



APPENDIX 2-1

SCOPING RESPONSES

Appendix 2-1

Proposed Knockshanvo Wind Farm, Co. Clare

ElAR Scoping Exercise Responses



From: [Matthew Craig](#)
To: [Eoin O'Sullivan](#)
Cc: [Johnny Evans](#); windfarms@rte.ie; [Ellen Costello](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Thursday 29 October 2020 13:51:43
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin,

I would say about 450m to allow for the FM path between Maghera and Woodcock Hill and about 350m for the path between Maghera and Mitchelstown.

Please let us know when you have some turbine locations and we will reassess.

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

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From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: 27 October 2020 09:29
To: Matthew Craig <matthew.craig@2rn.ie>
Cc: Johnny Evans <Johnny.Evans@2rn.ie>; windfarms@rte.ie; Ellen Costello <ecostello@mkoireland.ie>
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Matthew,

Thank you for the coordinates. Is there a standard buffer or set back distance that we need to apply to the links?

Regards

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Matthew Craig <matthew.craig@2rn.ie>

Sent: 23 October 2020 17:47

To: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Cc: Johnny Evans <Johnny.Evans@2rn.ie>; windfarms@rte.ie

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

We have two paths carrying several services that have a serious risk of interference on and near the area that you have highlighted.

1. The DTT services from Maghera to Mitchestown Transposer Site (This passes within less than 200m of the furthest extent the windfarm)
Mitchelstown covers potentially 21155 households.

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Maghera	52.968655°	-8.718119°	546	674
Mitchelstown	52.312990°	-8.306862°	340	

2. The DTT off air services from Maghera to Woodcock Hill

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Maghera	52.968655°	-8.718119°	546	674
Woodcock Hill	52.719770°	-8.692273°	270	

3. The DTT off air Services from Woodcock Hill to Maghera

Site	Lat.	Long.	Ant. Height	Lowest Freq in
------	------	-------	-------------	----------------

			AMSL (m)	band (MHz)
Woodcock Hill	52.719770°	-8.692273°	307	658
Maghera	52.968655°	-8.718119°	407	

4. The 6GHz Microwave link from Woodcock Hill to Maghera (This link is part of a ring that carries all of the national DTT and FM services around the country)

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Maghera	52.968655°	-8.718119°	411 & 421	6093.45
Woodcock Hill	52.719770°	-8.692273°	278 & 285	

5. The FM off air Services between Woodcock Hill and Maghera

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Woodcock Hill	52.719770°	-8.692273°	300	89.4
Maghera	52.968655°	-8.718119°	409	

6. The FM off air Services between Maghera and Woodcock Hill.

Site	Lat.	Long.	Ant. Height AMSL (m)	Lowest Freq in band (MHz)
Maghera	52.968655°	-8.718119°	471	88.8
Woodcock Hill	52.719770°	-8.692273°	270	

There is also a definite risk of interference to the reception of DTT and FM services from Maghera and Woodcock Hill. We would ask that a protocol between the developer and 2rn be signed should the site go ahead.

To give you an indication of the impact to the links I have populated a kmz file with the Fresnel zones of some of the links impacted by this site.

I have also raised the height of you shape file to 180m to simulate the height of the turbines should they be installed. If we have a better idea of the location of the turbines a more detailed assessment can be made.

Please let me know if you require any more information.

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

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From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: 23 October 2020 11:36

To: Johnny Evans <Johnny.Evans@2rn.ie>

Cc: Matthew Craig <matthew.craig@2rn.ie>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Johnny,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if 2rn has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: [Roger Woods](#)
To: [Emily Lynch](#)
Subject: RE: 200513-Knockshanvo Wind Farm- Scoping
Date: Monday 23 January 2023 14:52:52
Attachments: [image002.jpg](#)
[image003.png](#)
[image004.png](#)
[image005.jpg](#)
[image006.jpg](#)

Hi Emily

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



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Tá an ríomhphost seo agus aon iatán a ghabhann leis rúnda agus is leis an duine sin amháin a bhfuil siad seolta chuige/chuici a bhaineann siad. Muna duitse an ríomhphost seo, ní ceart é a léamh ná a scaoileadh chuig aon tríd páirtí. Iarrtar ort teachtaireacht a sheoladh chuig an seoltóir nó chuig info@bai.ie, agus an ríomhphost seo a scrios.

Please consider the environment before printing this email

From: Emily Lynch <elynych@mkoireland.ie>
Sent: Monday 23 January 2023 12:45
To: Roger Woods <rwoods@bai.ie>
Subject: 200513-Knockshanvo Wind Farm- Scoping

Dear Sir/Madam,

Please find attached a scoping document for FuturEnergy Irelands (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare. The proposed site covers an area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number

and layout of turbines will be defined during the upcoming project design stages.

The following application will be seeking determination from An Bord Pleanála in relation to the developments Strategic Infrastructure Development Status. If the Proposed Development does not fall under Section 182A of the Planning and Development Act 2000, an application for planning permission for any relevant works will be made to Clare County Council.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the proposed project.

If you have any queries, please do not hesitate to contact me.

Kind regards,
Emily

Emily Lynch (BSc)

Graduate Environmental Scientist

MKO

Tuam Road, Galway, H91 VW84

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



From: padraig.condon@bt.com
To: [Eoin O'Sullivan](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 23 October 2020 12:32:29
Attachments: [image004.jpg](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)

Hi Eoin,

I can confirm the proposed development will have no impact on the BT 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

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From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: 23 October 2020 11:35

To: Condon,PG,Padraig,NQE32E R <padraig.condon@bt.com>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Padraig,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if BT Communications Ireland has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me,

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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February 27th 2023

COMHAIRLE | CLARE
CONTAE AN CHLÁIR | COUNTY COUNCIL

Ms Emily Lynch (BSc)
MKO
Tuam Road
Galway
H91 VW84

Your ref: 200513

Re Scope 1/2023
Proposed Knockshanvo Wind Farm, Knockshanvo & adjacent townlands Co. Clare
(Applicant FuturEnergy Ireland)

A Chara

Introduction

I refer to the Scoping request and EIA Scoping Document received on the 23rd January 2023. In accordance with the requirements of Article 95 of the Planning and Development Regulations 2001, as amended, please see the following response.

Nature and Extent of Development

It is noted from your submission, and in accordance with the provisions of Section 173 of Part X of the Planning and Development Act 2000, as amended, that the subject scoping report pertains to an area on which the applicant intends to install a wind energy development comprising of:

- Erection of approximately 9no wind turbine (blade tip height, rotor diameter etc. not provided)
- Output >50MW – no further details provided.
- Construction of entrances, site access roads, burrow pit(s) temporary construction compound, and a permanent meteorological mast.
- New sections of turbine access route (locations not determined at this time)
- Construction of electricity substation and wind farm control buildings
- Grid connection to either Ardnacrusha or Drumline – no route options provided at this time.
- Site drainage works.
- Possible recreation and amenities facilities (no details provided at this time)
- The submitted documents do not mention forestry felling. However, large extents of the development location are planted with commercial forestry. Therefore, ancillary forestry felling as part of site development works is assumed.
- No details of the length of planning permission sought or the intended operational life of the proposed windfarm have been provided.

An Roinn Pleanála
An Stiúrthóireacht Forbairt Gheilleagrach

Áras Contae an Chláir, Bóthar Nua, Inis, Co. an Chláir, V95 DXP2

Planning Department
Economic Development Directorate

Áras Contae an Chláir, New Road, Ennis, Co. Clare, V95 DXP2





Image 2. Close up of Wet Heath vegetation: Cladonia lichen and Ling heather dominate.



Image 3. Wet area with abundant *Sphagnum* moss and Cottongrasses and frequent Bog Asphodel.

Legislative Context

Planning and Development Act 2000 (as amended)

Part X Section 171A of the Planning and Development Act 2000 (as amended), states that environmental impact assessment ' means a process —

(a) consisting of —

(i) the preparation of an environmental impact assessment report by the applicant in accordance with this Act and regulations made thereunder,

(ii) the carrying out of consultations in accordance with this Act and regulations made thereunder,

(iii) the examination by the planning authority or the Board, as the case may be, of —

(I) the information contained in the environmental impact assessment report,

(II) any supplementary information provided, where necessary, by the applicant in accordance with *section 172(1D) and (1E)*, and

(III) any relevant information received through the consultations carried out pursuant to *subparagraph (ii)* ,

(iv) the reasoned conclusion by the planning authority or the Board, as the case may be, on the significant effects on the environment of the proposed development, taking into account the results of the examination carried out pursuant to *subparagraph (iii)* and, where appropriate, its own supplementary examination, and

(v) the integration of the reasoned conclusion of the planning authority or the Board, as the case may be, into the decision on the proposed development, and

(b) which includes —

(i) an examination, analysis and evaluation, carried out by the planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that identifies, describes and assesses, in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following:

(I) population and human health;

(II) biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive;

(III) land, soil, water, air and climate;

(IV) material assets, cultural heritage and the landscape;

(V) the interaction between the factors mentioned in *clauses (I) to (IV)* , and

(ii) as regards the factors mentioned in *subparagraph (i)(I) to (V)*, such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the proposed development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development;

Planning and Development Regulations 2001 (as amended)

Information to be contained in the Environment Impact Assessment Report, as set out under Schedule 6 of the Planning and Development Regulations 2001, as amended. The Environmental Impact Statement for the project must contain the information specified in Paragraph 1 of Schedule 6 of the Planning and Development Regulations 2001, as amended and the additional information specified in Paragraph 2 of Schedule 6 by way of explanation or amplification of the information referred to in paragraph 1.

