaken which details the change in the noise environment resulting from the proposed development.
The Draft Revised Wind Energy Development Guidelines were published in December 2019. Whilst these have yet to be adopted, any proposed wind farm development should have consideration of the draft Guidelines.
https://www.housing.gov.ie/sites/default/files/public-consultation/files/draft_revised_wind_energy_development_guidelines_december_2019.pdf .

Shadow Flicker
It is recommended that a shadow flicker assessment is undertaken to identify any dwellings and sensitive receptors which may be impacted by shadow flicker. The assessment must include all proposed mitigation measures. Dwellings should include all occupied properties and any existing or proposed properties for which planning consent has been granted for construction or refurbishment.
It is recommended that turbine selection will be based on the most advanced available technology that permits shut down during times when residents are exposed to shadow flicker. As a result no dwelling should be exposed to shadow flicker.

Air Quality
Due to the nature of the proposed construction works generation of airborne dust has the potential to have significant impacts on sensitive receptors. A Construction Environmental Management Plan (CEMP) should be included in the EIAR which details dust control and mitigation measures. Measures should include:
- Sweeping of hard road surfaces
- Provision of a water bowser on site, regular spraying of haul roads
- Wheel washing facilities at site exit
- Restrict speed on site
- Provide covers to all delivery trucks to minimise dust generation
- Inspect and clean public roads in the vicinity if necessary
- Material stockpiling provided with adequate protection from the wind
- Dust monitoring at the site boundary
- Truck inspection and maintenance plan
- Details of a road maintenance agreement between the wind farm operator and the Local Roads Authority to clarify responsibility for the upkeep and repair of access roads during the construction phase of the project

Surface and Ground Water Quality
The proposed development has the potential to have a significant impact on the quality of both surface and ground water. All drinking water sources, both surface and ground water, must be identified. Public and Group Water Scheme sources and supplies should be identified in addition to any private wells supplying

potable water to houses in the vicinity of the proposed development. Measures to ensure that all sources and supplies are protected should be described. The Environmental Health Service recommends that a walk over survey of the site is undertaken in addition to a desktop analysis of Geological Survey of Ireland data in order to identify the location of private wells used for drinking water purposes.
Any potential significant impacts to drinking water sources should be assessed. Details of bedrock, overburden, vulnerability, groundwater flows, aquifers and catchment areas should be considered when assessing potential impacts and any proposed mitigation measures.
Any impacts on surface water as a result of the construction of the underground cables should be identified and addressed in the EIAR.

Geotechnical and Peat Stability Assessment
A detailed assessment of the current ground stability of the site for the proposed windfarm development and all proposed mitigation measures should be detailed in the EIAR. The assessment should include the impact construction work may have on the future stability of ground conditions, taking into consideration extreme weather events, site drainage and the potential for soil erosion.
Information should be provided on the make and model of the turbines and on construction details for the turbine foundations, including the depth and volume of concrete required. An accurate assessment of the potential impacts of the foundations on water quality and peat stability cannot be undertaken without this information.
Reference is made to a peat slide which occurred near Ballybofey in Co. Donegal on 13th November 2020 which may have been linked to construction activity at Meenbog Wind Farm. Potential impacts on water supply associated with contamination following a peat slide include sedimentation and alteration of pH levels.
The Environmental Health Service recommends that a detailed Peat Stability/Geotechnical Assessment should be undertaken to assess the suitability of the soil for the proposed development. The EIAR should include provision for a peat stability monitoring programme to identify early signs of potential bog slides ('pre-failure indicators' see the Scottish Government's 'Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Developments 2017)
https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2017/04/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/00517176-pdf/00517176-pdf/govscot%3Adocument/00517176.pdf

Ancillary Facilities
The EIAR should include details of the location of all site office, construction compound, fuel storage depot, sanitary accommodation and canteen, First Aid facilities, disposal of wastewater and the provision of a potable water supply to the site canteen.

Cumulative Impacts
All existing or proposed wind farm developments in the vicinity should be clearly identified in the EIAR. The impact on sensitive receptors of the proposed development combined with any other wind farm/renewable energy developments in the vicinity should be considered. The EIAR should include a detailed assessment of any likely significant cumulative impacts of the proposed windfarm development.

Andrew Sulley
Senior Environmental Health Officer

Rory O'Dea
Senior Environmental Health Officer

EUROCONTROL Guidelines

How to Assess the Potential Impact of Wind Turbines Surveillance Sensors

Edition: 1.2
Edition date: September 2014
ISBN number: 978-2-87497-043-6
Reference nr: EUROCONTROL-GUID-130

EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors

DOCUMENT IDENTIFIER : EUROCONTROL-GUID-0130

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Abstract

This document provides guidelines for Air Navigation Service Providers (ANSP), and also wind energy developers, on how to assess whether or not wind turbines could impact upon the provision of surveillance services currently provided and identifies some possible means of mitigation.
This document aims at maintaining the necessary levels of safety and efficiency of surveillance related Air Traffic Services whilst supporting to the maximum extent possible the development of wind energy.
The proposed process defines different geographical zones, based on simple criteria, for each type of sensors (radar only for the time being). For each of these zones different conditions are defined to ensure that the impact of the wind turbine is tolerable. In the “safeguarding” zone, the closest area to the sensor, wind turbines are not allowed to be built. In the second zone, wind turbines can be built provided that a specific impact assessment analysis demonstrates that the impact can be tolerated. In the third zone, wind turbine can be built on the basis of the results of a simple and generic impact assessment analysis that is further described in this document. In the last zone, the impact is acceptable or even non-existent.

Keywords

Wind	Turbine	Surveillance	Sensor
Radar	SSR	PSR	Mode S
Engineering	Operational	ADS-B	WAM
MLAT	ANSP		

Contact Person(s)	Tel	Unit
Michel BORELY	+32 2 72 91161	DPS/TEC

STATUS, AUDIENCE AND ACCESSIBILITY					
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Proposed Issue	☐	Restricted	☐	Internet (www.eurocontrol.int)	☑
Released Issue	☑				

DOCUMENT APPROVAL

The following table identifies all management authorities who have successively approved the present issue of this document.

AUTHORITY	NAME AND SIGNATURE	DATE
Editor:	Andrew DESMOND-KENNEDY Secretary of the Surveillance Steering Group	25/09/2014
Editor:	Michel BORELY	25/09/2014
Head of Surveillance and Code Coordination Unit (and Chairman of the Surveillance Steering Group)	Robert STEWART	2/10/2014
Head of Standardisation Unit	Peter GREEN	2/10/2014
Director Pan-European Single Sky	Luc TYTGAT	2/10/14
Director General	Frank BRENNER	10/10/14

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	PAGES AFFECTED
1.0	17/05/2010	First released issue	All
1.1	09/06/2010	Correction of equation 30	67
1.2	20/02/2014	Section 1.9 removal of link from section title Section 2.10 added Section 3.2 CFAR text elaborated Section 4.3.1 modified Section 4.4.12 added Section 4.6.1 modified Table 3 in 4.6.2 modified Annex C correction to footnote references	16 21 23 33 and 34 38 39 41 56

Publications
EUROCONTROL Headquarters
96 Rue de la Fusée
B-1130 BRUSSELS

Tel: +32 (0)2 729 4715
Fax: +32 (0)2 729 5149
E-mail: publications@eurocontrol.int

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EXECUTIVE SUMMARY

Many countries have set ambitious renewable energy targets for the year 2020. Meeting these targets requires a considerable deployment of renewable electricity generating capacity such as wind turbines. Wind turbines can have a detrimental impact on the functioning of Air Traffic Control (ATC) surveillance.

This document provides an approach based on an early and constructive dialogue promoting reciprocal transparency between Air Navigation Service Providers (ANSP) and wind energy developers to maintain the necessary levels of safety and efficiency of surveillance Air Traffic Services whilst supporting the development of wind energy.

The document provides three elements:

- A framework process further, supported by
- A methodology to assess whether or not wind turbine could impact on the provision of surveillance services
- A (non-exhaustive) list of possible measures to be applied to the air traffic control system or wind farm to mitigate that impact.

The proposed process includes an assessment methodology that defines different geographical zones, based on simple criteria, for each type of sensor (radar only for the time being). For each of these zones different conditions are defined to ensure that the impact of the wind turbine is manageable from an operational point of view. In summary these are as follows, in the “safeguarding” zone, the closest area to the sensor, wind turbines are very likely to cause harmful interferences. In the second zone, wind turbines could be built provided that a specific impact assessment analysis demonstrates that the impact can be managed. In the third zone, wind turbines could be built on the basis of the results of a simple and generic impact assessment analysis that is further described in this document. In the last zone, from a surveillance perspective, wind turbines could be built without any constraints.

The process also foresees wind energy developers and Air Navigation Service Providers mutually assessing possible mitigation options.

The document was written by a group of civil and military surveillance experts from the ECAC countries. The procedures described are a consolidation of practical experiences supplemented by the results of third-party studies.

It is recognised that the state of knowledge and the state of technology is continuously evolving. Therefore it is desirable to keep the document updated by modifying the approach when appropriate and adding new mitigation options when available.

The application of the procedures outlined in this document is not mandatory.

EUROCONTROL makes no warranty for the information contained in this document, nor does it assume any liability for its completeness or usefulness. Any decision taken on the basis of the information is at the sole responsibility of the user.

It is noted that only ATC surveillance related aspects are covered in this document. The readers are advised to ensure that all parties that may be impacted by such deployments are adequately consulted.

1. Introduction

1.1 Background

Air Navigation Service Providers (ANSP), throughout Europe, are legally responsible for the safe and expeditious movement of aircraft operating within their designated airspace. To undertake this responsibility, each has a comprehensive infrastructure of surveillance sensors (including radars), communication systems and navigational aids.

All these ground systems have an interface with the aircraft through a Radio Frequency (RF) link. Any structure that is located between a ground-based surveillance system and an aircraft has the potential to disturb the RF link between the ground system and the aircraft.

A large number of wind turbines are being deployed within the ECAC countries in order to support the strategy of increasing the share of renewable energy (e.g. 20% by 2020 for EU states).

Both communities of stakeholders have set ambitious development objectives for the next years, and it is therefore essential to ensure that each community achieves its objectives without detrimental impact on the other's.

Recommendations such as European Guidance Material on Managing Building Restricted Areas [RD 3] have been published for protecting an ANSP's Air Traffic Management infrastructure against static structures like buildings, telecommunication masts, etc. However wind turbines are not static structures (blades are turning, blade orientation is changing, nacelle is rotating), the recommendations defined for static structures are not applicable to wind turbines.

In responses to concerns regarding interference between surveillance sensors and wind turbines, the EUROCONTROL Surveillance Team established, at the end of 2005, a Wind Turbine Task Force and gave it the responsibility to develop a recommended methodology that could be used to assess the potential impact of structures such as wind turbines on Surveillance Systems and to provide suggestions for possible mitigation options.

This methodology and the framework process, in which it is embedded, are described in this document. They aim at maintaining the necessary levels of safety and efficiency of surveillance related Air Traffic Services whilst supporting to the maximum extent possible the installation of wind turbines.

1.2 EUROCONTROL Guidelines

EUROCONTROL guidelines, as defined in EUROCONTROL Regulatory and Advisory Framework (ERAF) [RD 5], are advisory materials and contain:

"Any information or provisions for physical characteristic, configuration, material, performance, personnel or procedure, the use of which is recognised as contributing to the establishment and operation of safe and efficient systems and services related to ATM in the EUROCONTROL Member States."

Therefore, the application of EUROCONTROL guidelines document is not mandatory.

In addition, it is stated in [RD 6] that:

"EUROCONTROL Guidelines may be used, inter alia, to support implementation and operation of ATM systems and services, and to:

- *complement EUROCONTROL Rules and Specifications;*
- *complement ICAO Recommended Practices and Procedures;*
- *complement EC legislation;*
- *indicate harmonisation targets for ATM Procedures;*
- *encourage the application of best practice;*
- *provide detailed procedural information."*

1.3 Objective of this document

The objective of this document is to provide a concise and transparent reference guide for both ANSPs and Wind Energy developers when assessing the impact of wind turbines on ATC surveillance systems.

This reference guide relies on a framework process including an assessment methodology and mitigation options. The assessment methodology is based on establishing when ATC services based on surveillance information could be affected beyond manageable level by the construction of a proposed wind turbine development.

For radar, the key performance characteristics are defined in the EUROCONTROL Standard Document for Radar Surveillance in En-route Airspace and Major Terminal Areas [RD 1]. They are used throughout this document when assessing radar performance.

For the time being the assessment methodology is limited to mono-static ATC radar surveillance sensor (Primary Surveillance Radar – PSR, Secondary Surveillance Radar – SSR); it is the intention to extend it to other technologies like Wide Area Multilateration (WAM), Automatic Dependent Surveillance Broadcast (ADS-B) and Multi-Static Primary Surveillance Radar (MSPSR) if relevant.

Initial studies showed that these technologies, which currently have different levels of maturity[1], are likely to be less susceptible to wind turbines than radars. Therefore, they could be implemented as possible mitigations in certain cases, provided that their deployment has been fully validated in the ATC context. Other currently available mitigations are described in section 4.6.

Wind turbines can also have detrimental impacts upon other aspects of air transport. Such aspects include, but are not limited to, performance reduction of ATM infrastructure (Communication, Navigation), constraints on procedure design, airspace planning and design, minimum safe altitudes, climb rates of aircraft, descent rates of aircraft, procedures to ensure that wind turbine locations are correctly represented on maps and in terrain avoidance tools, procedures to ensure that they are appropriately lit etc.

These aspects have to be addressed in accordance with the relevant documents. In particular, the European guidance material on managing Building Restricted Areas (BRA) (ICAO doc 015 [RD 3]) provides some specific recommendations in its Appendix 4 regarding wind turbine assessment for navigation facilities.

The relationships between these guidelines and ICAO doc 015 [RD 3] are further described in section 1.9 below.

[1] It should be noted that MSPSR maturity is currently at a research status.

1.4 Designing the Assessment Methodology

When producing this methodology the objective was to document a mechanism that was simple in its application and transparent in its structure.

Secondary Surveillance Radars (SSRs) are classified as a cooperative surveillance technique – equipment on board the aircraft receives an interrogation from the ground station and cooperates by replying with a signal broadcast of its own. The need to interface with the transponder carried by the aircraft means that, whilst various technologies can be employed (classical sliding window SSR, Monopulse SSR and Mode S SSR), Secondary Surveillance Radars are well standardised. This high degree of consistency between co-operative surveillance systems allows the prediction of a single range beyond which it is believed that wind turbines would have only a manageable impact upon the performance of an SSR system. Up to that range the deployment of wind turbines would only be permitted if a comprehensive study demonstrates that no detrimental impact will arise.

Primary Surveillance Radars differ in that the aircraft is non-cooperative and the only 'interface' is the electro-magnetic energy reflected from the body of the aircraft. In this sense the technique is classified as non-cooperative. The disparate nature of non-cooperative surveillance systems, such as Primary Surveillance Radar (PSR), requires a more complex approach tailored to the specific technology employed and the environment in which it is operated.

Whilst the basic physics behind non-cooperative target detection are common it can be said that no two designs of Primary Surveillance Radars achieve the same end goal by following the same approach. The following, non exhaustive, list highlights some of the considerations that should be taken into account to carry out a full, detailed and analytical assessment into whether a technical interference would result from the placement of a wind turbine in the proximity of a PSR:

- Antenna Design – ATC PSR systems normally use an antenna with a complex Cosec2 beam pattern, typically with two beams (one Tx/Rx and one Rx only) – each beam with a different pre-set elevation angle. Each antenna has different characteristics, from the electrical elevation, through to gain and Integrated Cancellation Ratio and such parameters impact upon how much of a wind farm would be 'illuminated' by the radar and how much of the return would be passed to the subsequent receiver stage. The horn arrangement may support linear or circular polarized transmission or be switchable between the two. Phased array antennas present a different approach.
- The turning gear rotating the antenna is not an immediate consideration except for the fact that many can apply mechanical tilts to the antenna pattern to optimise either low level detection or minimise ground clutter returns.
- The receiver stages of the PSR would normally permit the application of one or more Sensitivity Time Control (STC) laws to reduce the impact of ground clutter. The STC is normally integrated with multiple beam switch points (switching between the signals received from either the high or low antenna beam).
- The transmitted signal can differ significantly depending upon the technology employed – either a magnetron, a solid state system or a travelling wave tube etc. The choice of driver influences the waveform, the number and characteristics of the pulses, the frequency band, the utilisation of frequency diversity schemes etc. The frequency band selected can also impact upon the susceptibility of the system to anomalous propagation effects.
- The signal processing techniques and capabilities differ – sub-clutter visibility and ground clutter rejection capabilities vary and the rejection capabilities differ significantly between different types of sensor, types of signal processing, such as MTI or Moving Target Detection (MTD) and the system parameter settings established during site optimization and flight trials.

- Plot extraction techniques are often employed to facilitate further processing and to reduce the bandwidth of the data signal to be transmitted from a remote PSR to an ATC control centre. The resulting data reduction also removes the possibility of an ATC to review the 'raw video' of the radar and this can impact upon the ability of a controller to monitor flights over areas where wind farms are deployed.
- Some PSRs are equipped with mono-radar track processing capabilities and these could be used to suppress radar returns from over wind farms. Unfortunately this can also often result in suppressing the returns from valid targets as well – the performance of any mono-radar tracker will therefore also need to be taken into account when conducting an assessment of whether wind farms will impact upon the performance of such systems.
- The geographic environment plays a great part in defining radar coverage. Considerations such as radar horizon would obviously drive requirements for tower heights. Proximity to the sea or large areas of flat or marshy land can result in beam ducting whilst the shape of mountains and whether they are sparsely or heavily covered in either snow or vegetation can also increase or decrease the radar returns. The nature of the aircraft to be detected and the airspace in which they fly will also determine design and deployment considerations.

The authors of the document have taken key characteristics into account to produce a simplified approach to be used when conducting an initial assessment of whether wind turbines deployed in the proximity of a PSR would result in performance degradation for the latter.

Whilst this initial assessment may err on the side of caution from the radar operators perspective, the authors also fully support the wind farm applicant in their right to conduct their own detailed assessment and to this end have provided some guidelines for how to perform such an assessment – these guidelines can be found in the supporting annex of this document.

Surveillance providers will be able to assist in the detailed assessment by providing key radar characteristics to be used in the detailed assessment performed by the applicant but, depending upon the PSR, additional support may also need to be sought from the manufacturer of the system.

To summarise, the approach adopted within the methodology is for an initial safeguarding region in the vicinity immediately surrounding the surveillance sensor within which all planning applications would be objected. Beyond this restrictive zone lie regions where progressively reducing levels of proof are required. The approach is common for both the cooperative and non-cooperative surveillance techniques covered within this document.

1.5 Application of the assessment methodology

The methodology is based upon the following zone arrangements:

- Zone 1: Safeguarding Zone (PSR and SSR):

  An initial restrictive or safeguarding region that surrounds the surveillance sensor. No developments shall be agreed to within this area.
- Zone 2: Detailed Assessment Zone (PSR and SSR):

  Following the safeguarded region is an area where surveillance data providers would oppose planning applications unless they were supported by a detailed technical and operational assessment provided by the applicant and the results of which are found to be acceptable to the surveillance provider.

  The detailed technical assessment shall be based upon the approach detailed in paragraph 4.4.
- Zone 3: Simple Assessment Zone (PSR only):

  Beyond the detailed assessment zone is a region within which a simple assessment of PSR performance, as detailed in section 4.3, should be sufficient to enable the surveillance data provider to assess the application.
- Zone 4: Accepted Zone (PSR and SSR):

  Beyond the simple assessment zone are areas within which no assessments are required and within which Surveillance Service providers would not raise objections to wind farms on the basis of an impact to surveillance services.

It is important to note that the zones are based upon a combination of range from the sensor and radar line of sight and therefore are not necessarily annular bands.

If necessary ANSPs and wind energy developers should discuss and agree mitigation options (see paragraphs 2.6 and 4.6) to overcome issues that have been identified in the course of the assessment.

1.6 Structure of the document

This document is structured in 5 chapters and 5 annexes:

- Chapter 1, this chapter provides an introduction to the document describing its background, its objective, its approach, its structure and its use.
- Chapter 2 describes the process flow when assessing the impact of wind turbines on surveillance sensors.
- Chapter 3 defines the required input information needed to undertake the previously defined process.
- Chapter 4 specifies for radar sensors the different zones, the simple impact assessment process, and the issues to be addressed, as a minimum, in the frame of the detailed assessment process. It also contains a table identifying possible mitigation options.
- Chapter 5 provides the lists of referenced documents and the definition of acronyms.
- Annexes A to C justify and describe the different equations that are used in the different assessments described in chapter 4.
- Annex D provides the justification for the selection of the zone 2 range defined for SSR.
- Annex E proposes a wind energy project description pro-forma.

1.7 Use of this document

This document is intended to be read and used by:

- Civil and military Air Navigation Service Provider (ANSP)
- Surveillance data provider
- National Supervisory Authority (NSA)
- Civil and military aviation authority
- Wind energy developer

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1.8 Conventions

The following drafting conventions are used in this document:

- **"Shall"** – indicates a statement of specification, the compliance with which is mandatory to achieve the implementation of these EUROCONTROL Guidelines.
- **"Should"** – indicates a recommendation or best practice, which may or may not be applied.
- **"May"** – indicates an optional element.

1.9 Relationship with ICAO Doc 015

The aim of this document is to supplement ICAO doc 015 [RD 3]. In particular with respect to § 6.4 where it is stated that: "*For surveillance and communication facilities it is recommended that wind turbine(s) should be assessed at all times even outside the BRA for omni-directional facilities.*"

2. Impact assessment process

Figure 1 describes the generic process to be followed by ANSP and the wind energy developers when assessing the impact of a wind turbine project on surveillance infrastructure. This diagram has deliberately been kept at a high level to be compatible with formal and informal requests.