Issues for Consideration

In addition to the issues as set out in the EIA Scoping reports the Planning Authority advises that the following information is considered in the preparation of the EIAR.

Water Quality

- The aquifer vulnerability within the site ranges from Extreme to the highest level of vulnerability where *rock is at or near the surface*. The proposal site accommodates a number of watercourses (and associated designated flood risk areas) which flow generally in a southern direction towards the Truagh River and River Blackwater. As such the EIAR should take into consideration the potential for impacts on water quality both within the site and its wider environs. All stages of the development should be considered in compiling information regarding the interactions of the development with surface water and groundwater. Impacts on downstream receptors shall be identified;

Noise & Vibration

- Acoustics and vibration should be considered in relation to noise and vibration arising from the proposed development. Noise should be assessed in the context of site preparation, ongoing operation and any restoration required. Baseline readings at all noise-sensitive locations (e.g. houses, schools etc) should be obtained. The noise reports should also provide an assessment of the potential impacts on sensitive receptors arising from the activities associated with the proposed borrow pit(s).

Habitat Protection

- The EIAR must fully assess the impact of the proposal on habitats within and surrounding/connected to the site. There is a mix of habitat types within the development site including Conifer plantations (WD4), recently felled woodland (WS5), mixed conifer woodland (WD3), wet heath (HH3), unknown wetland type (CWS), scrub (WS1) and dense bracken (HD1).
- On the eastern side of the development site, there are habitats which are identified as being of international and local importance. The Target Notes for these sites are attached for your consideration.

Hen Harrier

- The hen harrier (*Circus cyaneus*) is a protected raptor, listed in Annex I of the EU Birds Directive and as such, Member States are obligated to protect and conserve the species. It is a noted Ecologically Sensitive Species. While the application footprint for the proposed wind farm is not located within a Special Protection Area (SPA) it does provide or has in the past provided important areas for breeding Hen harrier outside of the six Special Protection areas which have Hen harrier as a qualifying interest. While it is noted that a Hen harrier buffer has been applied as part of the constraints mapping, the EIAR will need to consider the potential loss of foraging habitat due to the proposed development. This must be assessed in the context and backdrop of the National Biodiversity Plan 2017-2021 which aims to achieve no net loss of biodiversity in Ireland. In addition to any direct losses of Hen harrier foraging habitat, the additional small but cumulative losses arising from the removal of woodland, scrub, hedgerows and coniferous forestry plus habitat associated with this afforested area must also be accounted for within the EIAR. It represents a loss of biodiversity across the footprint of the site which is in contravention of Objective 1 of the National Biodiversity Action Plan which seeks to “*Mainstream biodiversity into decision-making across all sectors*” with a shared responsibility for the conservation of biodiversity and the sustainable use of its components is fully recognised and acted upon, by all sectors.

The EIAR must also take into consideration the cumulative impacts of the permitted and constructed windfarms in conjunction with the current project in terms of the following;

- Collision with turbine blades
- Displacement of birds due to loss of suitable feeding and/or breeding/wintering habitat;
- Disturbance within and around the turbine envelope;
- Creating a barrier to dispersal, regular movements or migration

Adjacent Land Uses & Sensitive Receptors

- With respect to the proximity to sensitive receptors (e.g. from shadow flicker, noise etc) the EIAR should take into account permitted dwellings and other sensitive developments that may not as yet be constructed;

Population and Human Health

The 12 O’Clock Hills is a recreational and heritage project near Kilkishen located within the Zone of Influence of the proposed Windfarm. The committee was formed to develop the area as a local amenity consisting of a range of walks and restored Heritage Sites which can be visited along the trails including restored bridges and the partly restored Mary Anne’s stone cottage to mention a few. This group should be added as a key consultee in Appendix 1, included as a constraint as part of the constraints mapping contained in Figure 5-1 Constraints Mapping. Potential for impacts on this key amenity will need to be carefully considered as part of the EIA process.

Visual Amenities

- The visual impact of the windfarm must be assessed, with particular emphasis on views towards the site from the R471 to the south, the R465 to the east, the local roads in the surrounding area, settlements in the area, historical or tourist related features in the area, and from potential views from designated scenic routes (as per the Clare County Development Plan 2017-2023 (as varied) and the Clare County Development Plan 2023-2029 which will come into effect in April 2023). Finally, intervisibility between the proposed wind farm and existing wind farm developments from these views should also be assessed.

Photomontages that are to be provided with the application should be in the context of clear skies. The viewpoint locations as appended to the EIA Scoping documents are considered to provide adequate representation of the views available towards the site.

Cumulative Impacts

- The cumulative impact of the proposed development and the current wind farms in the wider area must be assessed in all assessment chapters contained within the EIAR.

Grid Connection

- Details on the location and design of the proposed grid connection(s) to be included and adequately assessed within the EIAR and the NIS.

Ground Conditions

- A peat stability assessment and landslide susceptibility modelling are recommended on any areas within the site which may have significant level changes. The model should show areas at risk of landslide based on peat depth, slope, altitude, aspect and curvature.

- **Peat Stability and Water Quality**

Notwithstanding the information as submitted by the applicant there are concerns in relation to the potential impact of this development primarily during the construction phase, in particular the geotechnical aspects, road construction, site drainage and the potential run-off to watercourses from construction and excavation together with the storage of peat excavation and storage activities i.e. borrow pits and side casting should it be deemed necessary. The potential for increased run-off from the site due to the increased area of road network and hard stand areas for the associated turbine bases and the water quality of this run-off, especially during the construction phase is a concern. The proposed construction of new access road together with the upgrade of existing tracks/ roads and provision of new site access roads and hardstand areas, underground cable works all has potential for considerable impacts, given the habitats present, the high levels of rainfall which can be experienced in this area and the sensitivity of the landscape on a whole.

- **Peat Stability**

- Peat has a very low compressive strength and very low density. Generally, it has a higher water content and once disturbed a very low shear strength which can enable long run-out landslides to form. In particular, special care is necessary to prevent instability in areas of blanket peat coverage as per the current development site. Sitka spruce has a shallow and plate like root structure. The presence of commercial forestry such as Sitka Spruce which degrades peat, reduces strength and increases the likelihood of slope failure and therefore can increase the risk of peat slippage. The landslide susceptibility of the site was classified by the GSI (2020) as **high to moderately high with some areas indicating a moderately low to low susceptibility**, which is expected given the undulating terrain present.
- In relation to the removal and management of peat on site, it is noted that there is limited reference to same in the scoping submission. The Planning Authority would like to highlight that there would be concerns regarding any *excavate and replace* methodology to be used on this site as this method was used in previous windfarms in the country which lead to a landslide. The machinery used in any windfarm

will apply loads, vibration and excavation and consideration should be given to the movement arising from excavations within the site and the loads, vibrations and the risk of a landslide occurring.

Major Accidents

- The EIAR must include the expected effects from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project.

Traffic and Transportation

- Traffic management information relating to the proposed number, composition, routes etc for traffic associated with the construction, operational and decommissioning phase of the development is required.

Cultural Heritage

Full assessment of the potential for direct and indirect impacts on the cultural heritage assets of the area to be adequately assessed within the EIAR.

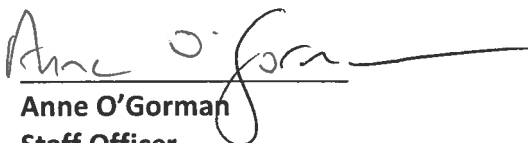
County Level Planning Policy

With respect to the Draft Clare County Development Plan 2023-2029 which is due for adoption on the 9th of March 2023, in line with the requirements of the Department of Environment, Community and Local Government as set out in Circular PL20-13, the current "Clare Wind Energy Strategy 2017-2023" has not been reviewed as part of the preparation of this draft Plan. However, a new Renewable Energy Strategy has been prepared which should be considered as part of the assessment process for this Windfarm. The Renewable Energy Strategy is contained in Volume 5 of the new County Development Plan.

Conclusion

The information set out within this response is provided in good faith and a full assessment of all of the issues would be carried out by the Planning Authority of Clare County Council at planning application stage. You are advised that the Planning Authority is available to provide further feedback on the EIAR scoping process on request.

Mise le meas



Anne O'Gorman
Staff Officer

Planning Department
Economic Development Directorate

From: [Martin O Donoghue](#)
To: [Eoin O'Sullivan](#)
Cc: [Licensing](#)
Subject: RE: [Confidential] 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Wednesday 4 November 2020 11:24:01
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[List Of Operators.xlsx](#)

Hi Eoin,

Apologies for the delay. Please find attached the list of operators within 15 km.
Can you address any future queries to licensing@comreg.ie?

Kind Regards,

Martin O'Donoghue

Innealtóir Speictrim Raidió

Radio Spectrum Engineer

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation

1 Lárcheantar na nDugaí, Sráid na nGildeanna, BÁC 1, Éire, D01 E4X0.
One Dockland Central, Guild Street, Dublin 1, Ireland, D01 E4X0.
Teil | Tel +353 1 8049670
Rphost | Email martin.odonoghue@comreg.ie
Suíomh | Website www.comreg.ie

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Friday 23 October 2020 11:52
To: Martin O Donoghue <Martin.ODonoghue@comreg.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Martin,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map is also attached. I will send the shapefiles under separate cover.

We are consulting with all of the main telecoms operators, but would like to check if there are any other operators in the area – would it be possible to send this information on to me please?

Many thanks,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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



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GDPR information: we have updated our Privacy Notice, which explains what personal information we collect and use about individuals, what we do with it and why. Here is a link to our updated Privacy Notice: <https://www.comreg.ie/privacy/>

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Faisnéis GDPR: tá nuashonrú déanta againn ar ár bhFógra Príobháideachta, a mhíníonn an fhaisnéis phearsanta a bhailimid agus a úsáideannimid faoi dhaoine aonair, an méid a dhéanaimid leis agus cén fáth. Seo nasc chuig ár bhFógra Príobháideachta nuashonraithe: <https://www.comreg.ie/privacy/>

Tá an ríomhphost seo, chomh maith le haon iatáin a bhaineann leis faoi rún agus d'fhéadfadh leis a bheith faoi phribhléid nó cosanta ó aon nochtadh. Is don seolaí(aithe) ainmnithe thuas amháin é. Níl sé ceadaithe go mbeidh rochtain ag éinne eile ar an ríomhphost seo. Más rud é nach tusa an faighteoir ainmnithe, ná cló amach, léigh, cóipeáil, nocht d'éinne nó bain úsáid as an eolas sa ríomhphost seo in aon tslí eile, le do thoil. Más rud é go bhfuair tú an ríomhphost seo trí earráid, dean teagmháil leis an seoltóir láithreach agus scríos an t-ábhar ina iomlán, biodh sé i gcóip leictreonach nó chrua.

User	Contact	Email
Ajisko Ltd		info@aibridges.ie
Eircom Ltd	Seamus	seamus.okeeffe@openeir.ie
Electricity Supply Board	Dermot	dermot.hopkins@esbtelecoms.ie
Enet Telecommunications	Peter	peter.obrien@enet.ie
Imagine Networks Services	Ronnie	ronnie.oneill@imagingroup.ie
Irish Telecom Services		licensing@exigentnetworks.ie
Kirby Group Engineering		support@kirbygroup.com
Meteor Mobile Communication	Paul	Paul.Marron@eir.ie
Ripple Communications Ltd	Denis	denis.herlihy@ripplecom.net
RTE Transmission Network	Johnny	johnny.evans@2rn.ie
Three Ireland	Alister	Alister.Cole1@three.ie
Treaty Radio Ltd	Joe	joen@live95fm.ie
Viatel Ireland Ltd	Conor	Conor.Pendlebury@viatel.com
Virgin Media Ireland Ltd	Mark	mark.nolan@virginmedia.ie
Vodafone Ireland Ltd	Gavin	gavin.byrne@vodafone.com

MKO

Tuam Road

Galway

Ireland

H91VW84

25TH January 2023

Re: Scoping Request for the proposed Knockshanvo Wind Farm near Broadford, 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.forests@agriculture.gov.ie or Web gov.ie - www.gov.ie - www.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 - www.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 \(www.gov.ie\)](http://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 \(www.gov.ie\)](http://gov.ie - Felling Licence Decisions (www.gov.ie))

It is important to note that when applying to a **Local Authority**, or **An Bord Pleanála**, 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 Pleanála, 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



Emily Lynch
Graduate Environment Scientist
MKO Ireland Ltd.
Tuam Road
Galway
H91 VW84

By email 15 February 2023

Without Prejudice

Dear Ms. Lynch,

I refer to your letter and e-mail dated 23 January 2023, in relation to the proposed Knockshanvo Windfarm development located approximately 3km south of Broadford, Co. Clare.

I wish to advise at the outset that any determination in relation to a planning consent is solely a matter for the planning authorities and/or ABP, as appropriate. Therefore, the following observations are made on a non-prejudicial basis, and are not intended to be used to rely on for a prospective planning application, nor are these observations to be relied on in the event of any commercial transaction pertaining to such lands and they are not to be relied on in the event of any contract exchange pertaining to same.

As a matter of practice, the Department of Defence does not provide observations or advice in the scoping process, except where the relevant parties have been directed by a planning authority to seek the Department's views. The following observations are based solely on the material provided by you and should be read in that context only. It should be noted that additional or supplemental observations may be made at the formal planning process.

Having consulted with the subject matter experts in the Irish Air Corps, the Department of Defence wishes to make the following observations:

- The Minister for Defence is responsible for the regulation of military aviation, whereas the Irish Aviation Authority (IAA) is responsible for the safety regulation of civil aviation including aerodromes. The IAA does not have remit for military aviation or installations. Safeguarding of military flight operations and installations is intended to protect both current and future aircraft operations and also to take account of the security requirements associated with some of those operations.



- The Department of Defence cannot support, based on military advises, the erection of wind farms or other tall structures within 3 NM of roads identified as critical low level routes in support of operational requirements. The erection of obstacles within low-level helicopter routes could affect the Irish Air Corps ability to access regional areas and to fulfil its role.
- Single turbines, structures, or turbines delineating the windfarm should be illuminated by Type C, Medium intensity, Fixed Red obstacle lighting with a minimum output of 2,000 candela to be visible in all directions of azimuth and to be operational H24/7 days a week. Obstacle lighting should be incandescent or of a type visible to Night Vision equipment. Obstacle lighting must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum, specifically at or near 850 nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.
- It is noted in the received scoping document that comments received shall set out the proposed scope of work for the Environmental Impact Assessment Report (EIAR). When such data is available and included in an EIAR which depicts the specific locations of the turbines, additional observations may be made by the Department of Defence if applicable.
- Any Irish Air Corps (IAC) requirements are separate to Irish Aviation Authority (IAA) requirements.

Nothing in the above observations shall be taken as a binding response by the Minister for Defence in the event that a planning application is made. The Minister reserves the right to comment on an actual planning application as and when it is submitted in accordance with the provisions of the planning regulatory code.

We would appreciate if you could keep us informed on any progress relating to this proposed development, in particular if this development was to progress to the planning stage.

Yours sincerely

Don Watchorn
Property Management Branch
Department of Defence
Station Road
Newbridge
Co. Kildare W12 AD93



Emily Lynch
MKO
Tuam Road
Galway
H91 VW84
1st February 2023

Re: EIA Scoping Document for the Proposed Knockshanvo Wind Farm in the townland of Knockshanvo and adjacent townlands, Co. Clare

Dear Emily,

The Department of Transport makes the following comments on the Knockshanvo Wind Energy Development located 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 consider 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.

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

From: [John Bagnall](#)
To: [Eoin O'Sullivan](#)
Cc: [Brendan.OFlaherty@eir.ie](#); [MobileNetworksTXN@eir.ie](#)
Subject: Re: FW: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 13 November 2020 09:52:29
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image.png](#)

Hi Eoin,

We have no transmission services that will be affected by these works, the nearest is over 2.8Km away.

Please keep sending future windfarm development analysis and large infrastructure project requests to [MobileNetworksTXN@eir.ie](#) for Eir Mobile (formerly Meteor) network analysis.

image.png



Kind regards,



John Bagnall

Transmission Design & Engineering

M: +353 85 1053746

E: john.bagnall@eir.ie

Address: EirCode - D24 HX03

On Mon, 9 Nov 2020 at 10:24, Eoin O'Sullivan <eosullivan@mkoireland.ie> wrote:

Dear John

Further to my email below, can you please confirm whether Eir has any links in the area as indicated on the attached mapping?

Thank you

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Eoin O'Sullivan

Sent: 23 October 2020 11:35

To: John Bagnall <john.bagnall@eir.ie>

Cc: Brendan.OFlaherty@eir.ie; MobileNetworksTXN@eir.ie

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear John,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Eir has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me,

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: [Peter O`Brien](#)
To: [Eoin O`Sullivan](#)
Cc: [Ellen Costello](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 23 October 2020 15:07:21
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin,

Ideally about 100m,

Thanks,

Peter

From: Eoin O`Sullivan <eosullivan@mkoireland.ie>
Sent: Friday, October 23, 2020 3:06 PM
To: Peter O`Brien <peter.obrien@enet.ie>
Cc: Ellen Costello <ecostello@mkoireland.ie>
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Peter,

Thank you for getting back to me. Is there a standard buffer or set back distance that we need to apply to the links?

Regards

Eoin



Eoin O`Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Peter O`Brien <peter.obrien@enet.ie>
Sent: 23 October 2020 14:54

To: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

We have three links possibly affected:

A-End Coordinates	A-End Antenna Height	B-End Coordinates	B-End Antenna Height	Frequency
52°47'50.00"N 8°39'29.00"W	15m	52°43'5.08"N 8°52'15.12"W	8m	15GHz
52°47'50.00"N 8°39'29.00"W	15m	52°42'32.48"N 8°53'36.76"W	12m	11GHz
52°47'50.00"N 8°39'29.00"W	15m	52°38'22.19"N 8°32'49.95"W	15m	13GHz

Regards,
Peter

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: Friday, October 23, 2020 2:20 PM

To: Peter O'Brien <peter.obrien@enet.ie>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Peter,

Please find attached the KML.

Regards

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Peter O'Brien <peter.obrien@enet.ie>

Sent: 23 October 2020 11:38

To: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

Could you send the area on in a Google Earth kml file so that I can clash against our network?