Wind energy developers are invited to initiate this process on the basis of these guidelines as soon as possible in the preparation phase of their project. At the earliest stages of the project, when there is more room for adaptation, it is anticipated that cost effective mitigation options (see section 4.6 for some possible mitigations) could be agreed; whereas at later stages, viable mitigation options could be more difficult to define and to agree on.

In order to facilitate this dialogue, it is recommended that ATM stakeholders (e.g. ANSP, NSA) publish a single point of contact (e.g. a generic email address) through whom initial contact can be established.

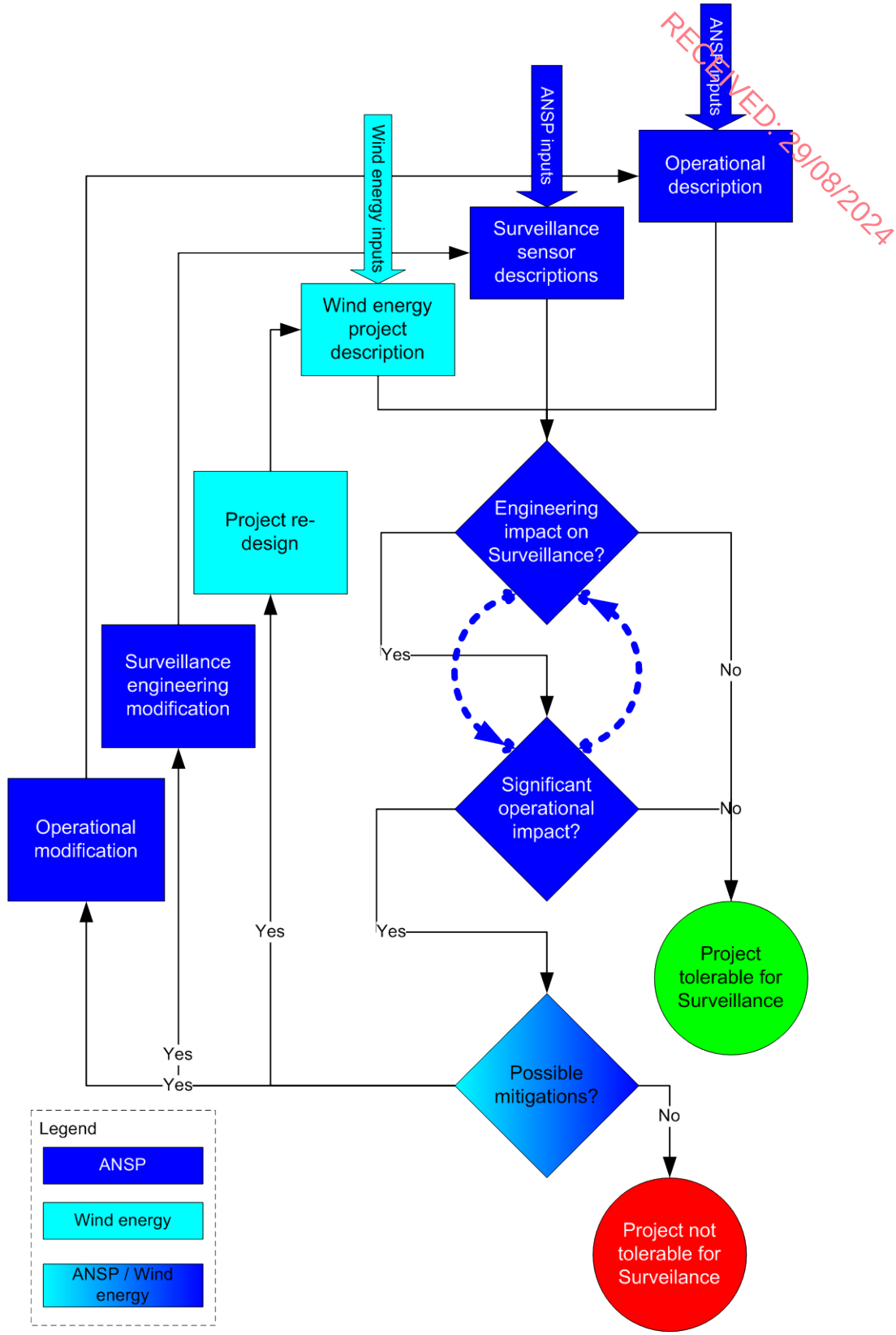

Figure 1: Impact Assessment Process

On Figure 1 the activities have been allocated on the basis of a formal request. In theory any activity can be undertaken by anybody provided that they have all the required pieces of information and the relevant knowledge.

2.1 Wind energy project description

This is a wind energy developer activity; it consists of collecting all the relevant wind energy project information to perform an impact assessment on the proposed development.

The information to be provided is described further in Section 3.1.

This project description shall be provided with any formal request to get a formal advice from the ANSP. It is to be noted that this process only addresses the impact on surveillance infrastructure, whereas the project may have other impacts that the ANSP have to assess. It is also to be noted that formal requests will be governed by state policy and as such will have to respect a number of national rules.

This project description may also be provided through an informal request at the earliest possible stage to avoid any further nugatory works. This is typically an informal approach to gauge reaction to a new development which is still at the exploratory stage of design. This should be encouraged, as early changes to a development proposal, prior to formal submittal to the planning authorities, are much easier to introduce to meet the needs of the ANSP.

By whatever route notification is received, it is important that as much of the relevant information is included as possible. At a pre-planning stage precise details of turbine locations and dimensions are often not fixed therefore any results based on this incomplete information must obviously be caveated such that relevant decision making authorities treat them with caution. Any change in the design proposal will require a re-assessment.

2.2 Surveillance sensor description

This is an ANSP activity; it consists of collecting all the relevant surveillance sensor information to perform an impact assessment on the proposed development.

In case the sensor is associated to a Far-Field Monitor (FFM), information related to that FFM is also needed.

The information to be provided is described further in Section 3.2.

This surveillance sensor description shall, subject to appropriate security and confidentiality considerations, be made available on request for preliminary analysis or site selection to wind energy developer.

2.3 Operational description

This is an ANSP activity; it consists of collecting all the relevant operational information (e.g. aeronautical navigation routes) to perform an impact assessment on the proposed development.

The information to be provided is described further in Section 3.3.

This operational description may, subject to appropriate security and confidentiality considerations, be made available on request for preliminary analysis or site selection to wind energy developer.

This operational description shall, subject to appropriate security and confidentiality considerations, be made available in response to a formal request attributable to a specific planning application

2.4 Engineering impact on surveillance

This is an ANSP activity, which consists of assessing the potential performance impacts that the submitted wind energy project could have on individual surveillance sensors operated by the ANSP, to derive the impact it may create at the output of the surveillance system and to consider possible mitigation mechanisms that could be introduced.

The assessment is described further for each type of radar in Chapter 4.

Although it is recognised that in most cases the sensor outputs will not be provided directly to the Air Traffic Controllers, but will go through further processing stages like Surveillance Data Processing systems; there are still some cases where the sensor output is used operationally (in normal or in fall-back mode). Therefore the maximum effort should be undertaken to minimise the impact of wind turbines at the earliest stages of the surveillance chain i.e. at the surveillance sensor level.

The application of specific features at surveillance data processing level is considered as a possible mitigation. Further mitigation possibilities may also be considered – a range of these are identified in section 4.6.

At this stage, the methodology encourages an ANSP engineering department to initiate discussions with the operational staff (as shown with the curved arrows on Figure 1) to assess the potential technical and operational impacts of the wind energy project in order to identify realistic mitigation measures that, in general, have both engineering and operational implementation aspects.

2.5 Operational impact on surveillance

This is an ANSP activity, which consists of assessing the impacts that the submitted wind energy project could have on the ANSP operations based on surveillance services and/or on the surveillance data service the ANSP is providing to other users.

This activity is described further for each type of radar in Chapter 4.

It is to be remembered that an ANSP is held legally accountable for the safe provision of service at all times.

As stated in paragraph 2.4 above and although the engineering and operational impact assessment stages are shown as two different boxes on Figure 1, a strong cooperation between the operational and engineering departments of the ANSP is needed to ensure that all aspects have been analysed and that all possible mitigations have been identified.

2.6 Possible mitigations

This is a combined ANSP/wind energy developer activity, which consists of identifying potential modifications to the surveillance system **and/or** the operational environment **and/or** the wind energy project that could mitigate to a tolerable level the impact of the wind energy development project.

This activity should be based on a transparent, coordinated and balanced approach with the objective of finding a solution that can be agreed by all parties.

When assessing mitigation options the following criteria shall be taken into account:

- Air traffic safety is maintained
- Cost efficiency based on through life cost over an agreed time period

The detailed assessment required to judge the suitability of such mitigations is beyond the scope of these guidelines due to their site specific nature.

2.7 Project re-design

This is a wind energy developer activity, which consists of taking into account in his project the possible mitigations identified at the previous stage to make the project impacts tolerable.

2.8 Surveillance engineering modification

This is an ANSP activity, which consists of taking into account the possible mitigations identified at the previous stage and that are applicable to the surveillance system to make the project impacts tolerable.

It is desirable that any surveillance engineering modification should be carbon neutral and have no detrimental impact on the environment.

2.9 Operational modification

This is an ANSP activity, which consists of taking into account the possible mitigations proposed at the previous stage and that are applicable to the operational environment to make the project impacts tolerable.

It is desirable that any operational modification should be carbon neutral and have no detrimental impact on the environment (e.g. noise, longer routes, etc.).

2.10 Feedback to surveillance sensor manufaturers

The ANSP should feedback to the surveillance sensor manufacturer the observed impacts of wind turbines on the sensor behaviour so that the manufacturer can improve its sensor design to be less sensitive to wind turbines.

3. Input information

3.1 Wind energy project description

A simple way that an ANSP can ensure that planning authorities and developers understand what information is required prior to an assessment is by making available a pro forma which developers can complete and submit. The following list of requested information has been constructed based on the pro-forma used by different stakeholders and is further developed in ANNEX E where a practical pro-forma can be found. The different parts of a wind turbine are identified on Figure 2 below.

The following parameters are needed to perform the simple engineering assessment:

- Hub height (above ground level in m)
- Rotor diameter (m)
- Turbine locations (National Grid system and/or WGS84 including terrain height)

Additional parameters could be needed to perform the detailed engineering assessment, for example:

- Wind turbine model and manufacturer
- Number of blades
- Rotation speed (Rpm) nominal and maximum
- Tower design (tubular/lattice)
- Tower base diameter (m)
- Tower top diameter (m)
- Nacelle Dimensions (width x length x height in m)
- Rotor blade material including lightening conductor

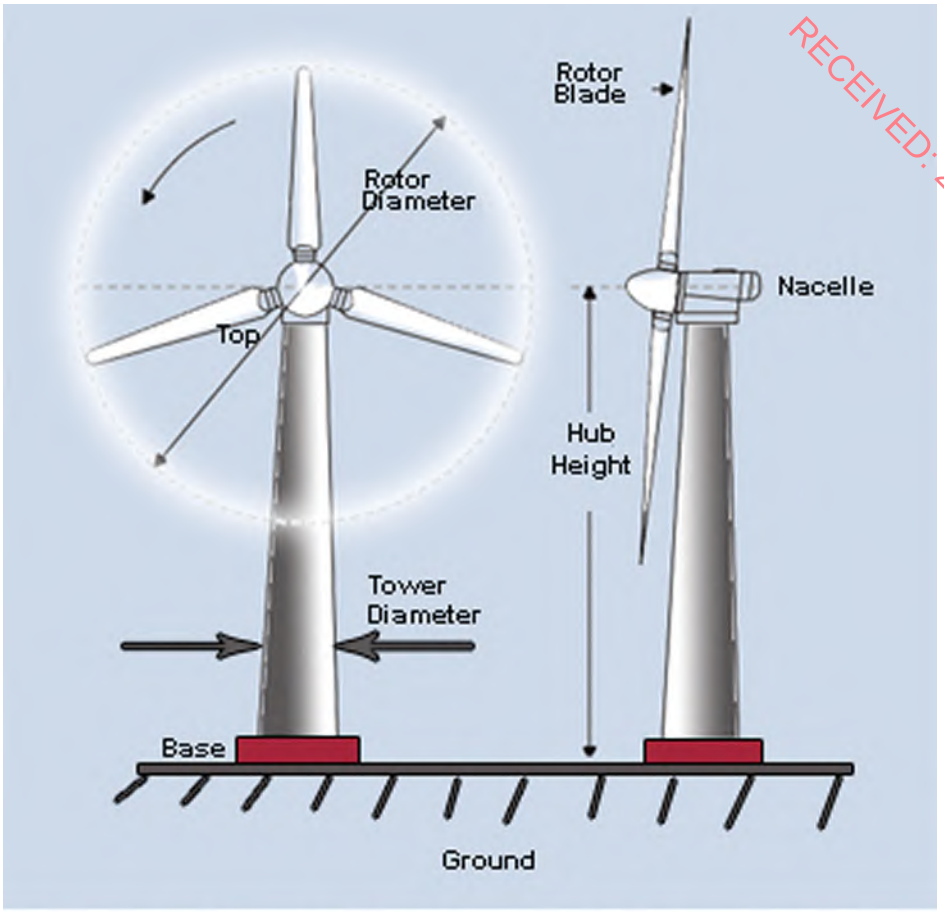

Figure 2: Wind turbine diagram

3.2 Surveillance sensor description

The list of information needed to undertake the simple engineering assessment is the following:

- Radar line of sight calculation method/tool
- Primary Surveillance Radar:
  - Antenna 3D position (WGS84 and/or national grid system and height above terrain)
  - Frequency range (in GHz)
  - Instrumented range (in NM)
  - Antenna horizontal beam-width at 3 dB (in °).
  - Information related to signal processing (such as CFAR), plot extractor (such as 'plot density filtering') and mono-radar tracker techniques required to undertake the assessment described in section 4.3.1. As it is recognized that radar operators do not always have such detailed knowledge on their systems, it is recommended that they request a list of potential impacts from their radar supplier.
  - Radar processing capacities (e.g. plots, tracks)
  - Overload prevention technique
- SSR:
  - Antenna 3D position (WGS84 and/or national grid system and height above terrain).
  - Antenna horizontal beam-width at 3 dB (in °) – 2.4° by default.

- SSR/PSR far-field monitor:
  - Position (WGS84 and/or national grid system)

In addition, further parameters could be needed to perform the detailed assessment, for example:

- Primary Surveillance Radar:
  - Antenna transmit vertical pattern.
  - Antenna receive vertical pattern.
  - Antenna tilt (in °).
  - Frequencies used (in GHz).
  - Anti-reflection processing capabilities (number of reflectors, number of reflections).
  - Transmitted power (in dBW).
  - Receiver, signal and data processing capabilities.
- SSR:
  - Type: classical sliding window, monopulse, Mode S.
  - Anti-reflection processing capabilities (number of reflectors, number of reflections).
  - Receiver, signal and data processing capabilities.
  - Overload prevention technique.

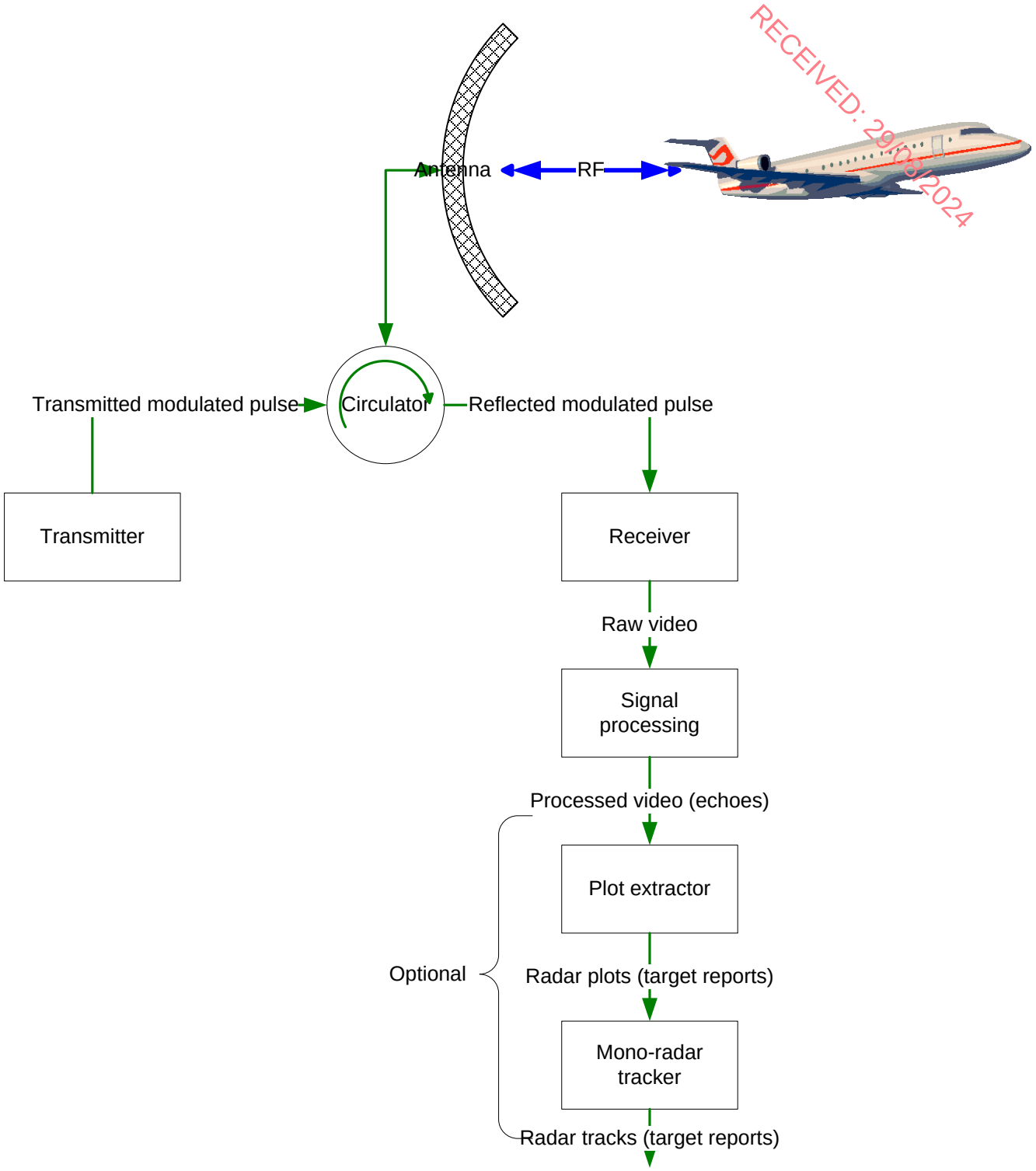

Figure 3: Primary Surveillance Radar diagram

The diagram above illustrates the main components of a modern primary surveillance radar system; the radar output may also be at processed video or at plot level. The radar output may be connected directly to a Controller Working Position or to a multi-sensor tracker for further processing.

The picture below (Figure 4) shows a primary radar antenna co-mounted with a secondary radar antenna (on top).

Figure 4: Primary and secondary co-mounted radar antennas

3.3 Operational description

The information needed to undertake the operational impact assessment is the 3D airspace volume, per ATC service[2] (e.g. 3 NM horizontal separation, parallel runway monitoring, vectoring), where surveillance information is required to support ATC operations.

[2] The different ATC services are described in Chapter 8 of [RD 4].

4. Radar impact assessment

Information on how such an assessment can be performed is contained within the following paragraphs. The assessment shall be conducted for each sensor that has at least one wind turbine within its range coverage.

4.1 Radar line of sight assessment

The first assessment that shall take place is to determine whether or not any part of the turbine will be within the line of sight of the radar (i.e. from the electrical centre of the radar antenna). If the turbines are located in a way that does not affect the surveillance sensor performance (e.g. the turbines are fully 'hidden' from the sensors by terrain or the turbines are located further away than the radar instrumented range), then consent for the development can be approved. However if a part of the wind turbine (e.g. a blade) can be in radar line of sight then there is potential for an impact upon the radar.

Tools are available to undertake this assessment. Each of them has some specific features and some limitations. The focus is put on the agreement to be reached between the ANSP and the wind energy developer to select a tool that is familiar to the ANSP and which is parameterised in accordance with the local conditions and/or the type of assessment (e.g. the accuracy of the digital terrain modelling may depend on the distance between the wind turbine and the radar and/or whether a simple or a detailed assessment is being conducted).

4.2 Top-level engineering assessment

In order to facilitate this process, different zones have been defined corresponding to different levels of engineering assessment. They are summarised in the tables below.

It should be noted that Zone 2 is not a No-Go area but indicates where further consideration needs to be applied compared to Zone 3. In any case wind turbines could be placed in zone 2 or zone 3 if no intolerable impact would result from their deployment.

4.2.1 Primary Surveillance Radar

Zone	Zone 1	Zone 2	Zone 3	Zone 4
Description	0 - 500 m	500 m - 15 km and in radar line of sight	Further than 15 km but within maximum instrumented range **and in** radar line of sight	Anywhere within maximum instrumented range but **not in** radar line of sight or outside the maximum instrumented range.
Assessment Requirements	**Safeguarding**	**Detailed assessment**	**Simple assessment**	**No assessment**

Table 1: PSR recommended ranges

The PSR safeguarding range where no wind turbine shall be built is derived from the recommendations provided in the ICAO EUR 015 document [RD 3] which is applicable for any obstacle (r: radius of the first cylinder on figures 2.1 and 2.2).

PSR radar designs vary considerably and the design choices made by PSR manufacturers influence the susceptibility of their radars to wind turbines (see paragraph 1.4 above). The figure for the PSR recommended limit between detailed and simple assessment is therefore derived from the best practices collected from the ECAC member states and it is also a figure recognised in the ICAO EUR 015 document [RD 3] (R: radius of the second cylinder on figures 2.1 and 2.2).

Therefore these figures are applicable to current wind turbine design, e.g. 3-blades, 30-200 m height, horizontal rotation axis. For other types of turbines, it is recommended to undertake the detailed assessment as long as the wind turbine is in radar line of sight.

When outside the radar line of sight of a PSR, the impact of the wind turbine (3-blades, 30-200 m height, and horizontal rotation axis) is considered to be tolerable.

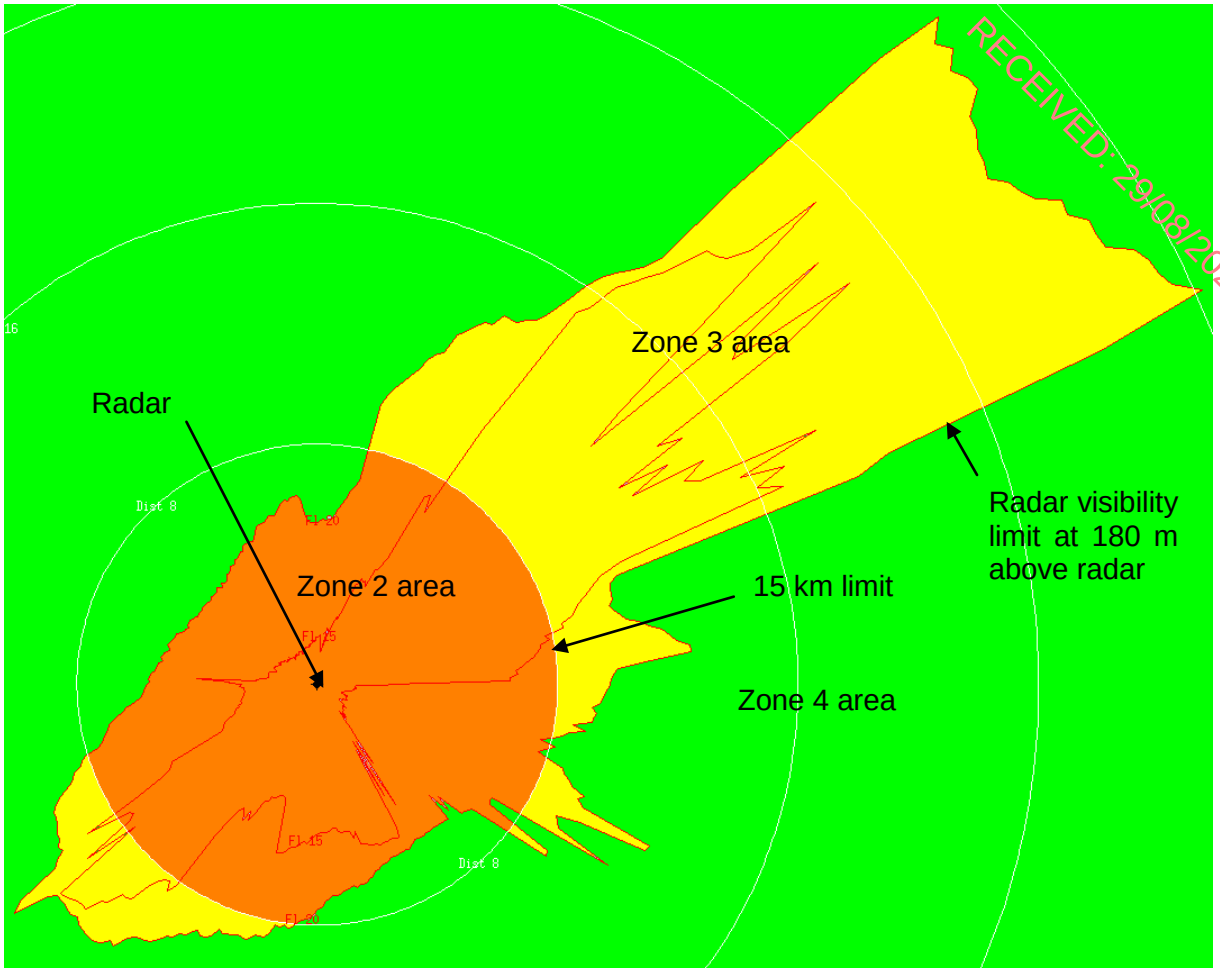

Figure 5: Example of zones at 180 m above a real radar

Figure 5 above shows that the different zones are not annular bands (unless in a theoretical no obstacle environment) and their shape depends on the terrain surrounding the radar. These zones have been calculated on the basis of a real radar and, for this example, at 180 m above the radar ground level.

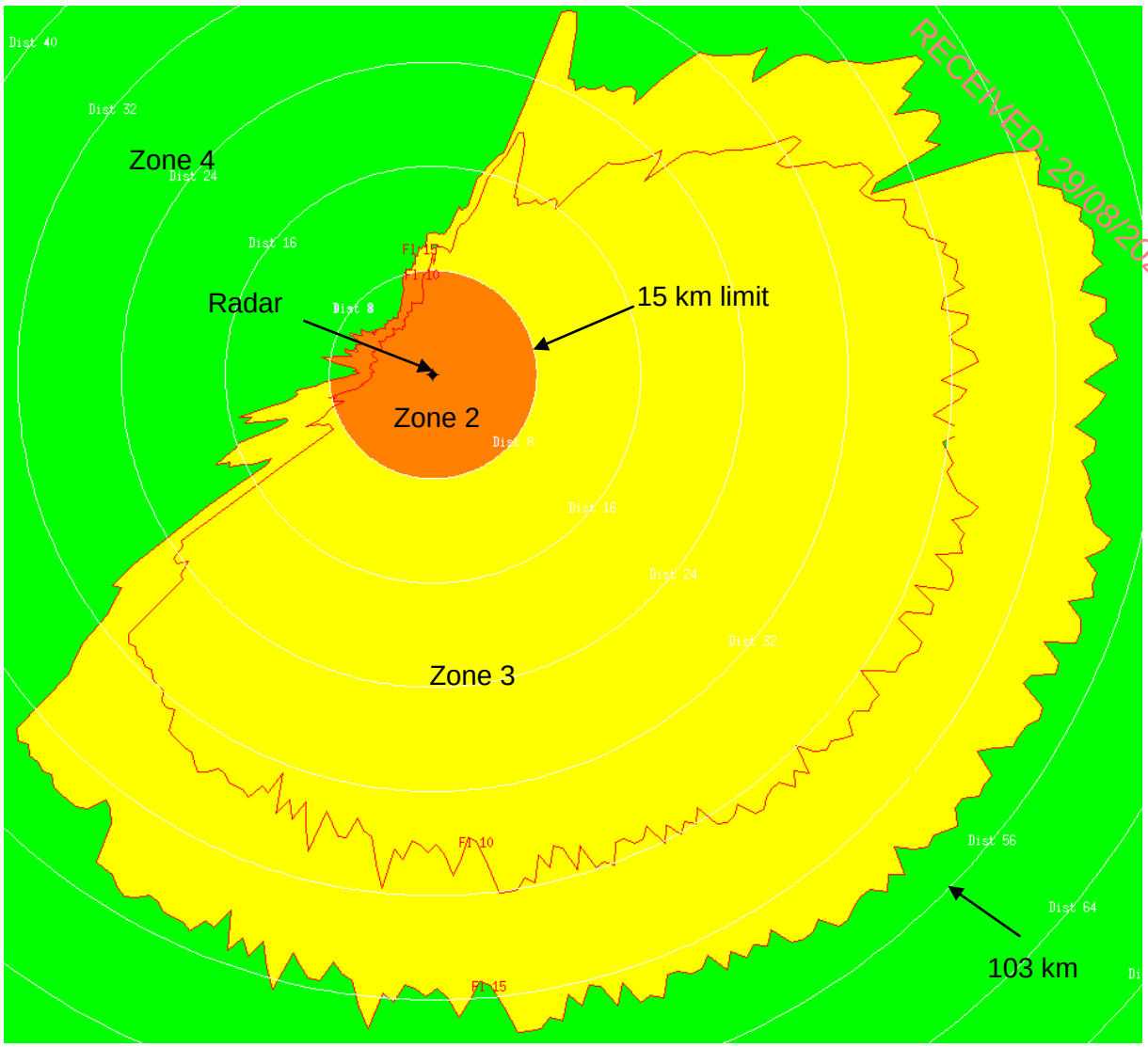

Figure 6: Example of zones at 320 m above a real radar

Figure 6 above shows another example of the different zones around a real radar at 320 m above the ground level at the radar site.

4.2.2 Secondary Surveillance Radar (classical, monopulse and Mode S)

Zone	Zone 1	Zone 2	Zone 4
Description	0 - 500 m	500 m - 16 km but within maximum instrumented range **and in** radar line of sight	Further than 16 km **or not** in radar line of sight
Assessment Requirements	**Safeguarding**	**Detailed assessment**	**No assessment**

Table 2: SSR recommended ranges

The SSR safeguarding range where no wind turbine shall be built is derived from the recommendations provided in the ICAO EUR 015 document [RD 3] which is applicable for any obstacle (r: radius of the first cylinder on figures 2.1 and 2.2).

The figure for the recommended limit of SSR detailed assessment is further justified in □based on the SSR specifications provided in ICAO Annex 10 Volume IV [RD 2].

As the justifications developed in □are based on current wind turbine design, e.g. 3-blades, 30-200 m height, horizontal rotation axis. For other types of turbines, it is recommended to undertake the detailed assessment as long as the wind turbine is in radar line of sight.

It is to be noted that in the case of SSR there is no simple assessment zone.

When outside the radar line of sight of an SSR the impact of the wind turbine is considered to be tolerable.

When further than 16 km from an SSR the impact of a wind turbine (3-blades, 30-200 m height, and horizontal rotation axis) is considered to be tolerable.

4.2.3 Radar Far-Field Monitors (FFM)

In addition, irrespective of the zone in which the wind turbine falls, it is recommended to protect the radar far-field monitor as described below.

Wind turbines shall not be built in a sector of 2 times the radar antenna horizontal beam-width at 3dB, centred on the far-field monitor azimuth and limited up to the range of the far-field monitor (as illustrated on Figure 7 below). This is applicable to far-field monitors of primary or secondary surveillance radar.

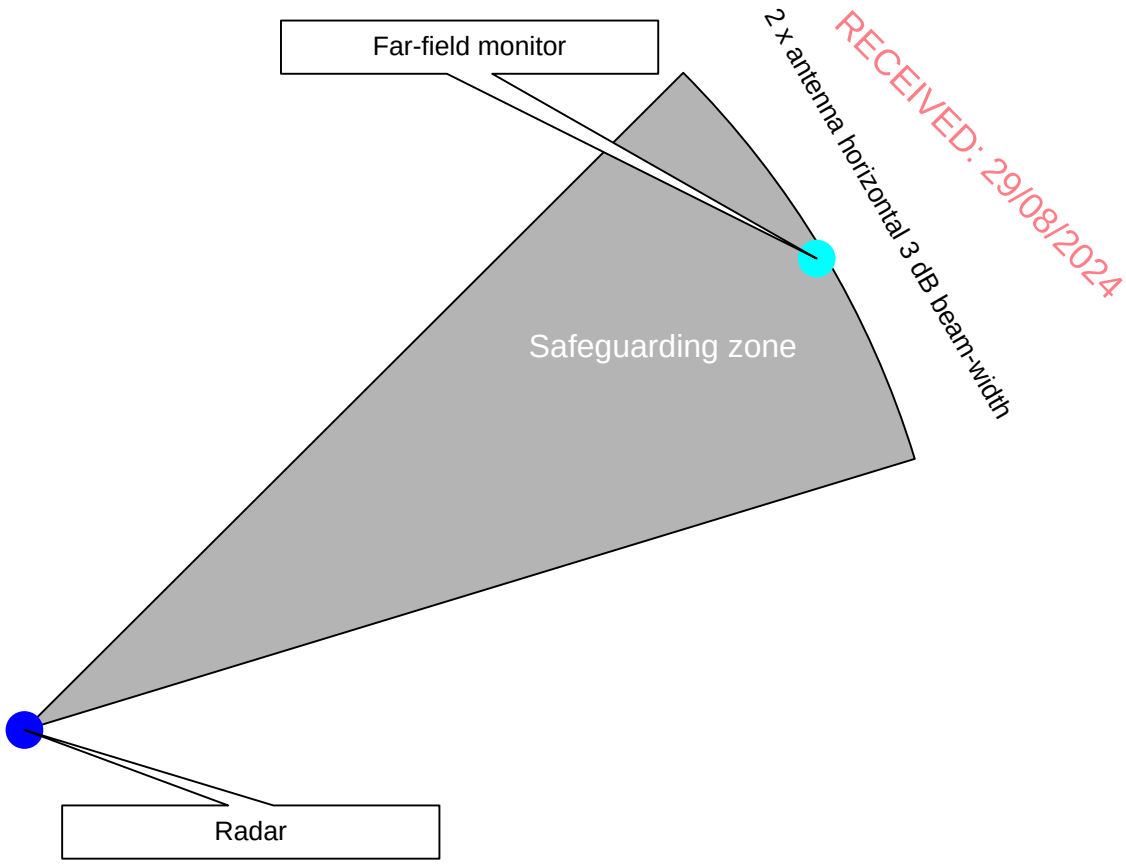

Figure 7: Recommended protection zone for far-field monitor

Possible mitigations are to move either the wind turbine or the far-field monitor.

4.2.4 Radar data sharing

In case the surveillance data provided by the impacted radar is shared, the radar data user should be informed of the wind turbine project. If applicable, the engineering assessment process shall take into account any radar data quality requirements imposed by the SLA (Service Level Agreement) associated to this radar data sharing.

4.2.5 Cumulative impact

As further detailed in the following sections, the impact of wind turbines on the operational service provided by a radar depends on the number of wind turbines located in the radar line of sight. Therefore it is strongly recommended that ANSP's keep an accurate tracking of all the approved wind energy projects. With this information they will be able to conduct the impact assessment of the new project in conjunction with the neighbouring approved projects that may already affect the performance of radars.

4.3 Simple engineering assessment for PSR

4.3.1 PSR Probability of detection

One of the key performance characteristic of a Primary Surveillance Radar, as defined in § 6.2.2.2 of the EUROCONTROL Standard Document for Radar Surveillance in En-route Airspace and Major Terminal Areas [RD 1], is the probability of detection.

When a wind turbine lies in the line of sight of the PSR, the probability of detection can be reduced in three ways:

- In a shadow region directly behind the turbine (region 1 on Figure 8).
- In a volume located above and around the wind turbine (region 2 on Figure 8).
- In a larger volume located above and around the wind turbine if the radar has signal processing, plot extractor or mono-radar tracker techniques which can be affected by wind turbines.

The first effect is caused by the attenuation due to the wind turbine being an obstacle for the electromagnetic field. The second effect is caused by the large amount of energy reflected back by the wind turbine, causing an increase in the radar's detection threshold (CFAR) in the range-azimuth cell where the wind turbine is located and also in some adjacent cells.

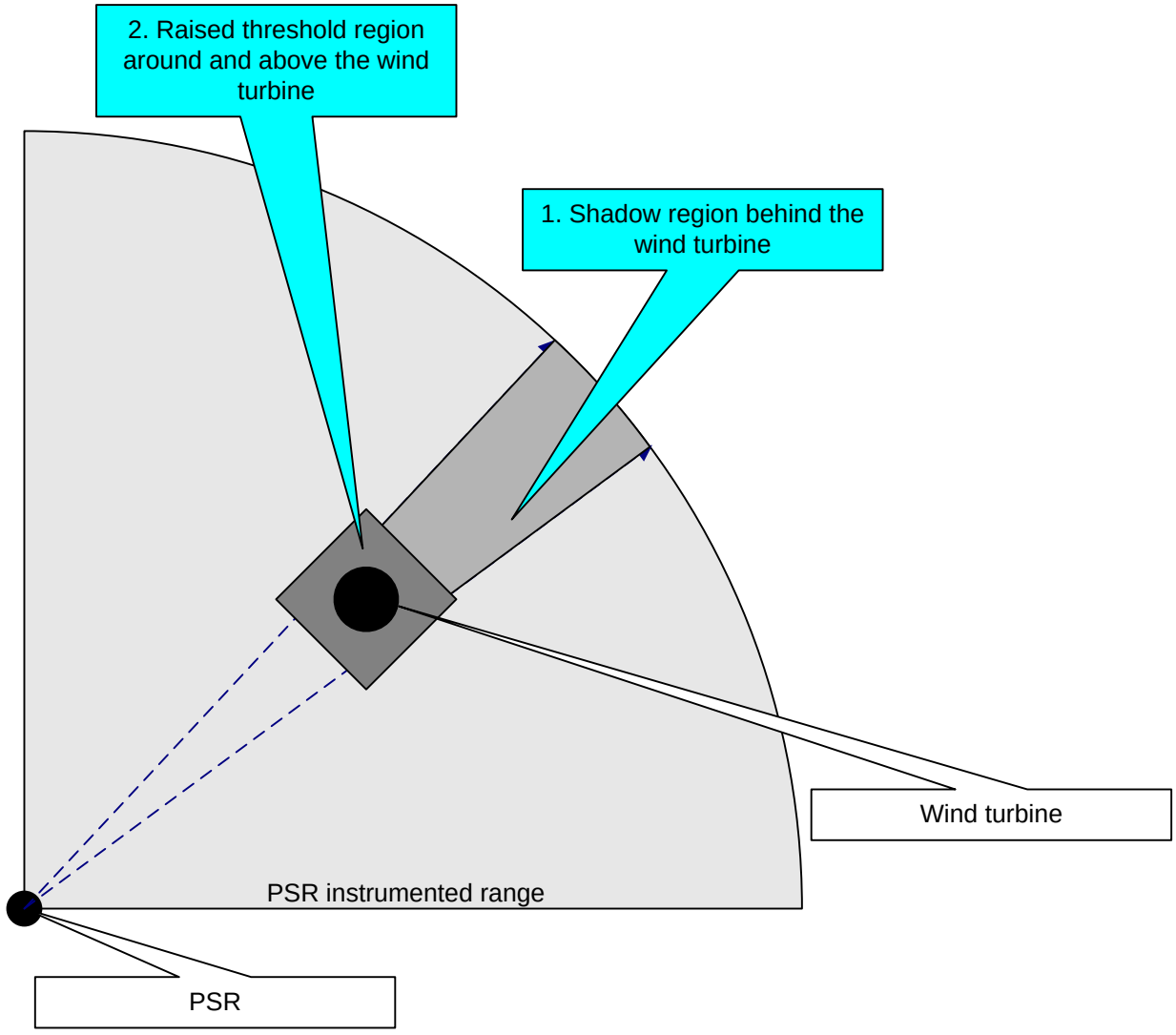

Figure 8: Shadow region behind a wind turbine and raised threshold region around and above a wind turbine

The cumulative impact of all mechanisms resulting in a reduced PSR probability of detection can be determined as:

1. Determine the areas with reduced detection for each wind turbine separately (cf. Figure 8)
   a. Dimensions of the shadow region (1) can be determined using Equation 4 in annex A.3 to calculate its width and Equation 1 annex A.2 to determine its height.
   b. The region (2) located directly above the wind turbine[3] is typically one to sixteen[4] clutter cells large, depending on the exact CFAR algorithm.
2. Enlarge the obtained zone to cover for losses due to plot extractor techniques such as 'plot density filtering'
3. If the obtained zone after step 1 and 2 is sufficiently large to cause track drops, enlarge the zone further to take track initialization into account

These calculations have to be repeated for each wind turbine of a wind farm and the global impact is the sum of the individual impacts. This may be achieved by overlaying the shadow zones from individual wind turbines to give an overall shadow representation.

4.3.2 PSR false target reports (due to echoes from wind turbines)

One of the key performance characteristic of a Primary Surveillance Radar, as defined in § 6.2.2.3 of the EUROCONTROL Standard Document for Radar Surveillance in En-route Airspace and Major Terminal Areas [RD 1], is the number of false target reports.

Due to their large radar cross section and moving parts turbines can be directly detected by a PSR and may generate false target reports.

If the highest point of the wind turbine (hub height + half the rotor diameter) is within the radar line-of-sight, it is assumed that the turbine will be detected by the PSR. This may manifest itself in the raw/processed video that may be presented to an ATCO, in plot reports, additionally they may be promoted to a mono or multi-sensor track due to their strength or when multiple plot reports correlate to form a track.

Further radar processing techniques (see Annex B.2) may provide protection against the generation of target reports corresponding to wind turbines.

These calculations have to be repeated for each wind turbine of a wind farm and the global impact is the sum of the individual impacts.

4.3.3 PSR processing overload

When PSR is including a plot extractor and/or a mono-radar tracker there will be a limitation in the number of inputs that it can process. If the number of PSR echoes, including those due to wind turbines, is too high, the plot processor may need to apply anti-overload techniques. Similarly, if the number of plots, including false plots due to wind turbines, is too high, the tracker may need to apply overload prevention techniques. Both may have an operational impact (e.g. reducing the operational capability of the radar).

It is to be noted that in this case the affected areas do not depend on where the wind turbines are located but on the internal design of the system (i.e. the applied overload prevention techniques).

It is assumed that the next stages of the surveillance chain (e.g. communication network and multi-sensor tracker) are compatible with the maximum PSR output capacity.

[3] The effect has been observed for wind turbines at any range from the radar. Placing the wind turbines further away from the radar is therefore not necessarily a solution to this problem.

[4] The column of airspace can extend out from the turbine position if smearing algorithms are used in clutter map generation.

4.4 Detailed engineering assessment for PSR and SSR

4.4.1 Generalities

When a wind turbine is located close to a radar (less than 15 km for a PSR, less than 16 km for an SSR) a detailed impact assessment shall be undertaken unless the potential impact of the wind turbine does not cause an operational issue (e.g. if the wind turbine is not located under an ANSP operational area). This detailed impact assessment shall, at least, address the topics identified in the following paragraphs.