Regards,
Peter

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: Friday, October 23, 2020 11:37 AM

To: Peter O'Brien <peter.obrien@enet.ie>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Peter

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Airspeed Communications/Enet has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: [Myles Redmond](#)
To: [Eoin O'Sullivan](#)
Cc: [Wilson Dalikeni](#); [Paul McDonagh](#); [Ellen Costello](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Thursday 29 October 2020 10:34:47
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin,

As per the Calculation of the Clearance Zone 3.1.doc by JRC, the buffer clearance zone recommended is the 2nd Fresnel zone clearance plus 150m, a buffer zone to allow for location accuracy of the link ends, turbine construction and ellipsoid conversion anomalies, plus 100m for Turbine micro siting.

The 2nd Fresnel Zone Clearance zone varies with the Frequency but also the link length and the distance of the turbine from Site A and to Site B. For the calculations below, I assumed the link length was 14km, with the turbine at 2km from site A and 12km to site B.

For the Point to Multipoint Polling radio links which operate at ~458MHz, This would be 50 (47.38m) + 150 + 100 = approx. 300m outside the blade tips on both sides of the links.

For the 11GHz link, the 2nd Fresnel zone is approx. 10m (9.669m) so the total would be 250m outside the blade tips on both sides of the links.

Regards,

Myles

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Tuesday 27 October 2020 14:21
To: Redmond. Myles (ESB Networks) <myles.redmond2@esb.ie>
Cc: Dalikeni. Wilson (ESB Networks) <wilson.dalikeni@esb.ie>; McDonagh. Paul (ESB Networks) <paul.mcdonagh@esb.ie>; Ellen Costello <ecostello@mkoireland.ie>
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Myles,

Thank you for the coordinates. We will incorporate onto our constraints map.

Is there a standard ESB buffer or set back distance that we need to apply to the links?

Thank you

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Myles Redmond <myles.redmond2@esb.ie>
Sent: 27 October 2020 13:45
To: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Cc: Wilson Dalikeni <wilson.dalikenii@esb.ie>; Paul McDonagh <paul.mcdonagh@esb.ie>
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

We have a significant amount of point to multipoint radio links and also 2 Point to Point radio links in the vicinity of the proposed Windfarm. I have plotted this links and also provided the site information for each of the links along with the heights and frequencies, please find attached report. If you require further information, please let me know.

As this project progresses, please let us know as early as possible the coordinates of the proposed turbines which will allow us to carry out a more detailed impact analysis.

Regards,

Myles

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Friday 23 October 2020 11:35
To: Redmond. Myles (ESB Networks) <myles.redmond2@esb.ie>; McDonagh. Paul (ESB Networks) <paul.mcdonagh@esb.ie>
Cc: Dalikeni. Wilson (ESB Networks) <wilson.dalikenii@esb.ie>; Hopkins. Dermot (Engineering and Major Projects) <dermot.hopkins@esbtelecoms.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

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Dear Myles,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if ESB Networks has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me,

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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Tá an t-eolas sa ríomhphost seo agus in aon chomhad a ghabhann leis rúnda agus ceaptha le haghaidh úsáide an té nó an aonáin ar seoladh chuige iad agus na húsáide sin amháin.

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Fáilte Ireland
National Tourism Development Authority

EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects



An tÚdarás Náisiúnta Forbartha Turasóireachta
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Contents

1. Introduction	1
2. Background to this Document.....	1
3. Legislation and Statutory Guidance	2
4. Assessing Tourism	4
5. Guiding Principles of EIAR	5
6. Consideration of Competency and Qualifications	5
7. EIAR Requirements.....	5
Population and Human Health	7
Biodiversity	7
Land, Soils and Geology	7
Water	8
Air Quality and Climate	8
Noise and Vibration.....	8
Material Assets; Traffic and Transport.....	8
Cultural Heritage	8
Archaeology	8
Material Assets; Waste Management.....	8
Material Assets	8
Landscape	8
8. Sources of information on Tourism	9
Information available online.....	9

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 breadth and scope of an EIAR is known as 'scoping'. Guidance on this can be found in Section 3.2 of the EPA Guidelines.

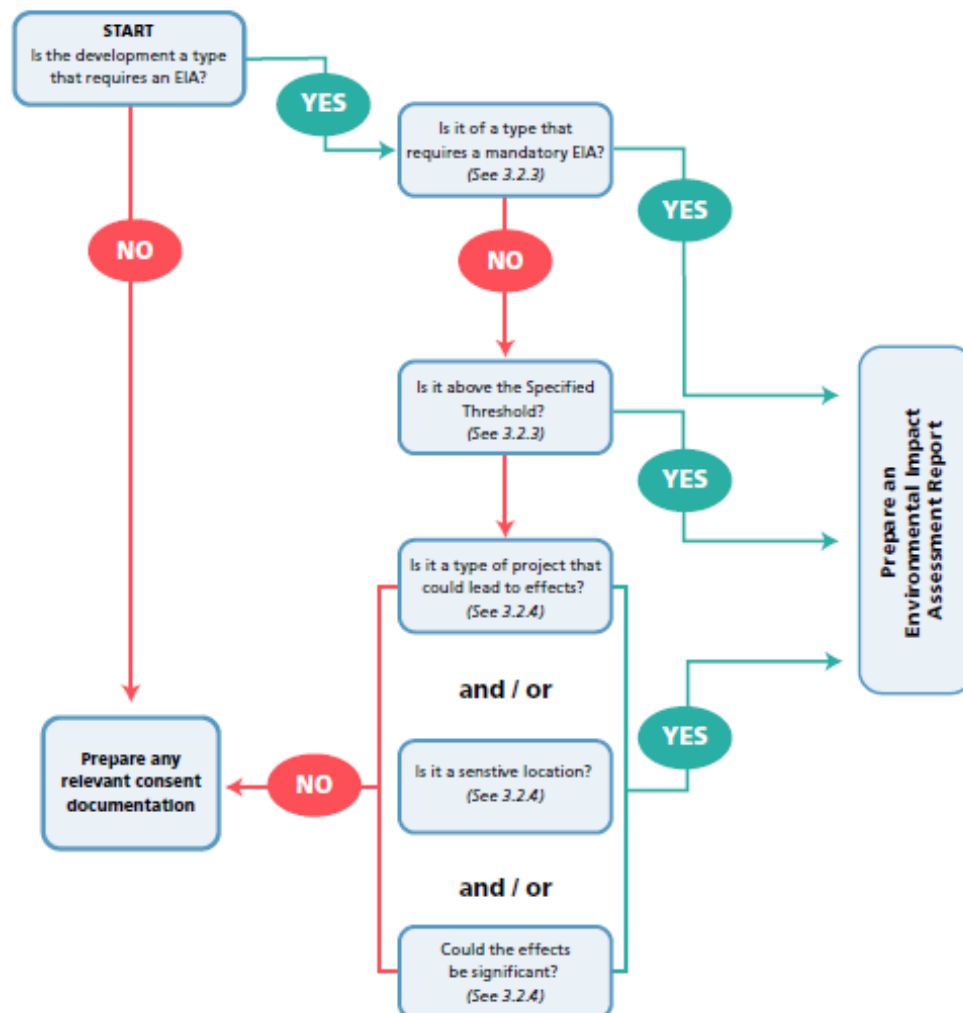
Screening

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.

EIAR Scoping

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 may 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 and 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 (RSEs) 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.



Emily Lynch
MKO
Tuam Road,
Galway, H91 VW84

08 February 2023

Re: EIA Scoping Document for the Proposed Knockshanvo Wind Farm in the townland of Knockshanvo and adjacent townlands, Co. Clare

Your Ref: 200513

Our Ref: 23/21

Dear Emily,

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 23 January 2023, concerning the EIA Scoping Document for the Proposed Knockshanvo Wind Farm in the townland of Knockshanvo and adjacent townlands, 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

Geological Survey Ireland is in partnership with the National Parks and Wildlife Service (NPWS, Department of Housing, Local Government and Heritage), to identify and select important geological and geomorphological sites throughout the country for designation as geological NHAs (Natural Heritage Areas). This is addressed by the Geoheritage Programme of Geological Survey Ireland, under 16 different geological themes, in which the minimum number of scientifically significant sites that best represent the theme are rigorously selected by a panel of theme experts.

County Geological Sites (CGSs), as adopted under the National Heritage Plan, include additional sites that may also be of national importance, but which were not selected as the very best examples for NHA designation. All geological heritage sites identified by Geological Survey Ireland are categorised as CGS pending any further NHA designation by 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 is a CGS on the margins of the proposed wind farm site boundary.**

Ballyvorgal South, Co. Clare (GR 151261, 168493), under IGH theme: IGH 2 Precambrian to Devonian Palaeontology. The Ballyvorgal site is an unusual Irish occurrence of an assemblage of deep-water fossils now found all over the world in rocks of Upper Ordovician age. Ballyvorgal is an important site for understanding and dating the rocks of the Slieve Bernagh Inlier. This site is the type locality for five species of trilobite. The gorse, bramble and other vegetation overgrowing the stream banks means there are currently only three small exposures of the brown mudstones, and no clear section of the trilobite bed. Whilst it would be necessary for some clearance to take place for any future study, if the landowner was to undertake any drainage work in the immediate vicinity of the stream, then a geological investigation should be made at the same time. Equally any major forestry work (felling/gripping/planting) in the adjacent western bank of the stream (not included within the site boundary) should be notified so that investigation may also occur of fresh exposures. Link to Site Report: [CE006](#).