Moreover, in case of a wind farm the detailed impact assessment shall be made for each individual wind turbine and globally for all the visible wind turbines of the wind farm as the global impact may not be equal to the sum of the individual impacts.

As a summary, the detailed engineering assessment is a complex and lengthy process; it requires identifying a large number of cases corresponding to different parameter values each of them corresponding to different external conditions (wind speed and direction, terrain configuration, etc.). Therefore it is recommended to avoid impacting operational areas or to remain within the simple assessment conditions in order to facilitate the impact assessment and the discussions between the ANSP and the wind energy developer.

At this stage, a more accurate assessment of the visibility of the wind turbines by the radars may be undertaken, to concentrate the detailed assessment efforts on the relevant issues.

The following paragraphs specify the requirements that shall be included, as a minimum, in the detailed engineering assessment statement of work.

4.4.2 PSR shadowing

The detailed assessment shall include:

- A calculation of the (two-way) attenuation caused by the wind turbines in three dimensions
- The impact in the three dimensions of this attenuation on the radar detection performance.

The detailed assessment shall address this topic in terms of impact on the PSR probability of detection.

4.4.3 PSR false target reports (due to echoes caused by wind turbines)

The detailed assessment should include:

- A calculation of the amount of energy reflected back to the radar by the wind turbine taking into account:
  - Different nacelle orientations,
  - Different blade orientations,
  - Different radar frequencies,
  - Different surface conditions (wet, moisture, etc), materials, etc are correctly incorporated in the study,
  - The different elements of the wind turbine located at different heights,
  - Appropriate terrain attenuation calculation based on the use of an agreed tool using appropriate parameters.
- The impact of this energy in terms of false target reports taking into account:
  - Radar receiver capability,
  - Radar signal processing capability,
  - Radar data processing capability

If some of the above aspects cannot be taken into account in a reliable way, it may be agreed by all parties to replace them by mutually agreed assumptions (e.g. worst case).

The detailed assessment shall address this topic and assess the region where these false target reports may appear and their density.

4.4.4 PSR false target reports (due to secondary or indirect reflections from the wind turbines)

In addition to the case reported above, another potential mechanism providing spurious false target reports is through reflection of true target echoes on wind turbines and through reflection of wind turbine echoes on aircraft.

Four different cases of reflections may happen; they are summarised below and are further described in ANNEX C.

True aircraft echoes reflected from the wind turbine: aircraft located in the vicinity of a wind turbine (for cases 1 and 2) or in the vicinity of the radar (only for case 2) will produce a genuine target report at their actual position and may produce a reflected target report in the azimuth of the wind turbine.

Wind turbine echoes reflected to the aircraft: aircraft located in the vicinity of a wind turbine or radar (both cases 3 and 4) will produce a genuine target report at their actual position and may produce a second, reflected target report in the azimuth of the aircraft.

The different cases (1, 2, 3 and 4) and examples of calculation based on simplified equations are provided in ANNEX C.

The detailed assessment of false target reports due to reflections shall include:

- A calculation of the aircraft locations where reflections can occur.
- A calculation of where the corresponding false target reports due to reflections will be located.

4.4.5 PSR range and azimuth errors

When there is a small path difference between the direct and reflected signals the received signal will be a combination of both, which can result in a range and/or bearing measurement error.

In the case where there is a large path difference the two can be separated, which can lead to a false target - as discussed in paragraph 4.4.4 (reflection case).

This effect may occur to targets located further away than the wind turbine and in the same azimuth region.

The detailed assessment shall address this topic and assess the region where these errors may occur and the impact on PSR position accuracy performance in this region.

4.4.6 PSR processing overload

When PSR is including a plot extractor and/or a mono-radar tracker there will be a limitation in the number of inputs that it can process. If the number of PSR echoes due to wind turbines (clutter and reflections) is too high, the plot processor may need to apply anti-overload techniques. Similarly, if the number of false plots due to wind turbines is too high, the tracker may need to apply overload prevention techniques. Both may have an operational impact (e.g. reducing the operational capability of the radar).

The detailed assessment shall address this topic.

It is to be noted that in this case the affected areas do not depend on where the wind turbines are located but on the internal design of the system (i.e. the applied overload prevention techniques).

It is assumed that the next stages of the surveillance chain (e.g. communication network and multi-sensor tracker) are compatible with the maximum PSR output capacity.

4.4.7 PSR raised thresholds

In addition to the generation of false target reports the amount of energy reflected back to the radar by the wind turbine (see paragraph 4.4.3 above) will have an impact on the radar CFAR.

The detailed assessment shall address this topic in terms of impact on the PSR probability of detection.

4.4.8 PSR receiver saturation

In certain cases, the amount of energy reflected back to the radar from the wind turbine (see paragraph 4.4.3 above) can be so large that it saturates the radar receiver.

The detailed assessment shall address this topic in terms of impact on the PSR probability of detection.

4.4.9 SSR Probability of detection and probability of Mode A and Mode C code detection

If a wind turbine is located close to an SSR, the detection of aircraft located close to the wind turbine and within the same azimuth may be impacted. The impact shall be calculated in the three dimensions independently for the uplink (aircraft located in the shadow region behind the wind turbine) and the downlink transmissions (SSR located in the shadow region behind the wind turbine). In the case of the downlink transmission, the aircraft position detection may not be affected whereas the Mode A or Mode C code detection may be affected.

The detailed assessment shall address this topic and shall predict the impact in the 3 dimensions on position detection and Mode A and C code detection performance.

4.4.10 SSR false target reports

Most SSR systems build up maps of static reflectors (e.g. tower, buildings) to reject reflected replies; but because wind turbines are not seen as static objects, this technique is not as efficient.

Therefore SSR false target reports may appear due to reflection on the wind turbine of the uplink signal, of the downlink signal and/or of both.

The detailed assessment shall address this topic and shall predict where the false target reports will be located.

4.4.11 SSR 2D position accuracy

SSR bearing errors may occur when there is a small path difference between the direct and reflected signals. In the case where there is a large path difference the two can be separated which can lead to a false target - as discussed in paragraph 4.4.10.

Effects can be seen in MSSR, Mode S and classical ‘sliding window’ SSR systems.

An MSSR or Mode S system calculates the bearing of an aircraft using the orientation of the EM wave as it reaches the antenna. Reflections of the transponder signal from nearby objects (such as wind turbines) will combine with the direct signal in such a way that the wave-front is distorted. This can lead to errors in the bearing calculation.

In sliding window systems, the reflected energy arriving back at the antenna will be dispersed in azimuth, such that it is no longer centred on the true target azimuth. This will ‘fool’ the algorithms used by many SSRs to determine azimuth, and an error will occur.

Under these conditions (small path difference) range measurement errors may also occur due to the combination of the direct and reflected signals and the measurement of the time of arrival of the SSR reply may be altered.

This effect may occur to targets located further away than the wind turbine and in the same azimuth region.

The detailed assessment shall address this topic and shall predict the impact in the 3 dimensions on the SSR position accuracy performance.

It is to be noted that in case of a Mode S radar a single reply is sufficient to generate a target report.

4.4.12 Other PSR detection losses

The detailed assessment should look at mechanisms resulting in PSR detection losses, such as plot density filtering, time needed to start a new track (track initialisation) in case of track loss in the mono-radar tracker, etc.

4.5 Operational assessment

4.5.1 Generalities

Once an adverse engineering impact has been predicted, the next phase will be to assess whether this effect will be operationally tolerable or not. The process can be made quicker if certain 'ground rules' can be established, or areas of known sensitivity are published in advance which precludes the need for engineers to approach ATC operational staff. Certain applications may have such dramatic effects that the need to enter a dialogue with ATC is nugatory. However, the majority of cases will normally involve discussions with ATC Operations representatives who are familiar with the airspace being affected and/or Human Factors specialists.

4.5.2 PSR Probability of detection

The operational assessment will be based on the location of the affected 3D zones with respect to the operational volume of airspace and the criticality of the PSR surveillance information in these zones.

4.5.3 PSR false target reports

The operational assessment will be based on the location of the false target reports due to the presence of the wind turbines with respect to the operational volume of airspace.

4.5.4 PSR 2D position accuracy

The operational assessment will be based on the location of the affected 2D zones with respect to the operational volume of airspace and the criticality of the PSR surveillance information in these zones.

4.5.5 PSR plot/track processing capacity

The operational assessment will be based on the location of the affected 2D zones with respect to the operational volume of airspace and the criticality of the PSR surveillance information in these zones.

4.5.6 SSR probability of detection

The operational assessment will be based on the location of the affected 3D zones with respect to the operational volume of airspace and the criticality of the SSR surveillance information in these zones.

4.5.7 SSR false target reports

The operational assessment will be based on the location of the false target reports due to the presence of the wind turbines with respect to the operational volume of airspace.

4.5.8 SSR 2D position accuracy

The operational assessment will be based on the location of the affected 2D zones with respect to the operational volume of airspace.

4.6 Possible mitigations

4.6.1 Generalities

It may be possible that a certain amount of reduced performance is tolerable, either because it is in an area of minimal concern to the end user or sufficient operational procedures are in place to address any surveillance short fall.

Otherwise, in order to accommodate the wind turbine application, mitigation options may be investigated. The following options should be considered individually and/or in combination:

1. Wind energy developer mitigations: Can the wind turbine proposal be modified to eradicate or minimise the effects on ATC surveillance systems and operations?
2. ANSP technical mitigations: Can the sensor and/or surveillance system architecture be modified or configured to accommodate the wind energy project to within a level of tolerable degradation of service to ATC?
3. ANSP operational mitigations: Can ATC modify procedures to accommodate the expected reduction in surveillance quality?

An important consideration for choosing the mitigation options should be maintenance of ATC safety and cost-effectiveness, while at the same time taking into account that the global project (wind energy and associated mitigations) should result in an overall net reduction in carbon over an agreed time period.

It should also be noted that, when calculating the size of potential blanking zone (as means of mitigation see Table 3 below), the acquisition or re-acquisition time/distance of the traffic crossing or getting out of that zone is considered as part of the overall size of the blanked area, especially where traffic travelling at high speed is concerned. This may require the implementation of an in-fill sensor.

4.6.2 Mitigation option table

The table below lists different mitigation options that may be applied alone or in combination with others. The table provides for every mitigation option the issues that it can potentially solve.

Applicable to	Mitigation option	When mitigation could be applied							Consideration regarding the mitigation option
		Lack of PSR Pd	PSR false targets	PSR position accuracy i	Overload of PSR capacities	Lack of SSR Pd	SSR false targets	SSR position accuracy	
Non cooperative surveillance sensor	Blank PSR transmission in an azimuth sector		☑		☑				May need to be combined with in-fill PSR/MSPSR in blanked sector(s).
	Suppress PSR radar returns in range-azimuth sector		☑		☑				May need to be combined with in-fill PSR/MSPSR in blanked sector(s).
	Improve PSR anti wind turbine clutter capabilities		☑		☑				
	Strengthen primary track initiation conditions		☑						At mono-radar tracker or at multi-sensor tracker level.
	Adapt PSR overload prevention facilities				☑				
	Upgrade PSR processing capabilities				☑				
	Upgrade PSR output interface capabilities				☑				
	In-fill PSR (inc. 3D PSR)	☑	☑	☑					
	In-fill MSPSR	☑	☑	☑					Provided that MSPSR concept is validated.

Applicable to	Mitigation option	When mitigation could be applied							Consideration regarding the mitigation option
		Lack of PSR Pd	PSR false targets	PSR position accuracy i	Overload of PSR capacities	Lack of SSR Pd	SSR false targets	SSR position accuracy	
Cooperative surveillance system	Blank SSR transmission in an azimuth sector						☑	☑	May need to be combined with in-fill SSR/WAM/ADS-B in blanked sector(s)
	In-fill SSR					☑	☑	☑	
	In-fill WAM[5]					☑	☑	☑	
	In-fill ADS-B					☑	☑	☑	Provided that aircraft are ADS-B equipped
	Improve SSR anti-reflection capabilities						☑		At SSR level and/or at multi-sensor level
Operation	Move ATC route	☑	☑	☑		☑		☑	
	Change airspace classification or apply MTZ[6]	☑	☑	☑					Note that PSR may still be required to detect aircraft without a functioning SSR Transponder.
Wind turbine	Move wind turbines out of radar line of sight	☑	☑	☑	☑	☑	☑	☑	
	Move wind turbines out of critical areas	☑	☑	☑		☑	☑	☑	
	Change wind farm layout	☑							Affects Region 2 only, see § 4.3.1.
	Reduce number of wind turbines in radar line of sight				☑				
	Reduce wind turbine radar reflectivity		☑		☑		☑		If wind turbine is in radar line of sight of several radars, the mitigation is only applicable if they operate in the same frequency band.

Table 3: Mitigation options

[5] This version of the guidelines does not address the assessment of wind turbine impacts on WAM or ADS-B.
[6] Mandatory Transponder Zone: a portion of the airspace where all aircraft are required to be equipped with a transponder.

5. References and Acronyms

5.1 Referenced documents

[RD 1] EUROCONTROL Standard for Surveillance in En-route Airspace and Major Terminal Areas – SUR.ET1.ST01.1000-STD-01-01 dated March 1997 edition 1.0

[RD 2] ICAO Annex 10 Volume IV 4th edition July 2007

[RD 3] ICAO European Guidance Material on Managing Building Restricted Areas Second Edition 2009 ICAO EUR Doc 015

[RD 4] ICAO Procedures for Air Navigation Services Air Traffic Management (PANS ATM) Doc 4444 ATM/501 Fifteenth Edition 2007

[RD 5] EUROCONTROL Regulatory and Advisory Framework – Regulatory Provisions dated November 2005 Edition 3.0 ERAF/04-002/3.0

[RD 6] EUROCONTROL Regulatory and Advisory Framework – Advisory Material dated November 2005 Edition 3.0 ERAF/04-002/ADV/3.0

[RD 7] Fundamentals of Ground Radar for Air Traffic Control engineers and Technicians, Ronald Bouwman, Scitech Publishing, 2009

[RD 8] http://www.radartutorial.eu/10.processing/sp10.en.html

5.2 List of acronyms

Acronym	Definition
ADS-B	Automatic Dependent Surveillance - Broadcast
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATM	Air Traffic Management
BRA	Building Restricted Areas
CFAR	Constant False Alarm Rate (primary radar technique)
DTED	Digital Terrain Elevation Data
EC	European Commission
EM	Electro Magnetic
ERAF	EUROCONTROL Regulatory and Advisory Framework
FFM	Far-Field Monitor
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
MDS	Minimum Discernable Signal
MLAT	Multi LATeration
MSPSR	Multi Static Primary Surveillance Radar
MSSR	Monopulse Secondary Surveillance Radar
MTD	Moving Target Detector (primary radar technique)
MTI	Moving Target Indicator (primary radar technique equivalent to MTD)
MTZ	Mandatory Transponder Zone
NSA	National Supervisory Authority
PSR	Primary Surveillance Radar
RCS	Radar Cross Section
RF	Radio Frequency
Rx	Receiver
SES	Single European Sky

Acronym	Definition
SESAR	Single European Sky ATM Research
SLA	Service Level Agreement
SSR	Secondary Surveillance Radar
STC	Sensitivity Time Control (primary radar technique)
Tx	Transmitter
UNFCC	United Nations Framework Convention on Climate Change
WAM	Wide Area Multilateration
WGS84	World Geodetic System 1984

Table 4: Acronym list

ANNEX A PSR reduction of probability of detection – Assessment of Region 1 dimensions

A.1 Introduction

When a turbine lies directly between the transmitting and receiving antenna the strength of the signal reaching the receiver is lower than it would otherwise be. When the transmitter and/or receiver are part of the surveillance sensor under assessment the shape and severity of this 'shadow region' will determine the impact of the turbine on how the equipment can be used. In the case of the PSR it is considered that region 1 extends up to the PSR maximum range. The basic features of the shadow are:

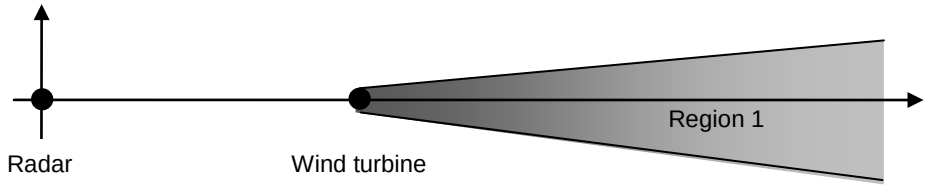

Figure 9: Top-view of wind turbine shadow

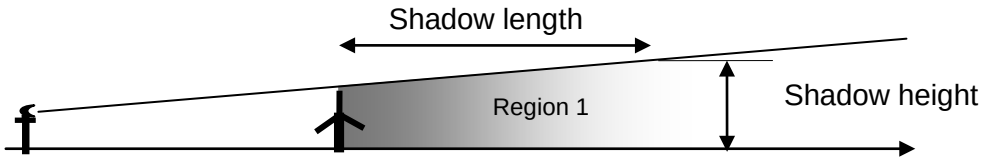

Figure 10: Side-view of wind turbine shadow

A.2 Shadow Height

The shadow height is calculated by simply considering the geometry of the wind turbine and the transmitter as shown on Figure 10 above, taking into account the maximum height of the turbine, the earth curvature (see Figure 11 below), the earth radius (R) and the fact that EM waves do not propagate in straight line above earth, therefore a factor k (typically 4/3) is applied to calculate the central angle.

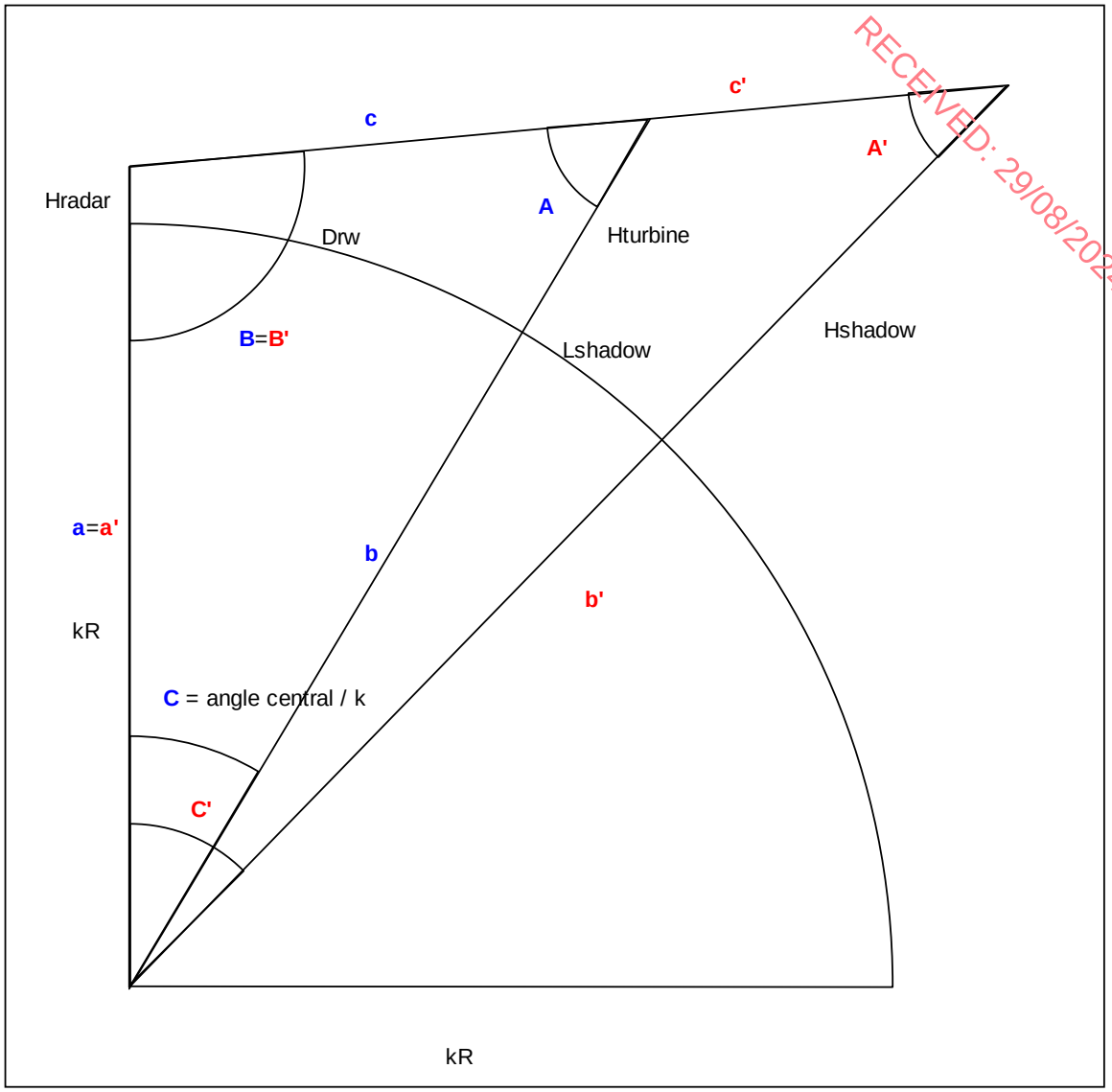

Figure 11: Principle of shadow height calculation

Taking into account that:

$$a = k.R + H_{radar}$$

$$b = k.R + H_{turbine}$$

$$c = \sqrt{a^2 + b^2 - 2.a.b.\cos(C)}$$

$$B = Arc\cos((a^2 - b^2 + c^2)/2.a.c)$$

$$C = {D_{rw}}/{k.R}$$

$$C' = \frac{D_{rw} + L_{shadow}}{R.k}$$

$$B' = B$$

$$A' = \pi - B' - C'$$

$$b' = a'.\sin(B')/\sin(A')$$

Where Drw is the distance between the radar and the wind turbine, R is the radius of the earth and Lshadow is the length of the shadow zone.

The height of the shadow zone can be calculated as follow:

$$H_{shadow} = b' - k.R \qquad \text{Equation 1}$$

The symbols used in this Annex have the following meanings

R	The radius of the earth (m) at the position of the radar
H_{radar}	Geodetic height of the radar (m)
$H_{turbine}$	Geodetic height of the wind turbine (m)
H_{shadow}	Geodetic height of the shadow of the wind turbine at shadow length (m)
L_{shadow}	Shadow length (m)
k	Factor (typically 4/3) to take into account that EM waves do not propagate in straight line above the earth.
D_{rw}	Distance radar to wind turbine (m)

A.3 Shadow Width

Figure 9 above shows a very simplistic representation of the shadow width, it is possible to calculate a more realistic estimate using the following argument. A typical cross-range section of the shadow effect is shown in the following Figure 12 where a reflection from a metallic object is assumed; hence the direct and reflected signals will be in anti-phase.

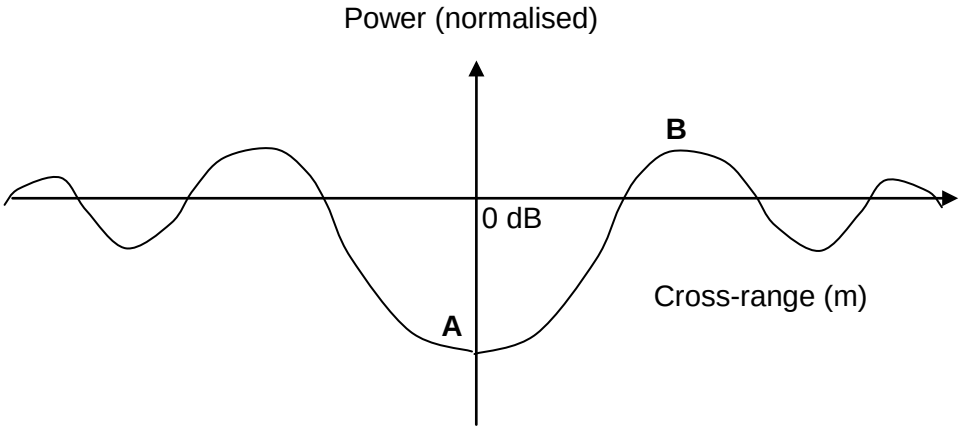

Figure 12: Diagram of a cross-section of a shadow

At point “A” the path difference is zero and so the signals combine de-constructively causing the deepest shadow; at point “B”, where path difference = λ/2, they combine constructively to give a maxima. Note that successive maxima are odd multiples of λ/2, where path difference = (2n+1)λ/2. The maxima get weaker because the interfering signal is weaker at larger angles off the forward-scatter direction.

A conservative estimate of shadow width is the locus of points formed by point B as a function of down-range; the geometry is as shown in Figure 13 below:

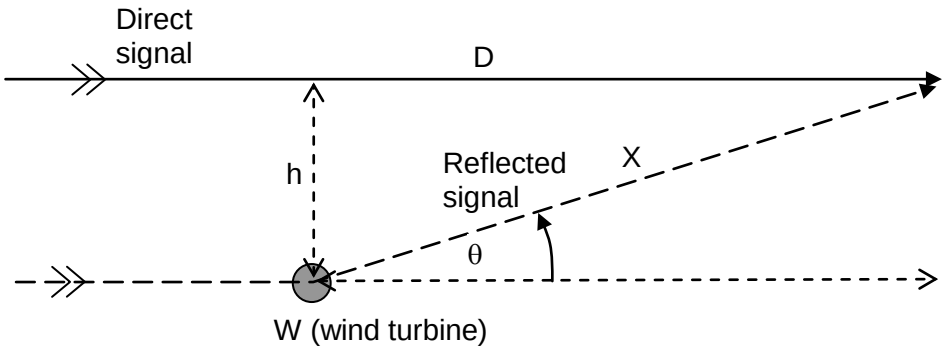

Figure 13: Path difference geometry for shadow width calculation

The path difference, Δ, between the direct and reflected signals at the receiver is given by:

$$\Delta = X - D = \sqrt{h^2 + D^2} - D \qquad \text{Equation 2}$$

and so the locus of points which define the width of the shadow at a distance D beyond the turbine is found by setting path difference = λ/2 and solving for the half-width, h:

$$\frac{\lambda}{2} = \sqrt{h^2 + D^2} - D \qquad \text{Equation 3}$$

$$h = \sqrt{\left(\lambda/2 + D\right)^2 - D^2} \qquad \text{Equation 4}$$

If λ is much smaller than D, which is the case here, Equation 4 can be simplified:

$$h = \sqrt{\lambda . D} \qquad \text{Equation 5}$$

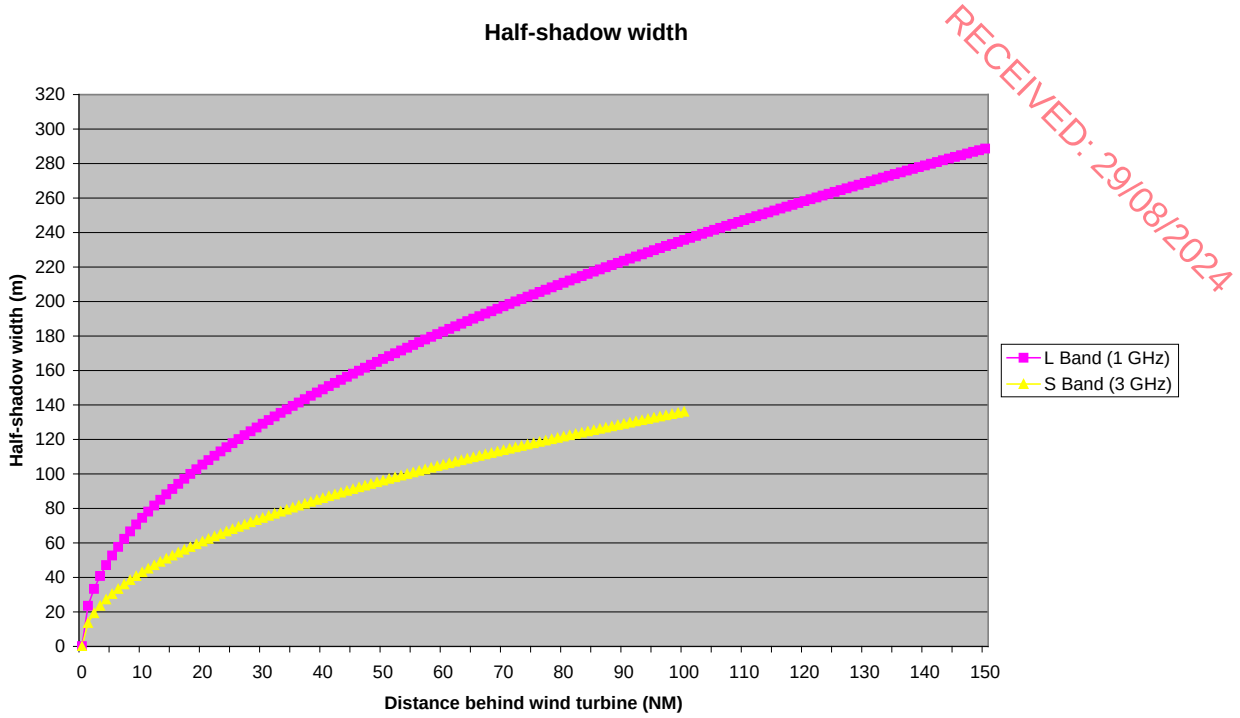

Figure 14: Half-shadow width as a function of D

ANNEX B PSR Equations (no reflection)

B.1 Basic Radar Equation

In normal PSR operation, the power reflected back from the wind turbine will be equal to:

$$P_{ref} = \frac{\sigma . F^2 . G_t . P_t . G_r . \lambda^2}{(4.\pi.)^3 . D^4}$$ Equation 6

where the symbols have the following meanings

P_{ref}	The power of the reflected signal arriving at the radar (W)
P_t	Transmitted power
G_t	Transmit antenna gain
G_r	Receive antenna gain
σ	The mono-static RCS of the wind turbine[7] (m^2)
F	Terrain induced attenuation factor between radar and wind turbine.
D	Distance radar to wind turbine (m)
λ	Signal wavelength (m)

B.2 Further Processing

Whilst at its most basic the remainder of the radar can be modelled as a simple threshold detector by comparing P_{ref}, above, to a defined threshold for the radar under test this is a huge simplification for a modern radar system.

Other than to state that where possible as much of the radars internal processing should be taken into account, it is not intended to go further within this document as data processing varies so widely from radar to radar and the relevant algorithms are often difficult to obtain or model. Some of the issues which may affect the probability of wind turbine detection include the following items:

Sliding window - Most systems determine detection using a statistical M detections from N pulses algorithm.

- **Sliding window** - Most systems determine detection using a statistical M detections from N pulses algorithm.
- **MTI-MTD Filtering** – Most PSR systems now employ MTI or MTD to discard returns from stationary objects based on Doppler filtering.
- **Tracking Algorithms** - Plot-extracted systems will only provide plot information should a series of echoes over a number of scans pass certain tracking criteria.

[7] *The radar cross section of the wind turbine, although the term is not fully relevant because the wind turbine is not in free space but put on the ground, represents the fraction of EM power transmitted by the radar that is reflected back (mono-static) or scattered in another direction (bi-static) by the wind turbine. This parameter depends a lot on the attitude of the wind turbine with respect to the direction of the EM wave transmitted by the radar, in particular on the orientation of the nacelle and on the orientation of the blades that are varying in accordance with the wind conditions. Furthermore in the case of the bi-static RCS, it depends on the considered directions (incidental and scattered)*

ANNEX C PSR Equations (reflection)

C.1 Radar Equations in case of reflected signals

There are 4 cases of configuration radar/wind turbine/aircraft where additional echoes due to reflected signal can be detected by the radar. They are illustrated on Figure 15 to Figure 18.

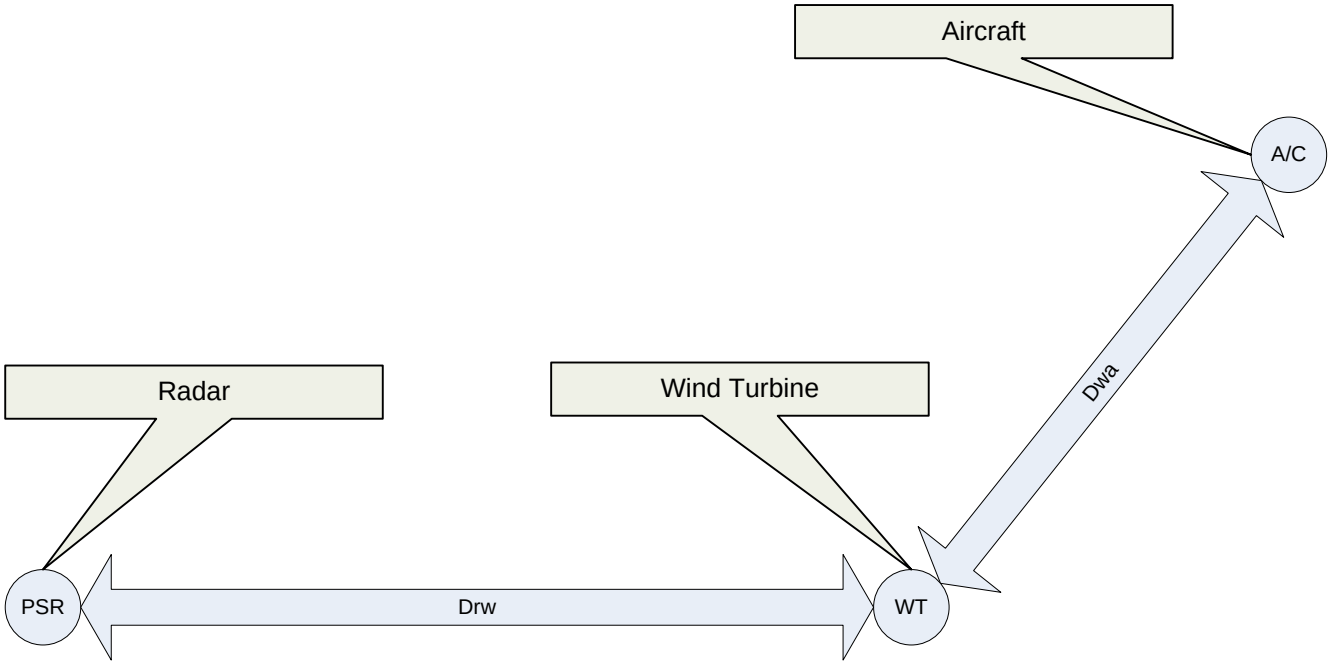

Figure 15: PSR reflection case 1

In case 1, the reflection is located in the azimuth of the wind turbine, the reflected signal is received through the radar antenna main beam.

In this case, the power reflected back will be equal to:

$$P_{r\,ef} = \frac{\sigma_a.\sigma_{w1}.\sigma_{w2}.F_{rw}^{\ 2}.F_{wa}^{\ 2}.G_t.P_t.G_r.\lambda^2}{(4.\pi.)^5.D_{rw}^{\ 4}.D_{wa}^{\ 4}}$$ Equation 7

Comparing this power to the radar receiver detection threshold one can derive the volume around a wind turbine where aircraft must be located to cause a reflection.

$$R_1 = \sqrt[4]{\frac{\sigma_a.\sigma_{w1}.\sigma_{w2}.F_{rw}^{\ 2}.F_{wa}^{\ 2}.G_t.P_t.G_r.\lambda^2}{(4.\pi.)^5.D_{rw}^{\ 4}.P_{thresh}}}$$ Equation 8

Worst case estimation can be calculated assuming $F_{rw} = F_{wa} = 1$, $G_t = G_r = G$ and $\sigma_{w1} = \sigma_{w2} = \sigma_w$.

$$R_1 = \sqrt[4]{\frac{\sigma_a.\sigma_w^2.G^2.P_t.\lambda^2}{(4.\pi.)^5.D_{rw}^{\ 4}.P_{thresh}}}$$ Equation 9

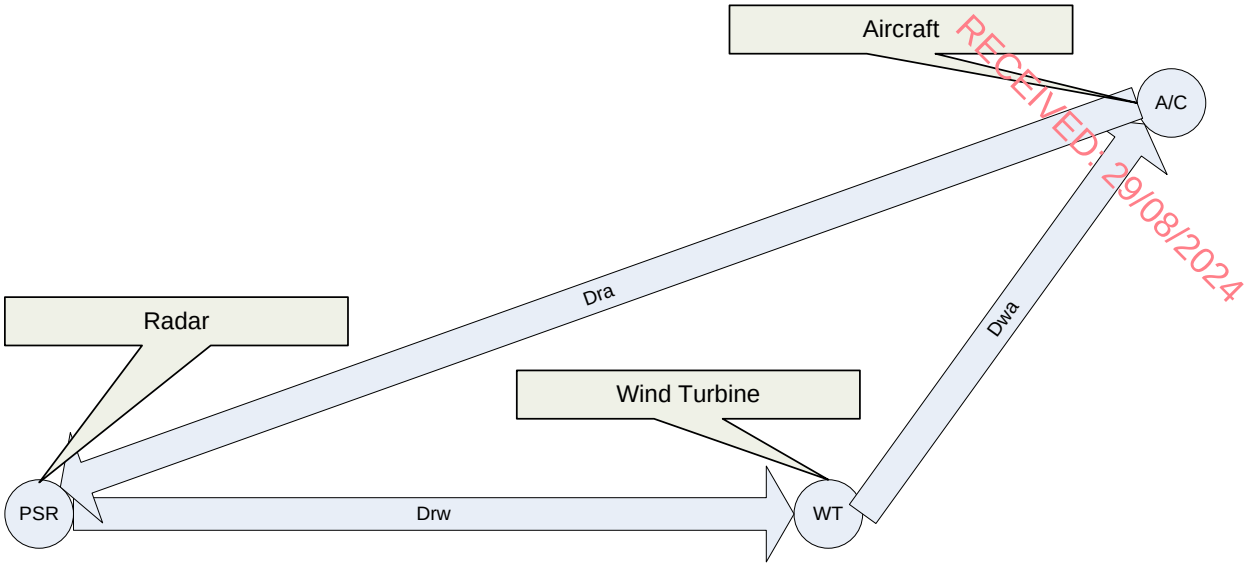

Figure 16: PSR reflection case 2

In case 2, the reflection is located in the azimuth of the wind turbine, the reflected signal is received through the radar antenna sidelobes.

In this case, the power reflected back will be equal to:

$$P_{r\,ef} = \frac{\sigma_{a2}.\sigma_{w1}.F_{rw}.F_{wa}.F_{ar}.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{rw}^{\ 2}.D_{wa}^{\ 2}.D_{ra}^{\ 2}}$$ Equation 10

Comparing this power to the radar receiver detection threshold one can derive the volume around a wind turbine where aircraft must be located to cause a reflection.

$$R_2 = \sqrt[2]{\frac{\sigma_{a2}.\sigma_{w1}.F_{rw}.F_{wa}.F_{ar}.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{rw}^{\ 2}.D_{ra}^{\ 2}.P_{thresh}}}$$ Equation 11

Worst case estimation can be calculated assuming $F_{rw} = F_{wa} = F_{ar} = 1$, $\sigma_{a2} = \sigma_a$ and $\sigma_{w1} = \sigma_w$.

$$R_2 = \sqrt[2]{\frac{\sigma_a.\sigma_w.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{rw}^{\ 2}.D_{ra}^{\ 2}.P_{thresh}}}$$ Equation 12

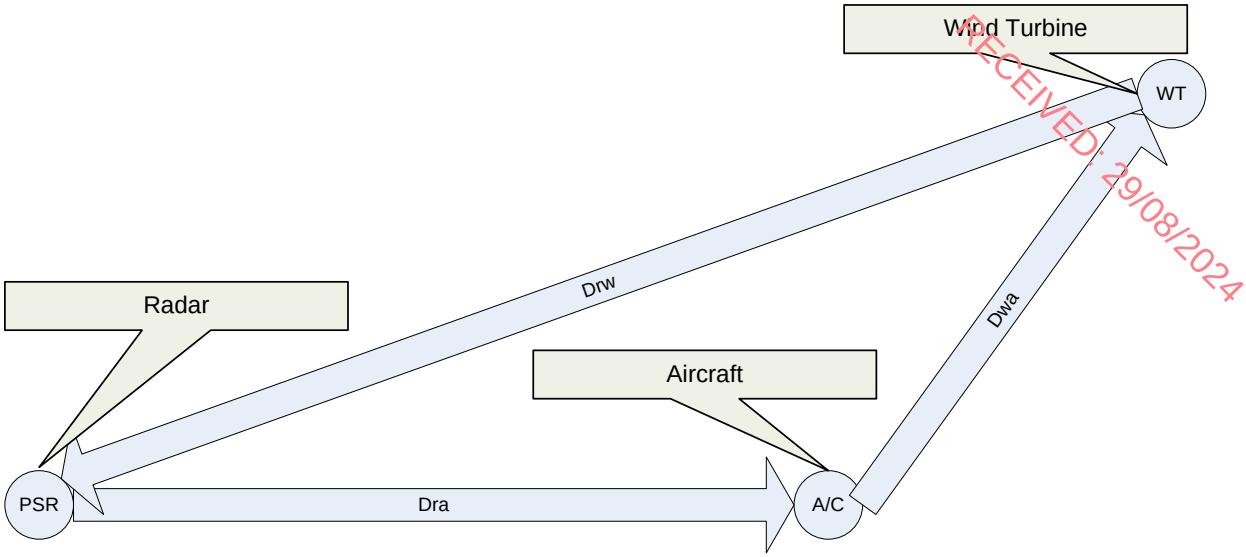

Figure 17: PSR reflection case 3

In case 3, the reflection is located in the azimuth of the aircraft, the reflected signal is received through the radar antenna sidelobes.

In this case, the power reflected back will be equal to:

$$P_{r\,ef} = \frac{\sigma_{a1}.\sigma_{w2}.F_{ra}.F_{aw}.F_{wr}.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{ra}{}^2.D_{wa}{}^2.D_{rw}{}^2}$$ Equation 13

Comparing this power to the radar receiver detection threshold one can derive the volume around a wind turbine where aircraft must be located to cause a reflection.

$$R_3 = \sqrt[2]{\frac{\sigma_{a1}.\sigma_{w2}.F_{ra}.F_{aw}.F_{wr}.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{ra}{}^2.D_{rw}{}^2.P_{thresh}}}$$ Equation 14

Worst case estimation can be calculated assuming $F_{ra} = F_{aw} = F_{wr} = 1$, $\sigma_{a1} = \sigma_a$ and $\sigma_{w2} = \sigma_w$.

$$R_3 = \sqrt[2]{\frac{\sigma_a.\sigma_w.G_t.P_t.G_{rs}.\lambda^2}{(4.\pi.)^4.D_{ra}{}^2.D_{rw}{}^2.P_{thresh}}}$$ Equation 15

Note that there exists a certain volume around the radar and wind turbine where these types (types 2 and 3) of reflections could occur (see Figure 19). There also exists a critical distance between radar and wind turbine for which these volumes start to merge.