With the current plan, although the Ballyvorgal South CGS is on the margins of the wind farm site boundary, there may be potential impacts on the integrity of current CGSs envisaged by the proposed wind farm development, should these sites not be assessed as constraints. Ideally, the sites should not be damaged or integrity impacted or reduced in any manner due to the proposed development. However, this is not always possible, and in this situation appropriate mitigation measures should be put in place to minimize or mitigate potential impacts. Where the integrity cannot be preserved we would ask that careful consideration be given in design to accommodating preservation of exposures and access to the site during construction to record the exposures to strengthen our knowledge and datasets.

It is quite possible that any groundworks exposing or encountering bedrock could provide important opportunity to record the geology and further our knowledge of this important fossil locality. We would request that both Geological Survey Ireland be notified of any ground works and provided the opportunity to attend the site and record any necessary data.

We would also ask that the design of any future development considers the use of information panels as appropriate to highlight the significance of the impacted CGS. Please contact Clare Glanville (Clare.Glanville@gsi.ie) for further information and possible mitigation measures if applicable.

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 aquifers classed as a 'Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones' and a 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones' underlie the proposed wind farm 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 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. **The Landslide Susceptibility Map indicates there are some areas of Moderately High to High Landside Susceptibility in the wind farm site boundary area.**

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 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. Should any significant bedrock cuttings be created, we would ask that they will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints. In areas where natural exposures are few, or deeply weathered, this measure would permit on-going improvement of geological knowledge of the subsurface and could be included as additional sites of the geoheritage dataset, if appropriate. Alternatively, we ask that a digital photographic record of significant new excavations could be provided. Potential visits from Geological Survey Ireland to personally document exposures could also be arranged.

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.

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/
Geohazards	County Geological Sites as adopted by National Heritage Plan and listed in County Development Plans	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=a30af518e87a4c0b2fbd2aaac3c228
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=afa76a20fc54877843aca1bc075c62b
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=9768f4818b794c16093beb2212a850ce6&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.dcaa.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 protection 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; turf/rough 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 Also, Roadmap for a Policy and Regulatory Framework for Geothermal Energy, November 2020	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		https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=9ee46bee08de41278b90a9916dc0b9e
Marine & Coastal Unit	INFOMAR - Ireland's national marine mapping programme; providing key baseline data for Ireland's	Water	National		https://secure.dcaa.gov.ie/GSI/INFOMAR_VIEWER/
Marine & Coastal Unit	CHERISH - Coastal change project (Climate, Heritage and Environments of Reefs, Islands, and Headlands)	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?teasting=7&nothing=7&lid=EPA:LEMA_Facilities_Extractive_Facilities
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=6304e122b733498b99642707f72754
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=6304e122b733498b99642707f72754
Tellus	urban geochemistry mapping (Dublin SURGE project).	Land & Soils	Regional		https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=6304e122b733498b99642707f72754

Notes:

- 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>
- Please read all disclaimers carefully when using Geological Survey Ireland data
- Geological Survey Ireland and Irish Concrete Federation published guidelines for the treatment of geological heritage in the extractive industry in 2008.



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: 27th February 2023
Our reference: EHIS 2996
Report to: Emily Lynch (BSc), MKO Consulting
Type of Consultation: EIA Scoping ref: **200513**
Proposed development: EIA Scoping for the Proposed Knockshanvo Wind Farm in the townland of Knockshanvo and adjacent townlands, Co. Clare
Applicant: FuturEnergy Ireland (FEI)

Proposed Development: The proposed site covers an area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number and layout of turbines will be refined during the upcoming project design stages.

The following HSE stakeholders were consulted on the scoping on 24th January 2023:

- Emergency Planning – Kay Kennington
- Estates – Helen Maher/Stephen Murphy
- Director of National Health Protection – Eamonn O' Moore
- CHO – Maria Bridgeman

Clarification on the content of this submission should be made, in the first instance, to Gerard Leen, Principal Environmental Health Officer, at Gerry.leen@hse.ie

Gerard Leen
Principal Environmental Health Officer

The Environmental Health Service (EHS) notes the decision to make an application to ABP for a determination on whether the project will be classified as a Strategic Infrastructure Development (SID). It is the experience of the EHS that the public consultation and awareness of projects within the SID process is sometimes not as effective as for non SID projects. It is therefore recommended that a dedicated website is developed that contains all the planning and environmental assessment documents and updates of the project process and timelines for consultation and submissions.

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 applicant should be aware of the proposed development of the Greenway in the area and any opportunities this offers for enhanced connectivity and positive health gain from the proposed development. 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 recommended 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 background 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.

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

From: [MKO-Admin](#)
To: [Emily Lynch](#)
Subject: FW: Proposed Knockshanvo Wind Farm. Knockshanvo, Co. Clare - your ref 200513
Date: Monday 13 February 2023 11:09:48
Attachments: [image001.jpg](#)
[image002.jpg](#)

Kind Regards,
Anna

Anna O'Gara
Administrator

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From: Colin Hedderly <Colin.Hedderly@irishrail.ie>
Sent: 13 February 2023 09:58
To: MKO-Admin <info@mkoireland.ie>
Subject: Proposed Knockshanvo Wind Farm. Knockshanvo, Co. Clare - your ref 200513

FAO Emily Lynch,

Dear Ms Lynch,

I reply to the letter attached of 23 January 2023. This proposed development is remote from the Iarnród Éireann railway network 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 Iarnród 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



*Chonghaille, Baile Átha Cliath 1, Ur. 119571 Ur. CBL: IE 4812851 O,
Iarnród Éireann Irish Rail, a designated activity company, limited by shares, registered in Ireland at Connolly Station, Dublin 1, No.
119571 VAT No. IE 4812851 O*

*In Iarnród Éireann, creideann muid in obair sholúbtha a éascú, agus mar sin, cé go n-oireann sé dom ríomhphost a sheoladh anois, níl
mé ag súil le freagra ná gníomh lasmuigh de d'uaireanta oibre.
At Iarnród Éireann we believe in facilitating flexible working, so while it suits me to email now, I do not expect a response or action
outside of your own working hours.*

From: [Ronnie O'Neill](#)
To: [Eoin O'Sullivan](#)
Cc: [Lorna Brennan](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 23 October 2020 11:51:14
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin ,

This location will not cause an issue for Imagine .

Please note , both Ali & William do not work for us any more .

Rgds,
Ronnie .

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Friday 23 October 2020 11:35
To: Ali Tariq <ali.tariq@imaginegroup.ie>
Cc: William Morgan <william.morgan@imaginegroup.ie>; Ronnie O'Neill <ronnie.oneill@imaginegroup.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Ali,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Imagine Group has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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MKO Ireland
Tuam Road
Galway



Iascach Intíre Éireann
Inland Fisheries Ireland

23.02.2023

Re. Consultation Request for Proposed Development of Knockshanvo Wind Farm, Co. Clare

Dear Emily,

Thank you for your email dated January 24th regarding a request for consultation on the proposed Knocknashanvo windfarm.

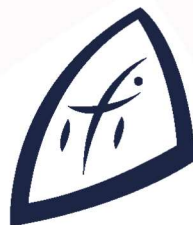
Please find below our initial concerns and recommendations in relation to this development. Our main concerns in relation to this development will be the protection of the aquatic resource and the associated riparian habitat. In particular, IFI are concerned for the protection of streams flowing south from the site into the Blackwater and flowing north into the Owenogarney, both of which are salmonid rivers. These streams provide excellent salmonid spawning habitat with good to high water quality in the most recent EPA Q-value surveys. Current flow regimes must not be changed due to the windfarm construction.

The accompanying map is low on detail making it difficult to assess the potential river crossings and interactions, therefore the comments below are generic in nature and reflect our general concerns in relation to such developments. Additional concerns may be raised when the final EIAR and planning application is available.

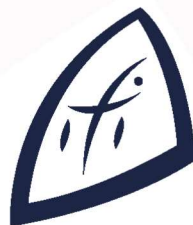
1. All watercourses that will receive drainage from the construction sites of the turbines or the access roads must be assessed in terms of aquatic biodiversity with particular emphasis on fish, the food of fish, spawning grounds and fish habitat in general. In this regard changes to river morphology should be avoided.
2. The aquatic habitat and physical nature of any watercourse affected by the development must be fully described in detail. This includes areas of open water, pool riffle glide sequences, density and types of aquatic vegetation, description of riparian zones to depth of at least 10 metres on either bank etc. The extent of the surveys should be sufficiently long enough so as to be representative of the habitat contained in that watercourse. There should be a particular focus on sections upstream and downstream of any point where an impact on the watercourse is likely to arise. It may be appropriate to survey a tributary stream and the larger, more important streams it joins, and assess the effect the discharge might further have on biodiversity and fisheries in the larger streams. Surveys of unimpacted (control) streams should also be included in the Environmental Impact Assessment.