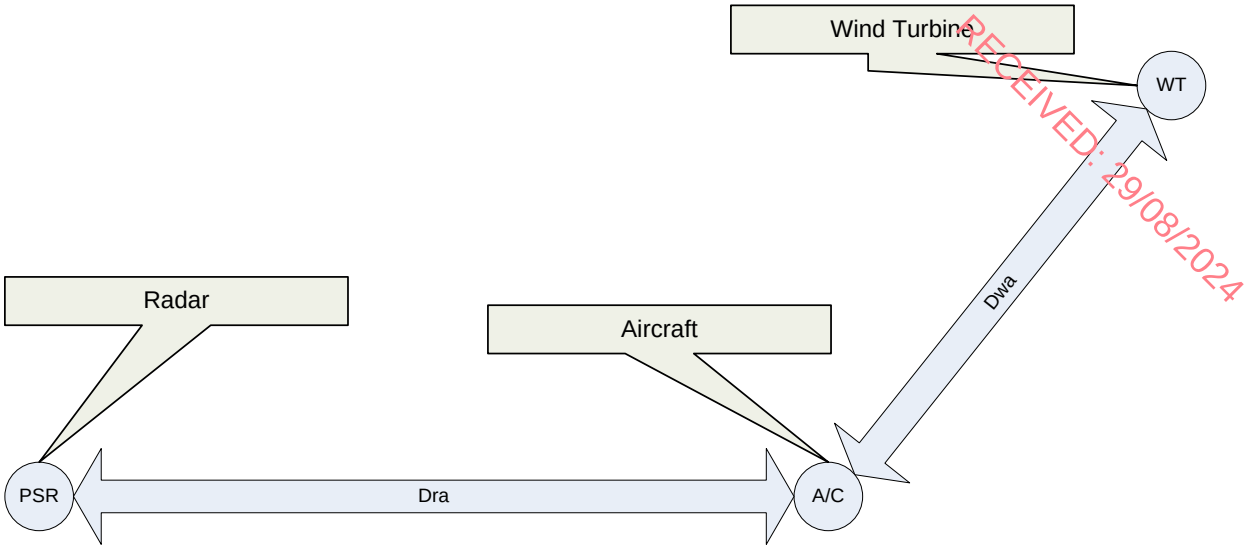

Figure 18: PSR reflection case 4

In case 4, the reflection is located in the azimuth of the aircraft, the reflected signal is received through the radar antenna main beam.

In this case, the power reflected back will be equal to:

$$P_{r\,ef} = \frac{\sigma_w.\sigma_{a1}.\sigma_{a2}.F_{ra}^{\,2}.F_{aw}^{\,2}.G_t.P_t.G_r.\lambda^2}{(4.\pi.)^5.D_{ra}^{\,4}.D_{wa}^{\,4}}$$ Equation 16

Comparing this power to the radar receiver detection threshold one can derive the volume around a wind turbine where aircraft must be located to cause a reflection.

$$R_4 = \sqrt[4]{\frac{\sigma_w.\sigma_{a1}.\sigma_{a2}.F_{ra}^{\,2}.F_{aw}^{\,2}.G_t.P_t.G_r.\lambda^2}{(4.\pi.)^5.D_{ra}^{\,4}.P_{thresh}}}$$ Equation 17

Worst case estimation can be calculated assuming $F_{ra} = F_{aw} = 1$, $G_t = G_r = G$ and $\sigma_{a1} = \sigma_{a2} = \sigma_a$.

$$R_4 = \sqrt[4]{\frac{\sigma_a^2.\sigma_w.G^2.P_t.\lambda^2}{(4.\pi.)^5.D_{ra}^{\,4}.P_{thresh}}}$$ Equation 18

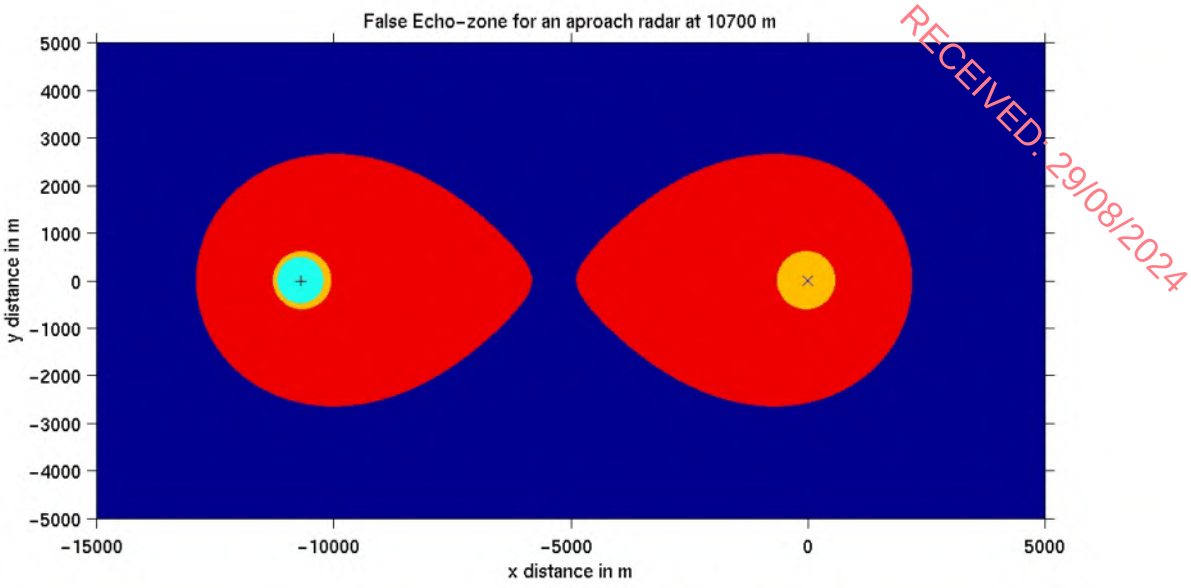

Figure 19: Example of calculation of aircraft locations where reflection can occur (horizontal)

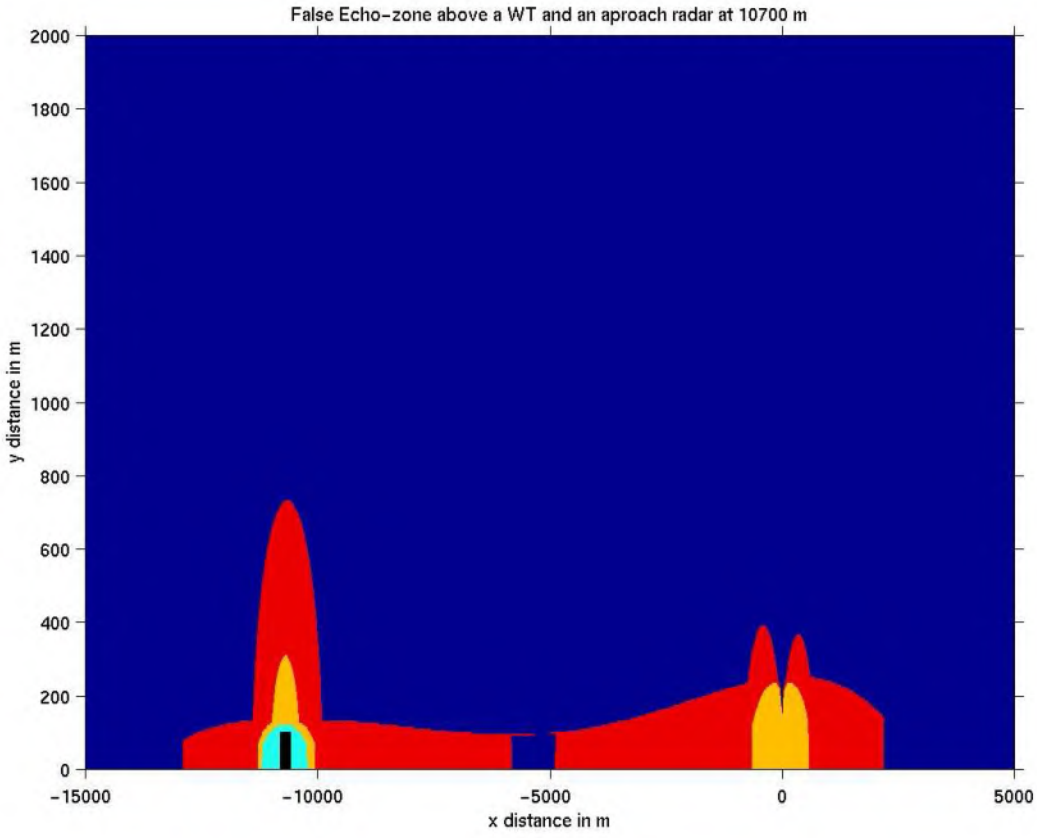

Figure 20: Example of calculation of aircraft locations where reflection can occur (vertical)

Figure 19 and Figure 20 provide a typical example of the computation of the different reflection zones (radar location marked with x; wind turbine location marked with +). The cyan area corresponds to aircraft locations where case 1 can happen. The orange areas correspond to aircraft locations where case 4 can happen. The red areas correspond to aircraft locations where case 2 or 3 can happen.

In equations 6 to 17 the symbols have the following meanings

P_{ref}	The power of the reflected signal arriving at the radar (W)
P_t	Transmitted power (W)
P_{thresh}	Radar receiver detection threshold (W)
G_t	Transmit antenna gain
G_r	Receive antenna gain (main beam)
G_{rs}	Receive antenna gain (side lobes)
σ_a	The mono-static RCS of the aircraft (m^2)
σ_w	The mono-static RCS of the wind turbine (m^2)
σ_{a1}	The bi-static RCS of the aircraft from radar to wind turbine (m^2)
σ_{a2}	The bi-static RCS of the aircraft from wind turbine to radar (m^2)
σ_{w1}	The bi-static RCS of the wind turbine from radar to aircraft (m^2)
σ_{w2}	The bi-static RCS of the wind turbine from aircraft to radar (m^2)
$F_{rw} = F_{wr}$	Terrain induced attenuation factor between radar and wind turbine.
$F_{wa} = F_{wa}$	Terrain induced attenuation factor between wind turbine and aircraft.
$F_{ra} = F_{ar}$	Terrain induced attenuation factor between radar and aircraft.
D_{rw}	Distance radar to wind turbine (m)
D_{wa}	Distance wind turbine to aircraft (m)
D_{ra}	Distance radar to aircraft (m)
λ	Signal wavelength (m)

C.2 Further Processing

Whilst at its most basic the remainder of the radar can be modelled as a simple threshold detector by comparing P_{ref}, above, to a defined threshold (P_{thresh})for the radar under test this is a huge simplification for a modern radar system.

Other than to state that where possible as much of the radars internal processing should be taken into account it is not intended to go further within this document as data processing varies so widely from radar to radar and the relevant algorithms are often difficult to obtain or model. Some of the issues which may affect the probability of detection of aircraft reflection include the following items[8]:

[8] MTI-MTD filtering is not applicable in this case as the reflected signal will have the same Doppler characteristics as the direct aircraft echo.

- **Sliding window** - Most systems determine detection using a statistical M detections from N pulses algorithm;
- **Tracking Algorithms** - Plot-extracted systems will only provide plot information should a series of echoes over a number of scans pass certain tracking criteria.

ANNEX D Justification of the recommended SSR protection range

D.1 Introduction

The selection of the recommended SSR protection range is based on the assessment of 3 impacts that a single wind turbine could have on the SSR performance:

- Position detection and Mode A/Mode C code detection performance characteristics.
- Multiple target reports performance characteristic.
- Azimuth accuracy performance characteristic.

D.2 2D position detection and Mode A/Mode C code detection

As for PSR (see 0), SSR is affected by a shadow region behind the wind turbine where the 2D position detection and the Mode A and Mode C code detection may be degraded. In the case of SSR the shadow length can be calculated.

The protection range has been calculated in such a way that the volume represented by region 1 (width, height and length) remains tolerably small.

SSR interrogations/responses can all be modelled as one-way communication links and probabilities of signal detection can be derived by from received signal power, P_r, and receiver sensitivity. P_r can be found by initially determining the power density, P, at a range of D from a transmitter radiating a signal with a power of P_t:

$$P = \frac{F.G_t.P_t}{4.\pi.D^2} \qquad \text{Equation 19}$$

The radar's ability to collect this power and feed it to its receiver is a function of its antenna's effective area, A_e, and P_r is therefore given by the equation;

$$\mathrm{P_r} = P.A_e \qquad \text{Equation 20}$$

Replacing A_e with its actual value gives:

$$\mathrm{P_r} = \frac{P.G_r.\lambda^2}{4.\pi} \qquad \text{Equation 21}$$

Replacing P with the terms of Equation 19 gives:

$$\mathrm{P_r} = \frac{F.G_t.P_t.G_r.\lambda^2}{(4.\pi.D)^2} \qquad \text{Equation 22}$$

when this signal is reflected off an object with bi-static radar cross section of σ, e.g. a wind turbine, rather than received directly, this equation can be modified to

$$\mathrm{P_{r\,ef}} = \frac{\sigma.F_{tw}.F_{wr}.G_{tw}.P_t.G_{rw}.\lambda^2}{(4.\pi.)^3.D_{tw}{}^2.D_{wr}{}^2} \qquad \text{Equation 23}$$

where the symbols have the following meanings

P_{ref}	The power of the reflected signal arriving at the receiver
P_t	Transmitted power
G_{tw}	Transmit antenna gain in the direction of the wind turbine
G_{rw}	Receive antenna gain in the direction of the wind turbine
σ	The bi-static RCS of the wind turbine as in Figure 21.
F_{tw}	Terrain induced attenuation factor between transmitter and wind turbine.
F_{wr}	Terrain induced attenuation factor between wind turbine and receiver.
D_{tw}	Distance transmitter to wind turbine
D_{wr}	Distance wind turbine to receiver
λ	Signal wavelength

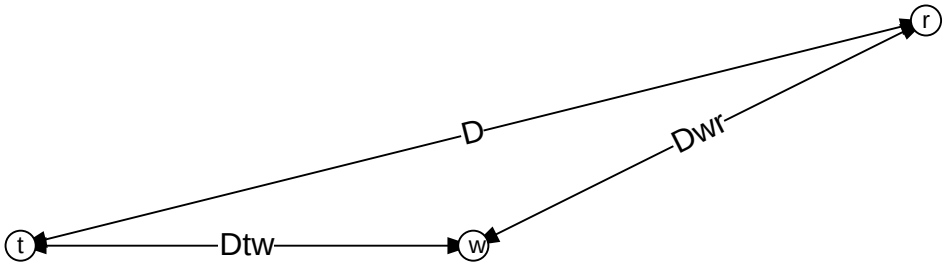

Figure 21: Direct and reflected signal paths

By replacing the power received, P_{ref}, with the threshold of the receiving system, P_{thresh}, the range from the turbine for a given turbine/transmitter geometry where the reflected signal is likely to be detected is given by:

$$D_{wr} = \sqrt{\frac{\sigma.F_{tw}.F_{wr}.G_{tw}.G_{wr}.P_t.\lambda^2}{(4.\pi)^3.D_{tw}.P_{thresh}}}$$

Equation 24

For certain assessments the ratio of the power received via the direct path D has to be compared to the power received via the indirect path. Combining Equation 19 and Equation 23 yields:

$$\frac{P_{direct}}{P_{ref}} = \frac{F_{dir}.G_t.G_r.4.\pi.D_{tw}^2.D_{wr}^2}{\sigma.G_{tw}.G_{wr}.D^2.F_{tw}.F_{wr}}$$

Equation 25

By inverting Equation 25 we get the ratio between direct signal and reflected signal behind a turbine:

$$\frac{P_{ref}}{P_{direct}} = \frac{\sigma.Gtw.Gwr.D^2.Ftw.Fwr}{Fdir.Gt.Gr.4.\pi.Dtw^2.Dwr^2}$$

Equation 26

For point “A”, directly behind the turbine, we can use the following relationships:

$G_{tw} = G_t$

$$G_{wr} = G_r$$

$$D = D_{tw} + D_{wr}$$

$$F_{dir} = F_{tw}.F_{wr}$$

$$\sigma = \frac{4.\pi.L^2.S^2}{\lambda^2}$$

$$L^2 = \frac{\lambda}{\frac{1}{D_{tw}} + \frac{1}{D_{wr}}}$$

Where L is the dimension of the 1st Fresnel zone and S is the diameter of the mast, this gives us:

$$\frac{P_{ref}}{P_{direct}} = \frac{S^2.D}{D_{tw}.D_{wr}.\lambda}$$ Equation 27

Using the relationship between field strength and power loss, PL, we get:

$$PL = \left(1 - \sqrt{\frac{P_{ref}}{P_{direct}}}\right)^2 = \left(1 - S.\sqrt{\frac{D}{D_{tw}.D_{wr}.\lambda}}\right)^2$$ Equation 28

Which can be rearranged to give:

$$D_{wr} = \frac{D_{tw}}{\left(\frac{D_{tw}.\lambda}{S^2}.\left(1 - \sqrt{PL}\right)^2 - 1\right)}$$ Equation 29

Which is the length of the shadow region for a given acceptable 1-way power loss PL.

Assuming that a 3 dB power loss is tolerable in the case of an SSR and a mast diameter of 6 m and taking into account $D_{tw} \geq 16$ km, the maximum length of the shadow region is equal to 1600 m.

At 1600 m behind the wind turbine the shadow height (see Annex A.2) is equal to 310 m assuming a wind turbine height of 200 m (nacelle height + half rotor blade diameter) and that the wind turbine altitude is 50 m higher than the SSR.

Using Equation 4 the width of the shadow region can be calculated and is equal to 45 m.

Under these conditions and assumptions the volume of the SSR shadow region behind a wind turbine (l 1600 m x w 45 m x h 310 m) is sufficiently small to be operationally tolerable.

The above assessment has been performed for a single wind turbine. Would there be multiple wind turbines located in a radar beam-width, the resulting shadow zone would be larger. Nevertheless it is believed that the 16 km limit is a valid figure for the border between SSR zone 2 (detailed assessment) and SSR zone 4 (no assessment).

D.3 Multiple target reports

Here the calculation is based on the conditions to get a reply from a transponder when the interrogation has been reflected onto a wind turbine.

Because of the ISLS implementation, the transponder will be insensitive during a 35 µs (see § 3.1.1.7.4 [RD 2]) period after the reception of a radar interrogation through radar sidelobes. Therefore any aircraft/transponder located closer than 5250 m (half of the distance corresponding to 35 µs) will not reply to reflected interrogations because in this case the path difference between the direct (through sidelobes) and the reflected signal will always be smaller than 35 µs.

When the aircraft transponder is located further than 5250 m from the wind turbine, the minimum power received by the transponder from a reflected interrogation can be calculated (using Equation 23) and can be compared with the minimum transponder receiver threshold (smaller specified value -77 dBm § 3.1.1.7.5 [RD 2]). Therefore the minimum distance between the SSR and the wind turbine can be calculated as follows:

$$D_{tw} = \sqrt{\frac{\sigma.F_{tw}.F_{wr}.G_{tw}.G_{wr}.P_t.\lambda^2}{(4.\pi)^3.D_{wr}^2.P_{thresh}}}$$ Equation 30

P_{thresh} = -77 dBm = $10^{-10.7}$ W

P_t = 2 kW = 2000 W

$F_{tw} = F_{wr} = 1$

σ = 35 dBm^2 = $10^{3.5}$ m^2

G_{tw} = 27 dB = $10^{2.7}$

$G_{wr} = 1$

D_{wr} = 5250 m

λ = 0.2913 m (corresponding to 1030 Mhz)

It gives:

D_{tw} = 15698 m

Therefore when the wind turbine is 16 km away from the SSR if the aircraft/transponder is located closer than 5250 m from the wind turbine the transponder will not reply to reflected interrogations because of ISLS implementation and when further than 5250 m the power of the reflected interrogation will be below the transponder receiver threshold and the transponder will not reply either.

It must be noted that the rationale above is only valid for Mode A/C operations.

D.4 Azimuth accuracy

Here the calculation is based on the azimuth error due to a wind turbine for aircraft located behind the wind turbine.

As explained in paragraph 4.4.11, azimuth error may happen when there is a small path difference (less than 0.25 µs = 75 m) between the direct and the reflected signals as illustrated on Figure 22 below.

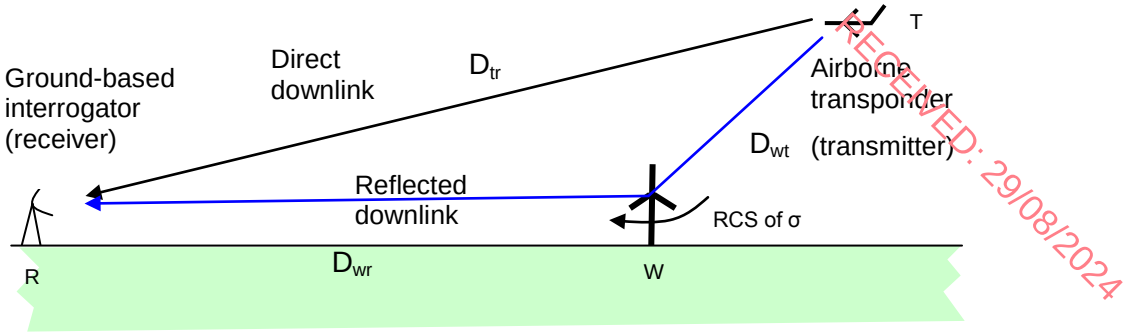

Figure 22: SSR downlink reflection

If the above criterion on path difference is met, this will have an impact on the azimuth measurement if the ratio C/I between the direct signal (C – Carriage) and the reflected signal (I – Interference) is smaller than a given threshold.

The C/I ratio can be calculated as follows assuming that:

- The propagation losses to the wind turbine and to the aircraft from the SSR ground system are the same;
- The propagation losses between the transponder and the wind turbine and the transponder and the SSR ground system are the same;
- The transponder gain in the direction of the wind turbine is the same in the direction of the SSR ground system;
- The SSR ground system receive gain is the same in the direction of the wind turbine as in the direction of the transponder.

If the above assumptions are met then:

$$\frac{C}{I} = \frac{D_{tw}^2 D_{wr}^2}{D_{tr}^2} \frac{4\pi}{\sigma}$$ Equation 31

Where σ is the wind turbine bi-static RCS as in Figure 22.