3. We are concerned about soils, their structure and types around all the turbines, turbine pads, associated access roads and site development. In particular we have concerns about the stability of the soils and the impact that works on both the turbines and access roads may have either directly or by vibration on the stability of the soils. IFI are particularly concerned where it is proposed to construct wind turbines on peat soils especially if these peat soils are located on upland areas. This would appear to be the case in the current application. Extra caution will be required to prevent deleterious discharges to waters.
4. IFI strongly recommends that specialist personnel are employed to assess soil strength and suitability of the ground at each site and along any proposed access road. This is particularly important in relation to peat soils. From our experiences we will have serious difficulties with developments on peat soils where there is excessive slope and/or where the peat depth exceeds one metre. Excessive slopes will be an issue with all wind farm proposals regardless of soil type. The potential for soil movement and landslides should be assessed fully within the EIS.
5. Particular attention should be paid to the hydrology of any site where excavations, including excavations for road construction are being undertaken. It is important that natural flow paths are not interrupted or diverted in such a manner as to give rise to erosion or instability of soils caused by an alteration in water movement either above or below ground.
6. Attention should be paid to drainage during both the construction phase and the operational phase. This includes waters being pumped from foundations or other excavations. It is particularly important during the construction phase that sufficient retention time is available in any settlement pond to ensure no deleterious matter is discharged to waters. We strongly recommend that settlement ponds are maintained, where appropriate, during the operational phase to allow for the adequate settlement of suspended solids and sediments and prevent any deleterious matter from discharging. In constructing and designing silt traps particular attention should be paid to rainfall levels and intensity. The silt traps should be designed to minimise the movement of silt during intense precipitation events where the trap may become hydraulically overloaded. It is essential that they are located with good access to facilitate monitoring sampling and maintenance. A license to discharge to waters may be required from the local authority.
7. We have concerns about the construction of roads as these will tend to provide preferential flow paths for surface waters. Considerable attention must be paid to the interception of surface water flows. Our concerns in relation to deleterious matter have been referred to above, but we also have concerns in relation to the flow patterns and to ensuring that existing flow patterns are maintained both during and after construction. Situations can arise where water transportation is significantly increased in certain watercourses thereby putting additional pressures on these and interfering with the sustained flow of water particularly during dry weather. This should be avoided.
8. Consideration must be given to the disposal of waste materials such that they will not give rise to discharges to waters. In terms of risk, the placing of soils on watercourse-adjacent ground should not be permitted unless the area has been the subject of a risk assessment.



9. This is of particular concern where peat soils are encountered. Furthermore drainage from disturbed and stockpiled soils will have to be considered in advance. It may be necessary to carry out soil stockpiling operations in confined areas only and to ensure vegetation/covering of the soils to prevent wash-out.
10. Details in relation to site offices and the services necessary for the site offices should form part of the EIA. In addition, details relating to operations during the construction phase to contain pollutants should also be considered. It should be noted that cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and should not be permitted to discharge to any waters. Please note that physical pollution of watercourses in terms of dumping of unsuitable gravel material or other construction debris in or stockpiling such materials near watercourses is not acceptable as this will interfere with the aquatic habitat.
11. The use of sedimentary rocks, such as shale, in road construction should be avoided. This type of material has poor tensile strength and is liable to be crushed by heavy vehicles thereby releasing fine sediment materials into the drainage system which are difficult to precipitate and may give rise to water pollution. We recommend that specialist expertise should advise on the type of material required for road construction bearing in mind the pressures that will arise during the construction phase and the necessity to avoid pollution due to fines washing out into the roadside drainage.
12. In relation to watercourse crossings for the road or grid connection please be advised that IFI will require to be consulted well in advance in relation to all watercourse crossings or the use of any temporary diversions. We strongly recommend that these crossings should be kept to a minimum. We will also require that any instream structures or bridge crossings are approved by the IFI. In designing crossings, the length, slope and width of any instream structure will be important. Clear span bridges are the preferred option for all crossings especially in upland areas.
13. Please also note that any instream works or other works which may impact directly on a watercourse should only be carried out during the open season which is from 1st July to 30th of September in each year (so as to avoid impacting on the aquatic habitat during the spawning season.) It would be important that appropriate scheduling of works is allowed for.
14. The EIAR should indicate proposals to monitor the impact on watercourses within the site. In the event that environmental damage to the aquatic habitat and associated riparian zone is caused, the EIAR should indicate the steps that may be taken to rectify any damage to the aquatic habitat including liaison with the appropriate authorities.



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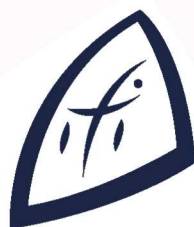
Should works be approved a finalised CEMP must be agreed with Inland Fisheries Ireland before works commence.

Should you require any further information or clarification from IFI, please do not hesitate to contact me.

Yours sincerely,

Jane Gilleran

.....
Jane Gilleran
Fisheries Environmental Officer
Inland Fisheries Ireland - Limerick



Iascach Intíre Éireann
Inland Fisheries Ireland



From: [MACCRIOSTAIL Cathal](#)
Sent: Friday 3 February 2023 12:27
To: Emily Lynch
Cc: [Paul Hennessy](#); [SYMMANS Terry](#); [BYRNE Jonathan](#); [O'KEEFE Martin](#); [OLOUGHLIN Charlie](#); [CORRIGAN Gary](#); [FLYNN Mark](#); [DOYLE Fergal](#); [O'CONNOR Brendan](#); [Planning](#)
Subject: 230203 Knockshanvo Wind Farm - Scoping - IAA ANSP Response
Attachments: 210323 ENVH EIA SD F1 - 2023.01.19 - 200513- Red.pdf; Shannon Airport 200513 2023.01.23.pdf; 20140909-impact-wind-turbines-sur-sensors-guid-v1.2 (2).pdf

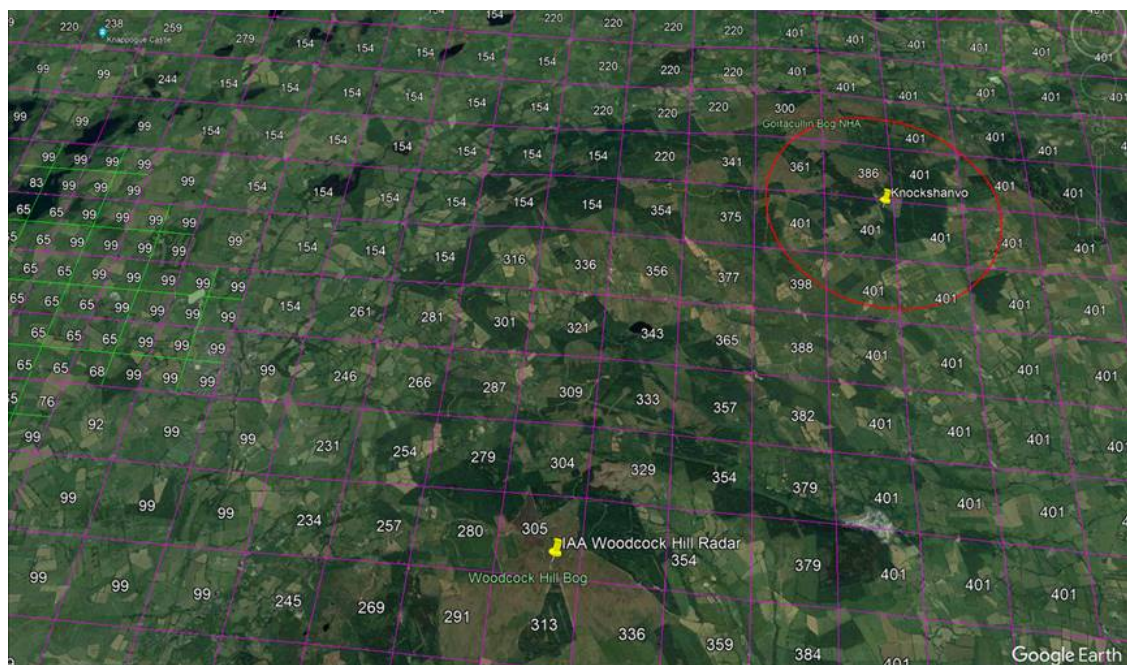
Importance: High

Dear Emily,

Correspondence below and attached refer, with thanks to Paul Hennessy for passing on this.

From an IAA Air Navigation Service Provider (ANSP) perspective, there are areas where we would need more analysis:

1. Instrument Flight Procedures (IFPs) Shannon Airport: the ANSP is required to Safeguard these IFPs See below a Google Earth snapshot:



- The Grids displayed represent the Max Above Mean Sea Level elevation of any new obstacles, above which, an IFP Assessment is needed.
 - In the area around Knockshanvo as per the attached report, there are a range of grid values from 361m to 401m. I understand that the proposed blade-tip heights are c.170m. This equates to a c.370m AMSL elevation based on a general site elevation of 200m. Added to this any potential craneage used during construction will need a full IFP Assessment.
2. Woodcock Hill Radar: Surveillance effect (IAA ANSP Surveillance Domain copied). Generally any significant obstacle within 16km of this facility may have impact. In the case of this proposed Wind farm, this is highly likely and will need to be assessed with mitigations proposed. Please note that previous experience has shown that mitigations suggested for similar developments have been prohibitively costly for the ANSP and ultimately don't guarantee that the surveillance service is not affected. Third attachment is the EUROCONTROL Guidelines on How to Assess the Potential Impact of Wind Turbines Surveillance Sensors
 3. Navigation Aids (NAVAIDS): This will need to be considered by my NAVAID colleagues (copied), although generally there should not be an impact. There is however another aspect to this. On a 6-monthly basis, these NAVAIDS have to be flight calibrated. The calibration aircraft flies in this area at low altitudes to achieve this and a report from this company (FCSL) may be required also.

Please feel free to revert by e-mail or phone as needed with any queries or clarifications needed.

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
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From: Emily Lynch <elynch@mkofireland.ie>
Sent: 23 January 2023 15:37
To: Comments <comments@shannonairport.ie>
Subject: [External] 200513-Knockshanvo Wind Farm- Scoping

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Dear Sir/Madam,

Please find attached a scoping document for FuturEnergy Irelands (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare. The proposed site covers an area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number and layout of turbines will be defined during the upcoming project design stages.