As $D_{tw} \leq D_{tr,}$, it can be derived that:

$$\frac{C}{I} \leq \frac{4\pi}{\sigma} . D_{wr}^2$$ Equation 32

Therefore, taking into account that a C/I ratio of 50 dB is largely sufficient to ensure a good discrimination between the direct signal and the reflected signal, one can derive the minimum D_{wr} for a given (maximum) bi-static wind turbine RCS (e.g. σ = 35 dBm^2).

D_{wr} = 5016 m

Consequently, when the wind turbine is more than 16 km away from the SSR, the impact on azimuth accuracy is tolerable irrespective of the path difference between the direct and the reflected signal.

The above assessment has been performed for a single wind turbine. It should be noted that would there be multiple wind turbines located in a radar beam-width and at a larger distance than 5 km, the resulting SSR azimuth error could be significant.

ANNEX E Wind energy project description pro-forma

The pro-forma below is based on a form currently in used; it can be adapted in accordance with national regulations and practice (see yellow shaded cell).

Wind Farm Name	
Also known as:	

Developers reference	
Application identification No.	

Related/previous applications (at or near this site): Provide reference names or numbers	

Developer Information	
Company name:	
Address:	
Contact:	
Telephone:	
Facsimile:	
e-mail:	

Relevant Wind Turbine Details			
Wind turbine manufacturer:			
Wind turbine model:			
Wind farm generation capacity (MW)		**Number of turbines**	
Blade manufacturer			
Number of blades			
Rotor diameter		Metres	
Rotation speed (or range)		Rpm	
Blade material including lightning conductors			
Wind turbine hub height		Metres	
Tower design (* delete as required)	* Tubular	* Lattice	
Tower base diameter/dimensions		Metres	
Tower top diameter/dimensions		Metres	

Comments Are there any details or uncertainties that may be helpful to add?

Turbine Locations

Please provide as much information as you can. The base position and tower height above sea level of every wind turbine if available, the site boundary if not.

Please number the turbines or boundary points on the map, to correlate with the information provided below.

Copy this page as necessary to account for all turbines or boundary points

Wind farm **Name & Address:**	

Turbine no.		**Height** above a known reference (m) of tower base				
	Degrees		Minutes		Seconds	
Latitude						
Longitude						
Turbine no.		**Height** above a known reference (m) of tower base				
	Degrees		Minutes		Seconds	
Latitude						
Longitude						
Turbine no.		**Height** above a known reference (m) of tower base				
Grid Reference			100 km square letter(s) identifier			
Latitude						
Longitude						
Turbine no.		**Height** above a known reference (m) of tower base				
	Degrees		Minutes		Seconds	
Latitude						
Longitude						

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Irish Aviation Authority
The Times Building
11–12 D'Olier Street
Dublin 2, D02 T449,
Ireland

Údarás Eitlíochta na hÉireann
Foirgneamh na hAmanna
11–12 Sráid D'Olier
Baile Átha Cliath 2, D02 T449,
Éire

T: +353 1 671 8655
F: +353 1 679 2934
www.iaa.ie

9th January 2023

Ms Niamh McHugh
MKO
Tuam Road
Galway
H91 VW84

Your Ref: **220245**
Applicant Name: **EDF Renewable Ireland Limited**

Re: Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Near Kilbane, Co. Clare.

Dear Ms. McHugh,

I refer to your email of the 7th December together with supporting scoping documentation in regard to the above proposed development.

The Irish Aviation Authority (IAA) Air Navigation Services Division (ANSD) does not get involved in the planning process. The IAA ANSD is to be notified as detailed hereafter:

According to S.I. 215 of 2005, Irish Aviation Authority (Obstacles to Aircraft in Flight), the IAA ANSD requires any person who seeks to erect a manmade object to notify the aerodrome operator of the intended operation **at least thirty days** in advance if the structure is to be erected in the vicinity of the aerodrome or the areas around the aerodrome and other protected surfaces associated with the aerodrome. Aerodrome Operators can be contacted via IAA AIP AD 1.3 INDEX TO AERODROMES AND HELIPORTS, to evaluate the impact of the intended operation on the protected airspace established for the aerodrome.

Additionally, any person who seeks to erect a manmade object in excess of 45 metres anywhere within the state above ground or water surface level must also notify the IAA ANSD of the intended crane erection **at least thirty days** in advance, as a crane operating at

or above this height may constitute an obstacle to air navigation. The IAA ANSD can be contacted via airspace@iaa.ie.

The State requires electronic terrain and obstacle data (eTOD) in accordance with International Civil Aviation Organisation (ICAO) Annex 15 requirements which shall be surveyed by Ordnance Survey Ireland (OSi). The cost of this OSi surveyed data is to be borne by the developer. Additionally, the following data is to be supplied once construction is planned or commenced or available to the airspace team via airspace@iaa.ie:

- The WGS84 coordinates (In degrees, minutes and seconds) for each turbine?
- Height above ground level (to blade tip) and elevation above mean sea level (to blade tip)?
- Verification if it's a standalone wind farm or is merged with others. Does the wind farm have any alternative names?
- Horizontal extent (rotor diameter) of turbines and blade length where applicable?
- Lighting of the wind farm, which turbine(s) is/are lit, and what type of lighting?

ICAO Light Type	**Colour**
Low-intensity Type A (fixed obstacle)	Red
Low-intensity Type B (fixed obstacle)	Red
Low-intensity Type C (mobile obstacle)	Yellow/Blue
Low-intensity Type D (follow-me vehicle)	Yellow
Low-intensity Type E	Red
Medium-intensity Type A	White
Medium-intensity Type B	Red
Medium-intensity Type C	Red
High-intensity Type A	White
High-intensity Type B	White

If you have any questions, please don't hesitate to contact the airspace team at airspace@iaa.ie.

Yours sincerely

p.p. G. O'Leary

Deirdre Forrest
Corporate Affairs

Niamh McHugh

From: Jane Gilleran <Jane.Gilleran@fisheriesireland.ie>
Sent: 05 January 2023 14:41
To: Niamh McHugh
Subject: Proposed Lackareagh Wind Farm Scoping

Good afternoon Niamh,

Apologies for the delay in coming back to you on the above. Obviously, the project is at an early stage and IFI reserve the right to make further comment at the planning stage. While Inland Fisheries Ireland (IFI) is not in principle opposed to the proposed development, we do wish to make the following observations and comments. Such developments have the potential to significantly impact on the aquatic environment if they are not carried out in an environmentally sensitive manner. IFI requests that you consider the following:

Prevention of discharges of polluting matter such as cement.
Uncured concrete can kill fish by altering the pH of the water. Pre-cast concrete should be used whenever possible, to eliminate the risk to fish and aquatic life. When cast-in-place concrete is required, all work must be done in the dry and effectively isolated from any water that may enter watercourses for a period sufficient to cure the concrete.

Prevention of silt deposition in streams.
One of the potential impacts from the development is the discharge of silt-laden waters to streams. The silt can clog salmonid spawning beds and can also precipitate further riverbank erosion downstream thereby escalating the deleterious impact. Inevitably this can lead to loss or degradation of valuable habitat. It is important to incorporate best practices into construction methods and strategies to minimise discharges of silt/suspended solids to waters.

Silt traps should be constructed at locations that will intercept run-off to streams and appropriately sized to provide sufficient retention time during both normal and flood flow conditions. The silt traps should not be constructed immediately adjacent to natural watercourses. A buffer zone should remain between the silt trap and the watercourse with natural vegetation left intact so as to assist silt interception. Given the size of watercourses in the vicinity of the wind farm a suspended solids discharge limit of 10mg/l should be the objective.

All natural watercourses that have to be traversed during site development work should be effectively bridged prior to commencement. The crossing of watercourses at fords is unacceptable because of the amount of uncontrolled sedimentation that can be generated by their use. Measures must be put in place to prevent silt run-off during road construction.

All road drainage channels or swales should have low rock dams located at appropriate intervals in order to reduce erosive energy and allow precipitation of solids. Such structures should be retained post construction phase.

Stream crossings
Bridging should be of a nature that will not interfere with the natural streambed, stream width or its gradient. Clear span designs maintain the stream channel profile, do not alter stream gradients, readily pass sediment and debris, and retain the natural stream bed and gradient. Water velocity is not significantly changed, and they can be designed to maintain the normal stream width. As stated above the crossing of watercourses at fords is unacceptable. Embedded culvert pipes are acceptable in fish bearing waters. Embedded pipe culverts are intended to maintain the natural

channel gradient, stream width and substrate configuration. On fisheries waters, they should be buried to a minimum of 0.5m, below the stream bed at the natural gradient, and sized to maintain the natural stream channel width. The usable gradient range recommended for embedded pipe culverts is less than three per cent (3%). Non-embedded culverts are not recommended.

Hardcore areas.
The increased volumes of surface water runoff from hardcore areas must not impact on aquatic habitat by giving rise to erosion.

Storage of fuels/oils etc.

All storage areas should be adequately bunded and hydrocarbon interceptors placed in locations to contain potential spillages on loading/working areas.

Having particular regard to the foregoing, ground stability should be kept under constant review, and that tree felling operations and site development works should be carried out in such manner as not to result in creation of unstable ground conditions, or subsequently lead to ground instability.

The Owenogarney system is an important Salmonid spawning river with salmon and trout recorded in the upper reaches of streams draining both the Sliabh Ghleann na gCaíleach/Lackareagh Mountain and Sliabh Bearnach areas of the development site and as such is especially sensitive to silt losses emanating from site works.

Yours sincerely,

Jane

Jane Gilleran
Fisheries Environmental Officer

Jane.Gilleran@fisheriesireland.ie • +353 (0)61 300238 • www.fisheriesireland.ie • V94 NPEO

Iascach Intíre Éireann
Inland Fisheries Ireland

Pictured above: A day in the life of **'Uschi'** - the Fisheries Detection Dog on patrol surveying Dysart Lakes. Taken by Fisheries Officer Maur
Ireland's Detection Dog Handler, this was the winning image in this year's Staff Christmas Photography Competition. Did you know that U
Detection Dog in Europe?

Maureen has nominated LauraLynn, Ireland's Children's Hospice, to receive a financial donation from Inland Fisheries Ireland. Congratulatio
and a very Merry Christmas and a Happy New Year to all!

Niamh McHugh

From: MKO-Admin
Sent: 19 December 2022 12:33
To: Niamh McHugh
Subject: FW: Lackareagh Wind Farm. Kilbane, Co. Clare - your ref 220245
Attachments: [Untitled].pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Kind regards,
Olivia

Olivia Coen
Receptionist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

From: Colin Hedderly <Colin.Hedderly@irishrail.ie>
Sent: 19 December 2022 12:15
To: MKO-Admin <info@mkoireland.ie>
Subject: Lackareagh Wind Farm. Kilbane, Co. Clare - your ref 220245

FAO Niamh McHugh,

Dear Ms McHugh,
I reply to the letter attached of 5th December 2022. This proposed development is remote from the railway line and therefore does not concern Iarnród Éireann.

Please bear in mind that should the grid connection for the proposed development be planned to cross railway property then the developer must enter into a wayleave agreement with Ianród Éireann and CIÉ for the crossings. It is unclear from the documents submitted what route is planned for the grid connection.

Regards,

Colin Hedderly

Senior Track & Structures Engineer, Iarnród Éireann/Irish Rail, CCE Dept, Old Railway Station,
Grace Road, Athlone, Co. Westmeath, N37 C573.

Mobile: 087 9681735 E-mail: colin.hedderly@irishrail.ie

Infrastructure Manager's Office Iarnród
Éireann
Old Railway Station
Grace Road
Athlone
Co. Westmeath

Our Ref: 220245
Your Ref:

5th December 2022

Re: EIA Scoping Document for the Proposed Lackareagh Wind Farm, Kilbane, Co. Clare.

Dear Sir or Madam,

EDF Renewables Ireland Limited (EDF Renewables). is investigating the potential for a proposed Wind Farm development at Lackareagh, near Kilbane Co. Clare. MKO has been appointed as Environmental Consultants on this project and will be preparing an Environmental Impact Assessment Report (EIAR) for the Proposed Development. The proposed study area measures approximately 232 hectares and is located approximately 1km east of Kilbane, Co. Clare.

It is envisaged that the Proposed Development will comprise approximately 7 no. wind turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, and a permanent anemometry mast, and grid connection to Ardnacrusha 110kV substation, located in Co. Clare, via an underground grid connection route.

An application will be made to Clare County Council in order to seek planning permission for the Proposed Development.

As part of the EIA process, we would welcome any comments that you might have in relation to the proposed project, including baseline data, survey techniques, or potential impacts that should be considered as part of the assessment process and in the preparation of the EIAR. In order to facilitate this, a Scoping Document providing details of the Proposed project and the site of the Proposed Development is enclosed with this letter.

If you could return any comments or suggestions at your earliest convenience, it would be much appreciated. If you require any further information, please do not hesitate to contact me.

Yours sincerely,

Niamh McHugh

Niamh McHugh BSc (Env)

MKO, Tuam Road, Galway, Ireland. H91 VW84
+ 353 (0)91 735611 | info@mkoireland.ie | www.mkoireland.ie | @mkoireland

Niamh McHugh

From: IWT Info <info@iwt.ie>
Sent: 22 December 2022 14:57
To: Niamh McHugh
Subject: Re: 220245 - Proposed Lackareagh Wind Farm Scoping

Dear Niamh,

Apologies for the late reply.

Thank you for contacting us. We do not have the staff capacity to respond to this consultation at the moment but we will endeavour to respond if possible.

Kind regards,
Fabiola Vieira

On Tue, 6 Dec 2022 at 12:45, Niamh McHugh <nhmchugh@mkoireland.ie> wrote:

> Dear Sir/Madam,
>
> Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.
>
> MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.
>
> Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.
>
> Kind regards,
>
> Niamh
>
> **Niamh McHugh BSc. (Env)**
>
> Environmental Scientist

MKO

Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin

mkoireland.ie | +353 (0)91 735 611

--
--

Thank you for your email. Please note that this email inbox is not monitored outside normal working hours.

--

Niamh McHugh

From: Niamh Rogan <nrogan@lawaters.ie>
Sent: Tuesday 6 December 2022 14:14
To: Niamh McHugh
Cc: Tracey Duffy
Subject: RE: 220245 - Proposed Lackareagh Wind Farm Scoping
Attachments: Lackareagh EIA SD F - 2022.12.05- 220245 Reduced.pdf; 220245 - LAWPRO Scoping Letter - 2022.12.05.pdf

Hi Niamh,

LAWPRO is a Local Authority Shared service and not a statutory body, thus, LAWPRO does not provide comment or make submissions on planning applications.
We would advise you to contact the relevant Local Authority with regards this matter which would be Clare County Council, particularly their Environment Section.

Niamh

Niamh Rogan | Catchment Manager
SouthWest Region
M 085 855 0776
Local Authority Waters Programme
Clár Uiscí na nÚdarás Áitiúil

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: 06 December 2022 12:51
To: Tracey Duffy <tduffy@lawaters.ie>
Subject: 220245 - Proposed Lackareagh Wind Farm Scoping

Hi Tracey,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

Niamh McHugh

From: INFO <Information@tii.ie>
Sent: 23 December 2022 10:53
To: Niamh McHugh
Subject: RE: 220245 - Proposed Lackareagh Wind Farm Scoping

Dear Ms. McHugh,

Thank you for your email of 6 December 2022 regarding the above. The position in relation to your enquiry is as follows.

Transport Infrastructure Ireland (TII) will endeavour to consider and respond to planning applications referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidelines as outlined in the Section 28 Ministerial Guidelines 'Spatial Planning and National Roads Guidelines for Planning Authorities' (DoECLG, 2012). Regard should also be had to other relevant guidance available at www.TII.ie.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

National Strategic Outcome 2 of the National Planning Framework includes the objective to maintain the strategic capacity and safety of the national roads network. In addition, Chapter 7 'Enhanced Regional Accessibility' of the National Development Plan, 2021 – 2030, sets out the key sectoral priority of maintaining Ireland's existing national road network to a robust and safe standard for users. This requirement is further reflected in the publication of the National Investment Framework for Transport in Ireland and also the existing Statutory Section 28 Spatial Planning and National Roads Guidelines for Planning Authorities.

With respect to EIAR scoping issues, the recommendations indicated below provide only general guidance for the preparation of an EIAR, which may affect the national road network.

The developer/scheme promoter should have regard, inter alia, to the following:

- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes,
- TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development,
- The developer should assess visual impacts from existing national roads,
- The developer should have regard to any EIAR/EIS and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts,
- The developer, in preparing an EIAR, should have regard to TII Publications (formerly DMRB and the Manual of Contract Documents for Road Works),
- The developer, in preparing an EIAR, should have regard to TII's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006),

- The EIAR/EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1st Rev., National Roads Authority, 2004)),

- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. In relation to national roads, TII's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the NRA/TII TTA Guidelines which addresses requirements for sub-threshold TTA. Any improvements required to facilitate development should be identified. It will be the responsibility of the developer to pay for the costs of any improvements to national roads to facilitate the private development proposed as TII will not be responsible for such costs,

- The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required,

- In the interests of maintaining the safety and standard of the national road network, the EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network,

- TII recommends that that applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. Where abnormal 'weight' loads are proposed, separate structure approvals/permits and other licences may be required in connection with the proposed haul route. All structures on the haul route through all the relevant County Council administrative areas should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal 'weight' load proposed. In addition, the haul route should be assessed to confirm capacity to accommodate abnormal 'length' loads and any temporary works required.

The national road network is managed by a combination of PPP Concessions, Motorway Maintenance and Renewal Contracts (MMaRC) and local road authorities in association with TII. The applicant/developer should also consult with all PPP Companies, MMaRC Contractors and road authorities over which the haul route traverses to ascertain any operational requirements, including delivery timetabling, etc. to ensure that the strategic function of the national road network is safeguarded.

Additionally, any damage caused to the pavement on the existing national road arising from any temporary works due to the turning movement of abnormal loads (e.g., tearing of the surface course, etc.) shall be rectified in accordance with TII Pavement Standards and details in this regard shall be agreed with the Road Authority prior to the commencement of any development on site.

- It is noted that grid connection routing is proposed to Ardnacrusha. Any grid connection and cable routing proposals should be developed to safeguard proposed road schemes as TII will not be responsible for costs associated with future relocation of cable routing where proposals are catered for in an area of a proposed national road scheme. In that regard, consideration should be given to routing options, use of existing crossings, depth of cable laying, etc.

In the context of the existing national road network, in accordance with the National Planning Framework National Strategic Outcome no. 2 'Enhanced Regional Accessibility', there is a requirement to maintain the strategic capacity and safety of the network. This requirement is further reflected in the National Development Plan, the National Investment Framework for Transport in Ireland and also the existing Statutory Section 28 Spatial Planning and National Roads Guidelines for Planning Authorities.

There is around 99,000km of roads in Ireland, the national road network which caters for strategic inter-urban travel consists of only approx. 5.4% of this. There is a critical requirement to ensure the strategic capacity and safety of this

national road network is maintained and significant Government investment already made in the national road network is safeguarded.

The provision of cabling along the national road network represents a number of significant implications for TII and road authorities in the management and maintenance of the strategic national road network and TII is of the opinion that grid connection cable routing should reflect the foregoing provisions of official policy.

Other consents or licences may be required from the road authority for any trenching or cabling proposals crossing the national road. TII requests referral of all proposals agreed and licensed between the road authority and the applicant which affect the national road network.

Cable routing should avoid all impacts to existing TII infrastructure such as traffic counters, weather stations, etc. and works required to such infrastructure shall only be undertaken in consultation with and subject to the agreement of TII, any costs attributable shall be borne by the applicant/developer. The developer should also be aware that separate approvals may be required for works traversing the national road network.

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.

I trust that the above comments are of use in your EIAR preparation.

Yours sincerely,

Alban Mills
Senior Regulatory & Administration Executive
Ref No. TII22-121206

www.tii.ie info@tii.ie +353 (0)1 646 3600

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Tuesday 6 December 2022 12:57
To: Landuse Planning <LandUsePlanning@tii.ie>
Subject: 220245 - Proposed Lackareagh Wind Farm Scoping

Dear Sir/Madam,

Please see attached Scoping Document and associated cover letter for the Proposed Lackareagh Wind Farm, near Kilbane, Co. Clare.

MKO has been appointed as the Environmental Consultants on this project, and engaged to compile the Environmental Impact Assessment Report for the Proposed Development. It is envisaged that the Proposed Development will consist of approximately 7 no. turbines, a 38kV substation, hardstands, access roads and entrance(s), borrow pit(s), a temporary construction compound, a permanent anemometry mast, and a grid connection to Ardnacrusha 110kV electrical substation. Further details relating to the Proposed Development can be found within the Scoping Document.

Any comments you may have in relation to this document would be welcomed. If you have any further queries or concerns in relation to this project, please don't hesitate to get back to me.

Kind regards,
Niamh

Niamh McHugh BSc. (Env)
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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Niamh McHugh

From: Matthew Craig <matthew.craig@2rn.ie>
Sent: Friday 6 May 2022 16:05
To: Niamh McHugh
Cc: Johnny Evans; windfarms
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,

We have one path transiting the area that you have sent us to assess between our high site at Maghera and Transposer site at Mitchelstown. The site at Mitchelstown provides DTT coverage to potentially fourteen thousand households.

The details are as follows:

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Maghera	52.968655°	-8.718119°	553	674
Mitchelstown	52.312990°	-8.306862°	340	

There is also the risk that the site could interfere with DTT viewers receiving their signals from the following sites depending on the direction that their antennas are pointed: Maghera, Woodcock Hill, Ballina, Mitchelstown, Mullaghanish.

As it stands we cannot perform an accurate assessment with the information provided, should any more details of the site become available we would be able to make a more accurate prediction. The second Fresnel zone at this frequency and distance is 122m wide.

Should the site go ahead we would also strongly recommend that a protocol be signed between the developer and 2rn.

Regards
.