The following application will be seeking determination from An Bord Pleanála in relation to the developments Strategic Infrastructure Development Status. If the Proposed Development does not fall under Section 182A of the Planning and Development Act 2000, an application for planning permission for any relevant works will be made to Clare County Council.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the proposed project. If you have any queries, please do not hesitate to contact me.

Kind regards,
Emily

Emily Lynch (BSc)
Graduate Environmental Scientist
MKO
Tuam Road, Galway, H91 VW84
Offices in Galway and Dublin
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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

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

DOCUMENT IDENTIFIER : EUROCONTROL-GUID-0130

Edition Number	:	1.2
Edition Date	:	09/09/2014
Status	:	Released Version
Intended for	:	General Public
Category	:	EUROCONTROL Guidelines

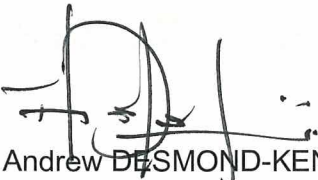



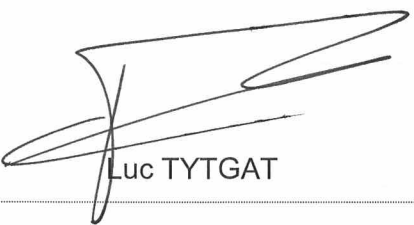

DOCUMENT CHARACTERISTICS

TITLE			
EUROCONTROL Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors			
Publications Reference:			GUID-0130
		ISBN Number:	978-2-87497-043-6
Document Identifier		Edition Number:	1.2
EUROCONTROL-GUID-0130		Edition Date:	09/09/2014
Abstract			
<p>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.</p> <p>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.</p> <p>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.</p>			
Keywords			
Wind Radar Engineering MLAT	Turbine SSR Operational ANSP	Surveillance PSR ADS-B	Sensor Mode S WAM
Contact Person(s)		Tel	Unit
Michel BORELY		+32 2 72 91161	DPS/TEC

STATUS, AUDIENCE AND ACCESSIBILITY					
Status		Intended for		Accessible via	
Working Draft	<input type="checkbox"/>	General Public	<input checked="" type="checkbox"/>	Intranet	<input type="checkbox"/>
Draft	<input type="checkbox"/>	EUROCONTROL	<input type="checkbox"/>	Extranet	<input type="checkbox"/>
Proposed Issue	<input type="checkbox"/>	Restricted	<input type="checkbox"/>	Internet (www.eurocontrol.int)	<input checked="" type="checkbox"/>
Released Issue	<input checked="" type="checkbox"/>				

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	4/10/14
Director General	 Frank BRENNER	7/10/14



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	16
		Section 2.10 added	21
		Section 3.2 CFAR text elaborated	23
		Section 4.3.1 modified	33 and 34
		Section 4.4.12 added	38
		Section 4.6.1 modified	39
		Table 3 in 4.6.2 modified	41
		Annex C correction to footnote references	56

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CONTENTS

DOCUMENT CHARACTERISTICS	2
DOCUMENT APPROVAL	3
DOCUMENT CHANGE RECORD	4
CONTENTS	5
LIST OF FIGURES	8
LIST OF TABLES	9
EXECUTIVE SUMMARY	10
1. Introduction	11
1.1 Background	11
1.2 EUROCONTROL Guidelines	11
1.3 Objective of this document.....	12
1.4 Designing the Assessment Methodology	13
1.5 Application of the assessment methodology	15
1.6 Structure of the document.....	15
1.7 Use of this document	16
1.8 Conventions	16
1.9 Relationship with ICAO Doc 015	16
2. Impact assessment process.....	17
2.1 Wind energy project description	19
2.2 Surveillance sensor description.....	19
2.3 Operational description	19
2.4 Engineering impact on surveillance	19
2.5 Operational impact on surveillance	20
2.6 Possible mitigations.....	20
2.7 Project re-design	20
2.8 Surveillance engineering modification	21
2.9 Operational modification	21
2.10 Feedback to surveillance sensor manufacturers	21
3. Input information	22
3.1 Wind energy project description	22
3.2 Surveillance sensor description.....	23
3.3 Operational description	26

4. Radar impact assessment	27
4.1 Radar line of sight assessment.....	27
4.2 Top-level engineering assessment	27
4.2.1 Primary Surveillance Radar	28
4.2.2 Secondary Surveillance Radar (classical, monopulse and Mode S).....	31
4.2.3 Radar Far-Field Monitors (FFM).....	31
4.2.4 Radar data sharing	32
4.2.5 Cumulative impact.....	32
4.3 Simple engineering assessment for PSR	33
4.3.1 PSR Probability of detection.....	33
4.3.2 PSR false target reports (due to echoes from wind turbines)	34
4.3.3 PSR processing overload	34
4.4 Detailed engineering assessment for PSR and SSR.....	35
4.4.1 Generalities	35
4.4.2 PSR shadowing	35
4.4.3 PSR false target reports (due to echoes caused by wind turbines).....	35
4.4.4 PSR false target reports (due to secondary or indirect reflections from the wind turbines).....	36
4.4.5 PSR range and azimuth errors.....	36
4.4.6 PSR processing overload	36
4.4.7 PSR raised thresholds	37
4.4.8 PSR receiver saturation	37
4.4.9 SSR Probability of detection and probability of Mode A and Mode C code detection	37
4.4.10 SSR false target reports	37
4.4.11 SSR 2D position accuracy	37
4.4.12 Other PSR detection losses.....	38
4.5 Operational assessment	38
4.5.1 Generalities	38
4.5.2 PSR Probability of detection.....	38
4.5.3 PSR false target reports	38
4.5.4 PSR 2D position accuracy	38
4.5.5 PSR plot/track processing capacity	38
4.5.6 SSR probability of detection	38
4.5.7 SSR false target reports	38
4.5.8 SSR 2D position accuracy	38
4.6 Possible mitigations.....	39
4.6.1 Generalities	39
4.6.2 Mitigation option table	40
5. References and Acronyms	42
5.1 Referenced documents.....	42
5.2 List of acronyms.....	43
ANNEX A PSR reduction of probability of detection – Assessment of Region 1 dimensions	45
A.1 Introduction	45

A.2 Shadow Height	45
A.3 Shadow Width.....	47
ANNEX B PSR Equations (no reflection).....	50
B.1 Basic Radar Equation	50
B.2 Further Processing	50
ANNEX C PSR Equations (reflection).....	51
C.1 Radar Equations in case of reflected signals.....	51
C.2 Further Processing	56
ANNEX D Justification of the recommended SSR protection range	58
D.1 Introduction	58
D.2 2D position detection and Mode A/Mode C code detection	58
D.3 Multiple target reports.....	61
D.4 Azimuth accuracy.....	61
ANNEX E Wind energy project description pro-forma.....	63

LIST OF FIGURES

Figure 1: Impact Assessment Process.....	18
Figure 2: Wind turbine diagram	23
Figure 3: Primary Surveillance Radar diagram.....	25
Figure 4: Primary and secondary co-mounted radar antennas	26
Figure 5: Example of zones at 180 m above a real radar	29
Figure 6: Example of zones at 320 m above a real radar	30
Figure 7: Recommended protection zone for far-field monitor	32
Figure 8: Shadow region behind a wind turbine and raised threshold region around and above a wind turbine	33
Figure 9: Top-view of wind turbine shadow	45
Figure 10: Side-view of wind turbine shadow.....	45
Figure 11: Principle of shadow height calculation	46
Figure 12: Diagram of a cross-section of a shadow	47
Figure 13: Path difference geometry for shadow width calculation.....	48
Figure 14: Half-shadow width as a function of D.....	49
Figure 15: PSR reflection case 1.....	51
Figure 16: PSR reflection case 2.....	52
Figure 17: PSR reflection case 3.....	53
Figure 18: PSR reflection case 4.....	54
Figure 19: Example of calculation of aircraft locations where reflection can occur (horizontal).....	55
Figure 20: Example of calculation of aircraft locations where reflection can occur (vertical).....	55
Figure 21: Direct and reflected signal paths	59
Figure 22: SSR downlink reflection	62

Table 1: PSR recommended ranges	28
Table 2: SSR recommended ranges	31
Table 3: Mitigation options.....	41
Table 4: Acronym list.....	44

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 maturity¹, 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 Cossec2 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.