Matthew Craig

Project Engineer
Projects and Coverage Planning
2RN
Block B, Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, Ireland D24 WK28
Phone: + 353 (0) 1 2082261 Mobile: + 353 (0) 87 7509955

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Friday 6 May 2022 12:21
To: Matthew Craig <matthew.craig@2rn.ie>; Johnny Evans <Johnny.Evans@rte.ie>; windfarms <windfarms@rte.ie>
Subject: 220245 - Telecoms Scoping Exercise

[CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe]

Hi Matthew, Johnny,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

The site location can be seen in the Figure attached, and I have also included the relevant shapefiles and .kml files for your convenience.

Could you let me know if you have any links or masts in this area, so we can incorporate them into out constraints mapping process. If any such link are present, could you also please send me on appropriate Fresnel zones/buffers for them.

If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

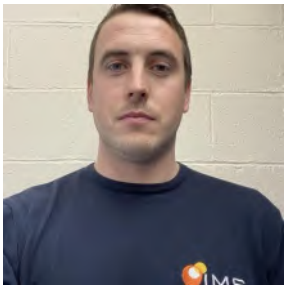
Niamh McHugh

From: Denis (Denny) Ahern <denis.ahern@imedia.ie>
Sent: Friday 6 May 2022 12:59
To: Niamh McHugh
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,

Nothing of concern here for us.

Thanks,
Denis



Denis (Denny) Ahern
Chief Operating Officer

Mobile. +353 (0) 87 8122298
Phone. +353 (0) 61 310752
Email. denis.ahern@imedia.ie
Address. 1st Floor Ashbourne Hall, Ashbourne Business Park, Dock Road, Limerick, Co Limerick, V94 NPE0, Ireland

Website. www.imedia.ie / www.imedia.co.uk

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Friday 6 May 2022 12:31
To: Denis (Denny) Ahern <denis.ahern@imedia.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Denis,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

The site location can be seen in the Figure attached, and I have also included the relevant shapefiles and .kml files for your convenience.

Could you let me know if you have any links or masts in this area, so we can incorporate them into our constraints mapping process. If any such link are present, could you also please send me on appropriate Fresnel zones/buffers for them.

If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: Roger Woods <rwoods@bai.ie>
Sent: Friday 6 May 2022 13:23
To: Niamh McHugh
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh

The BAI does not have any masts or links in that area.

Regards

Roger

Senior Executive Engineer
Broadcasting Authority of Ireland
2-5 Warrington Place
Dublin D02 XP29

Tel: 01 6441200
Fax: 01 6441299

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Friday 6 May 2022 12:30
To: Roger Woods <rwoods@bai.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Roger,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

The site location can be seen in the Figure attached, and I have also included the relevant shapefiles and .kml files for your convenience.

Could you let me know if you have any links or masts in this area, so we can incorporate them into out constraints mapping process. If any such link are present, could you also please send me on appropriate Fresnel zones/buffers for them.

If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: padraig.condon@bt.com
Sent: Friday 6 May 2022 12:35
To: Niamh McHugh
Subject: RE: 220245 - Telecoms Scoping Exercise

Follow Up Flag: Follow up
Flag Status: Completed

Hi Niamh,
I can confirm the planned development will have no impact on the BT Ireland Microwave network.

Regards

Padraig Condon
Core Network Operations

Tel: +353014326819
Mobile number: +353 86 604 0636
BT Meetme: + 353 1 6569053
E-mail padraig.condon@bt.com
https://www.webjoin.com/
Participant: 40342233#
Web: www.btireland.com

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: 06 May 2022 12:24
To: Condon,PG,Padraig,NQE32E R <padraig.condon@bt.com>
Subject: 220245 - Telecoms Scoping Exercise

Hi Padraig,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

The site location can be seen in the Figure attached, and I have also included the relevant shapefiles and .kml files for your convenience.

Could you let me know if you have any links or masts in this area, so we can incorporate them into out constraints mapping process. If any such link are present, could you also please send me on appropriate Fresnel zones/buffers for them.

If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: John Bagnall <john.bagnall@eir.ie>
Sent: Friday 7 October 2022 15:31
To: Niamh McHugh
Cc: Ellen Costello
Subject: Re: 220245 - Telecoms Scoping Exercise

Hi Niamh,

Forgive the delay, yes the option with the 10m extra distance would be fine and we would have minimal interference.

Kind regards,

John Bagnall
Transmission Design & Engineering

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D24 HX03

On Mon, 19 Sept 2022 at 10:24, Niamh McHugh <nhmchugh@mkoireland.ie> wrote:

Hi John,

Apologies for my delayed response on this, I was engaging with my client to determine if this could be achieved.

Please see attached a KML of the current turbine location (labelled Option 1), and an alternative location, based on the clearance distance you requested in the below emails (labelled Option 2).

Would you be able to advise me whether the attached is acceptable to you?

If you require anything further from me in order to make this decision, please let me know.

Kind Regards,

Niamh.

Niamh McHugh B.Sc (Env)
Environmental Scientist

MKO

Tuam Road, Galway

Ireland, H91 VW84

+353 (0) 91 735611

www.mkoireland.ie

From: John Bagnall <john.bagnall@eir.ie>
Sent: Friday 26 August 2022 16:42
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Cc: Ellen Costello <ecostello@mkoireland.ie>
Subject: Re: 220245 - Telecoms Scoping Exercise

Hi Niamh,

We would be unable to allow the blade to encroach that much into the buffer but if you could relocate another 10meters back from the path we could be confident the link wouldn't be affected.

Kind regards,

John Bagnall
Transmission Design & Engineering

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D24 HX03

On Fri, 12 Aug 2022 at 12:18, Niamh McHugh <nhmchugh@mkoireland.ie> wrote:

> Hi John,
>
> Our turbines will have a max tip height of 180m, and a max. blade length of 77.5m.
>
> Kind Regards,
>
> Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO

Tuam Road, Galway

Ireland, H91 VW84

+353 (0) 91 735611

www.mkoireland.ie

From: John Bagnall <john.bagnall@eir.ie>
Sent: Friday 12 August 2022 08:00
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Subject: Re: 220245 - Telecoms Scoping Exercise

Hi Niamh,

How tall is your turbine hub and your blade length we don't accept encroaches on the buffer at study stage generally.

Regards,

John Bagnall
Transmission Design & Engineering

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D24 HX03

On Thu, 28 Jul 2022 at 15:38, Niamh McHugh <nhmchugh@mkoireland.ie> wrote:

Hi John,

In relation to the correspondence below, we have one proposed turbine located at the following location:

ITM X 563374.07, Y 671869.75

According to the buffers and links you have previously sent on to us, the turbine **blade** is predicted to encroach approx. 40m into the buffer. Would you be able to tell me if this would be okay or if this would pose an issue to the CE_2455 to CE_1886 link?

If you require any further information from me to come to a conclusion on this matter, please don't hesitate to get back to me.

Kind Regards,

Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO

Tuam Road, Galway

Ireland, H91 VW84

+353 (0) 91 735611

www.mkoireland.ie

From: Niamh McHugh
Sent: Monday 16 May 2022 09:43
To: John Bagnall <john.bagnall@eir.ie>
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi John,

Thanks for passing on this information. I will be back in touch if the need arises.

Kind Regards,

Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist
MKO

Tuam Road, Galway

Ireland, H91 VW84

+353 (0) 91 735611

www.mkoireland.ie

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From: John Bagnall <john.bagnall@eir.ie>
Sent: Friday 13 May 2022 09:17
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Subject: Re: 220245 - Telecoms Scoping Exercise

Hi Niamh,

We have 1 transmission link within the proposed area that would be at risk, the end points of the transmission links are below, if you could keep a buffer of 100meters radius away from this transmission path when placing your turbines and send them on for further analysis.

		Site ID	Lat	Long			Site ID	Lat	Long
Link1	A-end	CE_2455	52°47'49.78"N	8°39'29.07"W	<--->	B-end	CE_1886	52°47'42.73"N	8°31'55.18"W

Kind regards,

John Bagnall
Transmission Design & Engineering

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D24 HX03

On Fri, 6 May 2022 at 12:09, Niamh McHugh <nhmchugh@mkoireland.ie> wrote:

Hi John,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,

Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist
MKO

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Ireland, H91 VW84

+353 (0) 91 735611

www.mkoireland.ie

RECEIVED: 29/08/2024

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Niamh McHugh

From: Peter O`Brien <peter.obrien@enet.ie>
Sent: Friday 6 May 2022 13:50
To: Niamh McHugh
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,

This won't affect us,

Regards,
Peter

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Friday, May 6, 2022 12:23 PM
To: Peter O`Brien <peter.obrien@enet.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Peter,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

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Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

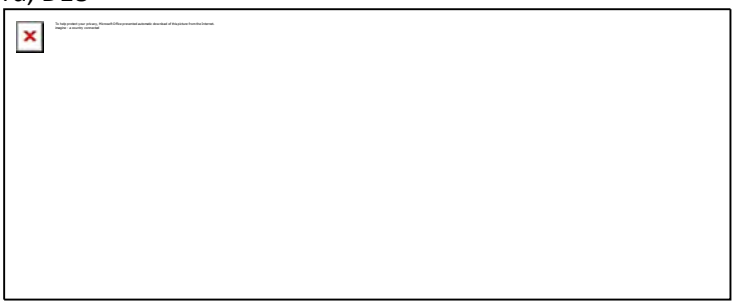
From: Paul Brunel <Paul.Brunel@imaginegroup.ie>
Sent: Friday 27 May 2022 08:34
To: Niamh McHugh
Cc: Ronnie O'Neill
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,
Imagine are not affected by this development.

Kind Regards,

Paul Brunel.
Transmission Planner.
Imagine Group.
Ph: 086 388 1962
imagine

t. +353 1 437 5000
m. +353 863832470
w. imagine.ie
Imagine
Sandyford Business Centre
Blackthorn Road, Sandyford, D18



AW89

From: Niamh McHugh
Sent: 26 May 2022 16:01
To: Paul Brunel <Paul.Brunel@imaginegroup.ie>; Ronnie O'Neill <Ronnie.ONeill@imaginegroup.ie>
Subject: FW: 220245 - Telecoms Scoping Exercise

Hi Paul, Ronnie,

Just wondering if you have gotten a chance to investigate the below? Thanks.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

From: Niamh McHugh
Sent: Friday 6 May 2022 12:07
To: Paul Brunel <Paul.Brunel@imaginegroup.ie>; Ronnie O'Neill <Ronnie.ONeill@imaginegroup.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Paul, Ronnie,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

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Graduate Environmental Scientist

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Niamh McHugh

From: Barry O'Donovan <barry@lightnet.ie>
Sent: Friday 6 May 2022 13:51
To: Niamh McHugh
Cc: Enda Broderick
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,

Lightnet do not have any radio links in the area you reference.

Regards,

Barry

lightnet CONNECTING YOU
SERVING RURAL IRELAND WITH HIGH SPEED BROADBAND SINCE 2006
www.lightnet.ie

BARRY O'DONOVAN
NETWORK MANAGER

+353 91 395804 barry@lightnet.ie www.lightnet.ie

East Point Business Park, Loughrea, Co. Galway

From: Enda Broderick <enda@lightnet.ie>
Sent: Friday 6 May 2022 13:02
To: Barry O'Donovan <barry@lightnet.ie>
Subject: FW: 220245 - Telecoms Scoping Exercise

Hi Barry
Would you mind referring to Niamh on this one for me please.
Enda

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Date: Friday, 6 May 2022 at 12:32
To: Enda Broderick <enda.broderick@lightnet.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Enda,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
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Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: Thomas Barry <Tom.Barry@TETRAIRELAND.IE>
Sent: Wednesday 18 May 2022 08:53
To: Niamh McHugh
Subject: FW: EXTERNAL MAIL:- 220245 - Telecoms Scoping Exercise

Niamh,

We anticipate no impact from the development as proposed, can you ensure the development is also reviewed by eir.

Regards,
Tom

From: Derek Rosarius
Sent: Friday 6 May 2022 12:34
To: Thomas Barry
Subject: FW: EXTERNAL MAIL:- 220245 - Telecoms Scoping Exercise

From quarantine

Regards

Derek Rosarius
Derek Rosarius | Compliance Manager |
TETRA Ireland Communications Ltd
Block 43a, 2nd floor, Yeats Way, Parkwest Business Park, Nangor Road, D12
M +353 85 1746044| E derek.rosarius@tetraireland.ie | : www.tetraireland.ie/

From: Niamh McHugh [mailto:nhmchugh@mkoireland.ie]
Sent: Friday 6 May 2022 12:28
To: Thomas Barry
Subject: EXTERNAL MAIL:- 220245 - Telecoms Scoping Exercise

Hi Tom,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

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+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: Alister Cole <Alister.Cole1@three.ie>
Sent: Thursday 19 May 2022 10:28
To: Niamh McHugh
Cc: Sean Kelly; DL Estates ROI
Subject: RE: 220245 - Telecoms Scoping Exercise
Attachments: 3Ireland Potentially affected MW links - Kilbane WF, Co. Clare.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

Hi Niamh,

I have reviewed the study area for the Kilbane Windfarm and 3Ireland have one microwave link that traverses the area and could potentially be affected. I have attached a speadsheet with details for this link. We would require a 30m buffer from link to rotor tip.

For future correspondence could you please Cc Sean Kelly and DL Estates (Cc'd on this response).

Best regards,

Alister

Alister Cole
Transmission Engineer

Mobile: 086 6024556
Email: Alister.Cole1@three.ie

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: 11 May 2022 16:36
To: Alister Cole <Alister.Cole1@three.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Alister,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: Rachel Hennessy <rachel.hennessy@towercom.ie>
Sent: Wednesday 11 May 2022 17:50
To: Niamh McHugh
Subject: RE: 220245 - Telecoms Scoping Exercise

Hi Niamh,

From review of the proposed location of the wind farm detailed below, it would not appear have an impact on Towercom's sites.

Kind regards,
Rachel

Rachel Hennessy

SRF Manager

m: +353 86 843 9587
Website | LinkedIn

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Friday 6 May 2022 12:29
To: Rachel Hennessy <rachel.hennessy@towercom.ie>
Subject: 220245 - Telecoms Scoping Exercise

Hi Rachel,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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If you have any queries or require further information, please do not hesitate to contact me.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

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Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

Niamh McHugh

From: Mark Nolan <Mark.Nolan@virginmedia.ie>
Sent: Thursday 26 May 2022 16:24
To: Niamh McHugh
Cc: Keiran Butler; Cathal O Donnell
Subject: FW: 220245 - Telecoms Scoping Exercise
Attachments: 220245 - Telecoms Scoping Files.zip

Hi Niamh,

Apologies this request was missed originally, Keiran cc will review next week. Is that ok?

Rgds

Mark

Mark Nolan B2B Access Manager
Virgin Media |LEDP, Roxboro Road, Limerick.
D: + 353(0))1 2458480 | M: + 353(0)862315007
mark.nolan@virginmedia.ie | www.virginmedia.ie

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Thursday 26 May 2022 16:17
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Cathal O Donnell <Cathal.ODonnell@virginmedia.ie>
Subject: FW: 220245 - Telecoms Scoping Exercise

Hi Mark, Cathal,

Just wondering if you have gotten a chance to investigate the below? Thanks.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

MKO
Tuam Road, Galway
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From: Niamh McHugh
Sent: Friday 6 May 2022 12:20
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Cathal O Donnell <Cathal.ODonnell@virginmedia.ie>; Liam.Allister@virginmedia.ie
Subject: 220245 - Telecoms Scoping Exercise

Hi all,

MKO are currently carrying out a telecoms scoping exercise as part of a constraints study for a proposed development, located near Kilbane, Co. Clare. The grid reference for the approximate centre of the site are X563783 Y672952 (ITM).

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Kind Regards,
Niamh.

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Graduate Environmental Scientist

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www.mkoireland.ie

Niamh McHugh

From: Keiran Butler <Keiran.Butler@virginmedia.ie>
Sent: Wednesday 17 August 2022 11:17
To: Mark Nolan; Niamh McHugh
Cc: Cathal O Donnell
Subject: RE: 220245 - Telecoms Scoping Exercise

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Niamh

Virgin Media Ireland DO NOT have any radio links in this area

Regards
Keiran Butler

From: Mark Nolan <Mark.Nolan@virginmedia.ie>
Sent: Thursday 26 May 2022 16:24
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Cc: Keiran Butler <Keiran.Butler@virginmedia.ie>; Cathal O Donnell <Cathal.ODonnell@virginmedia.ie>
Subject: FW: 220245 - Telecoms Scoping Exercise

Hi Niamh,

Apologies this request was missed originally, Keiran cc will review next week. Is that ok?

Rgds

Mark

Mark Nolan B2B Access Manager
Virgin Media |LEDP, Roxboro Road, Limerick.
D: + 353(0))1 2458480 | M: + 353(0)862315007
mark.nolan@virginmedia.ie | www.virginmedia.ie

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Thursday 26 May 2022 16:17
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Cathal O Donnell <Cathal.ODonnell@virginmedia.ie>
Subject: FW: 220245 - Telecoms Scoping Exercise

Hi Mark, Cathal,

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From: Niamh McHugh
Sent: Friday 6 May 2022 12:20
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Cathal O Donnell <Cathal.ODonnell@virginmedia.ie>; Liam.Allister@virginmedia.ie
Subject: 220245 - Telecoms Scoping Exercise

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Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Graduate Environmental Scientist

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+353 (0) 91 735611
www.mkoireland.ie

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Ciarán Fitzgerald

From: MACCRIOSTAIL Cathal <Cathal.MacCriostail@IAA.ie>
Sent: Monday 29 August 2022 17:28
To: Niamh McHugh
Cc: Patrick Downey; Ellen Costello; Paul Hennessy; SYMMANS Terry; OLOUGHLIN Charlie; ARTHURS Fergal; ARTHURS Fergal; DOYLE Fergal; Planning
Subject: 220829 Wind farm at Lackareagh, Co. Clare IAA ANSP Response Updated
Attachments: Turbine Layout V2 - 2022.08.29 - 220245.kml; 220816 - Wind Farm at Lackareagh Co_ Clare - IAA ANSP Response.msg

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Niamh,

Thanks for including me in the i[updated correspondence below.

This to be fair is much more positive for the iA ANSP, than I initially assessed, as per previous correspondence (second attachment).

Taking the worst case turbine on a site at 373m AOD (T4 which from the attached kml is the furthest North East proposed turbine) and adding a turbine max height of 180m = 553m AOD elevation.

We apply a Safeguarding Grid elevation of 614m for this particular grid (401m closer to Shannon for some of the other proposed turbines), which should be well within our limits.

What will be required to box this off is an Instrument Flight Procedures (IFP) assessment to confirm no impact on the Shannon Airport IFPs.

There is currently only one company certified to undertake this work for Ireland, ASAP s.r.o: asap@asap.sk

I would expect the cost of this assessment to be c.€5,000.00.

Separately, I'm reasonably confident that the technical systems managed by the IAA ANSP shouldn't be impacted but I'm asking my Technical Services colleagues (copied) to have a look and offer an opinion.

As before, you're welcome to call me if required.

Kind regards,

Cathal
Cathal Mac Criostail
Údarás Eitlíochta na hÉireann / Irish Aviation Authority

The Times Building, 11-12 D'Olier Street, Dublin 2, D02 T449, Ireland
✉ cathal.maccriostail@iaa.ie
☎ +353 (0)1 6031173
+353 (0)86 0527130
www.iaa.ie
Do you *really* need to print this?

From: Niamh McHugh <nhmchugh@mkoireland.ie>
Sent: Monday 29 August 2022 17:02
To: Paul Hennessy <paul.hennessy@shannonairport.ie>
Cc: Patrick Downey <patrick.downey@shannonairport.ie>; MACCRIOSTAIL Cathal <Cathal.MacCriostail@IAA.ie>; Ellen Costello <ecostello@mkoireland.ie>
Subject: RE: Wind farm at Lackareagh, Co. Clare

Hi Paul,

Thanks for getting back to me so quickly.

I can confirm that the maximum possible turbine **tip heights** are all **180m** (I made an error in my original email where I originally stated that the hub height was 180m, but this is actually the overall tip height).

As requested, I have attached a KML file of the **Proposed** turbine locations, which can be dropped into GIS software or Google Earth.

It must be kept in mind that these turbine locations are **proposed** and subject to change, and the file I have sent you includes options for alternative turbine locations (as you can see from my list below).

Please see below the mAOD of each of the turbine locations, to which 180m can be added:

- T1 – 233 mAOD
- T2 – 185 mAOD
- T3 – 202 mAOD
- T4 – 373 mAOD
- T5 - 294 mAOD
- T6 – 199 mAOD
- T7 - 191 mAOD
- T4 option b – 307 mAOD
- T6 option b – 168 mAOD

Please let me know if there is anything further you need from me regarding this project.

Kind Regards,
Niamh.

Niamh McHugh B.Sc (Env)
Environmental Scientist

MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

From: Paul Hennessy <paul.hennessy@shannonairport.ie>
Sent: Friday 19 August 2022 14:14
To: Niamh McHugh <nhmchugh@mkoireland.ie>
Cc: Patrick Downey <patrick.downey@shannonairport.ie>; Cathal MacCriostail -IAA <cathal.maccriostail@iaa.ie>
Subject: Wind farm at Lackareagh, Co. Clare
Importance: High

> You don't often get email from paul.hennessy@shannonairport.ie. Learn why this is important

Hi Niamh,

Can you provide AMSL (above mean sea level) for each turbine location with GPS also?
Confirmation of the max. turbine height (I presume each turbine will be similar) would also be appreciated.
We can then do our Obstacle Limitational Surfaces (OLS) assessment from the airport perspective.

Thanks,

Paul

Paul Hennessy
Safety Compliance & Environment Manager

T +353 (0) 61 712471
M +353 (0) 87 2382453
E paul.hennessy@shannonairport.ie
W shannonairport.ie

Shannon Airport,
Co. Clare, Ireland.
V14 EEO6