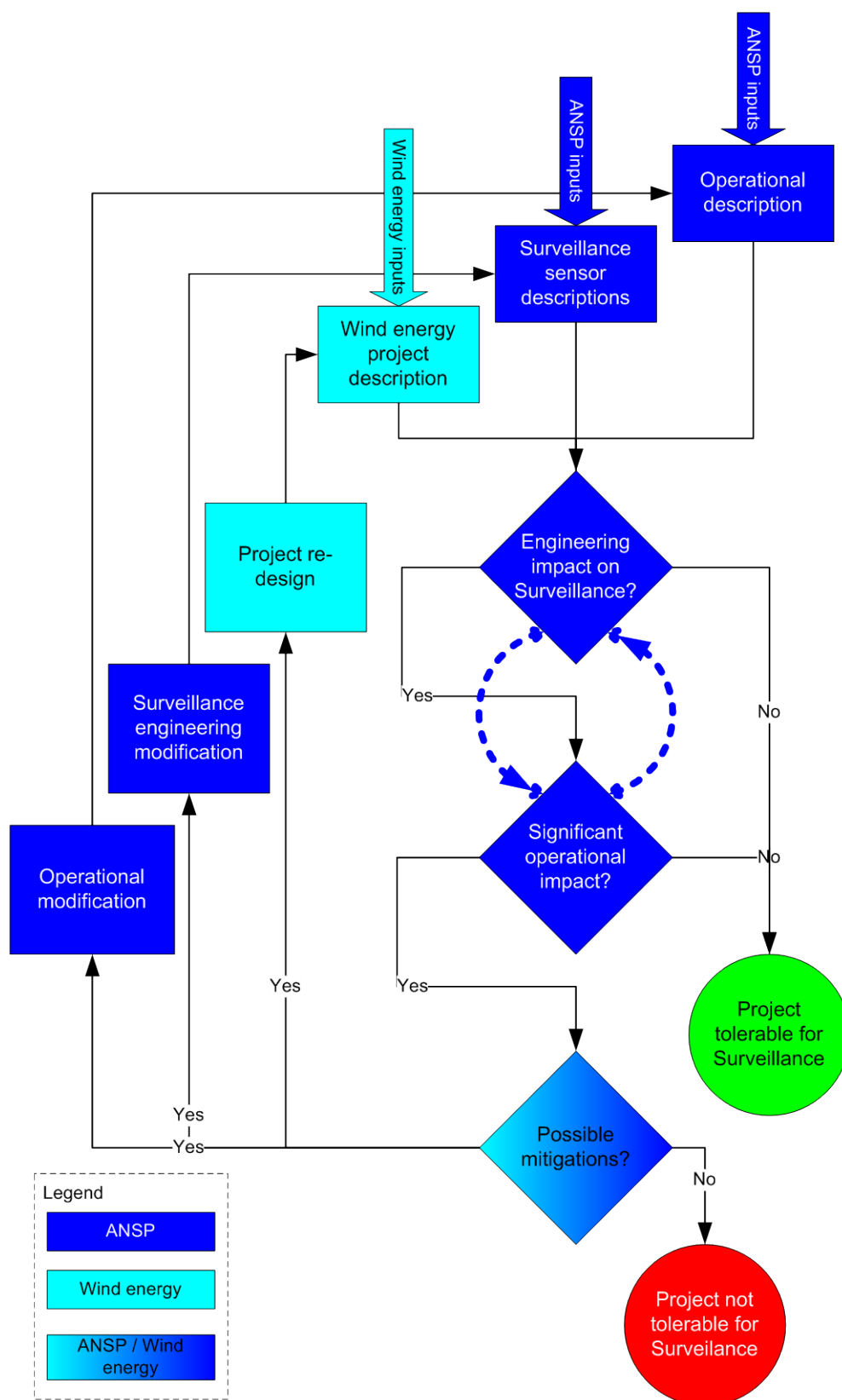


Figure 1: Impact Assessment Process

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 manufacturers

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

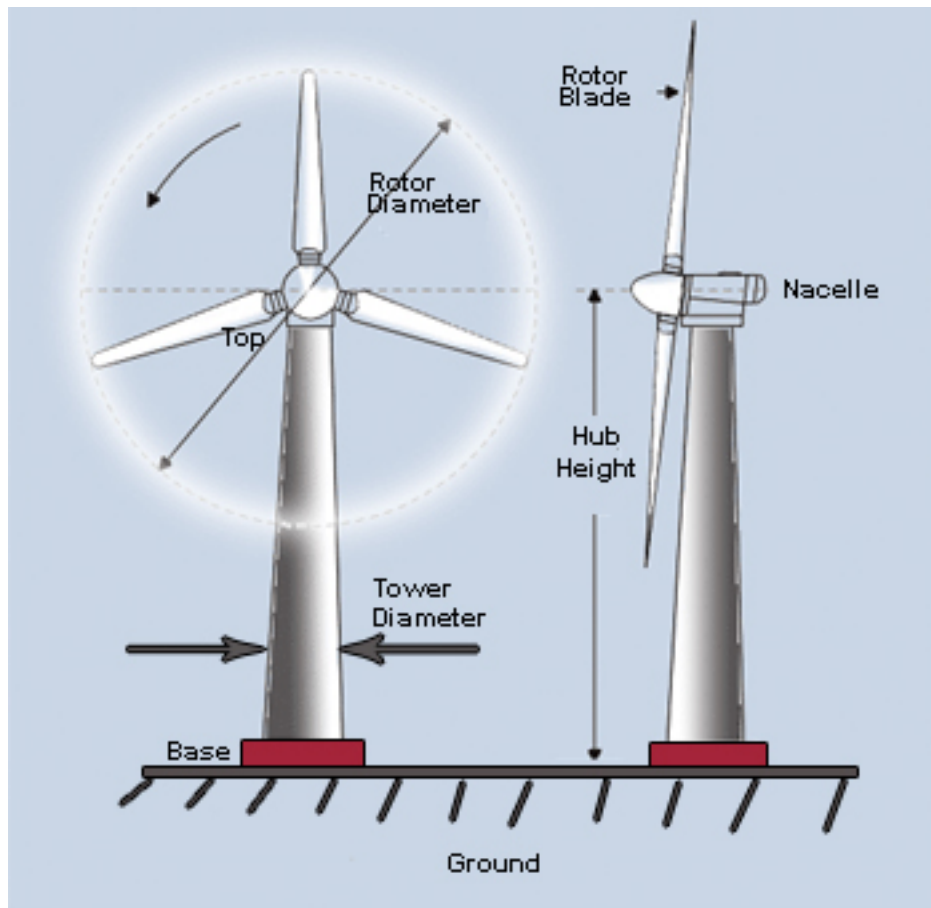


Illustration identifying wind turbine components and key parameters

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.

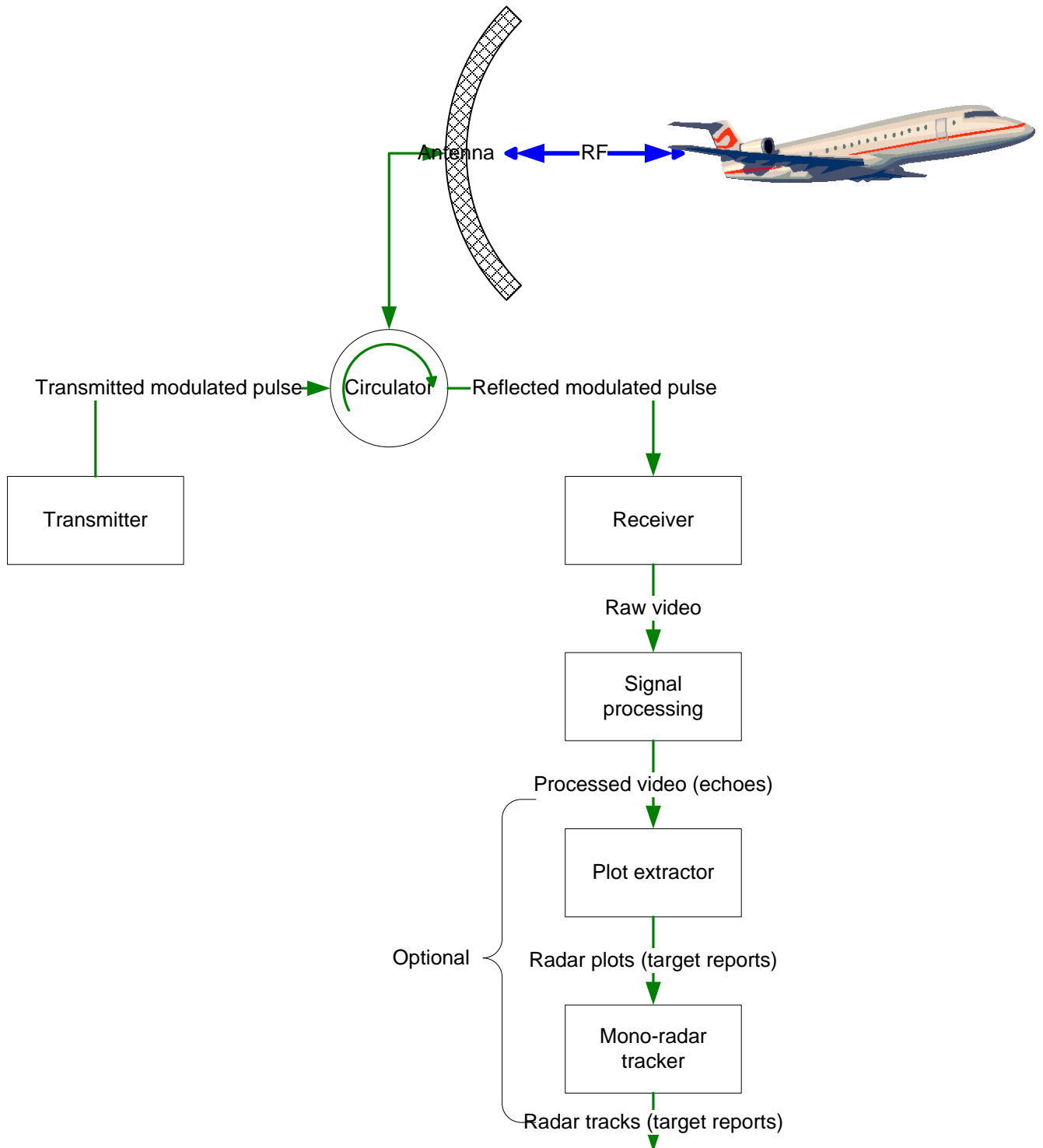


Figure 3: Primary Surveillance Radar diagram

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 service² (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.

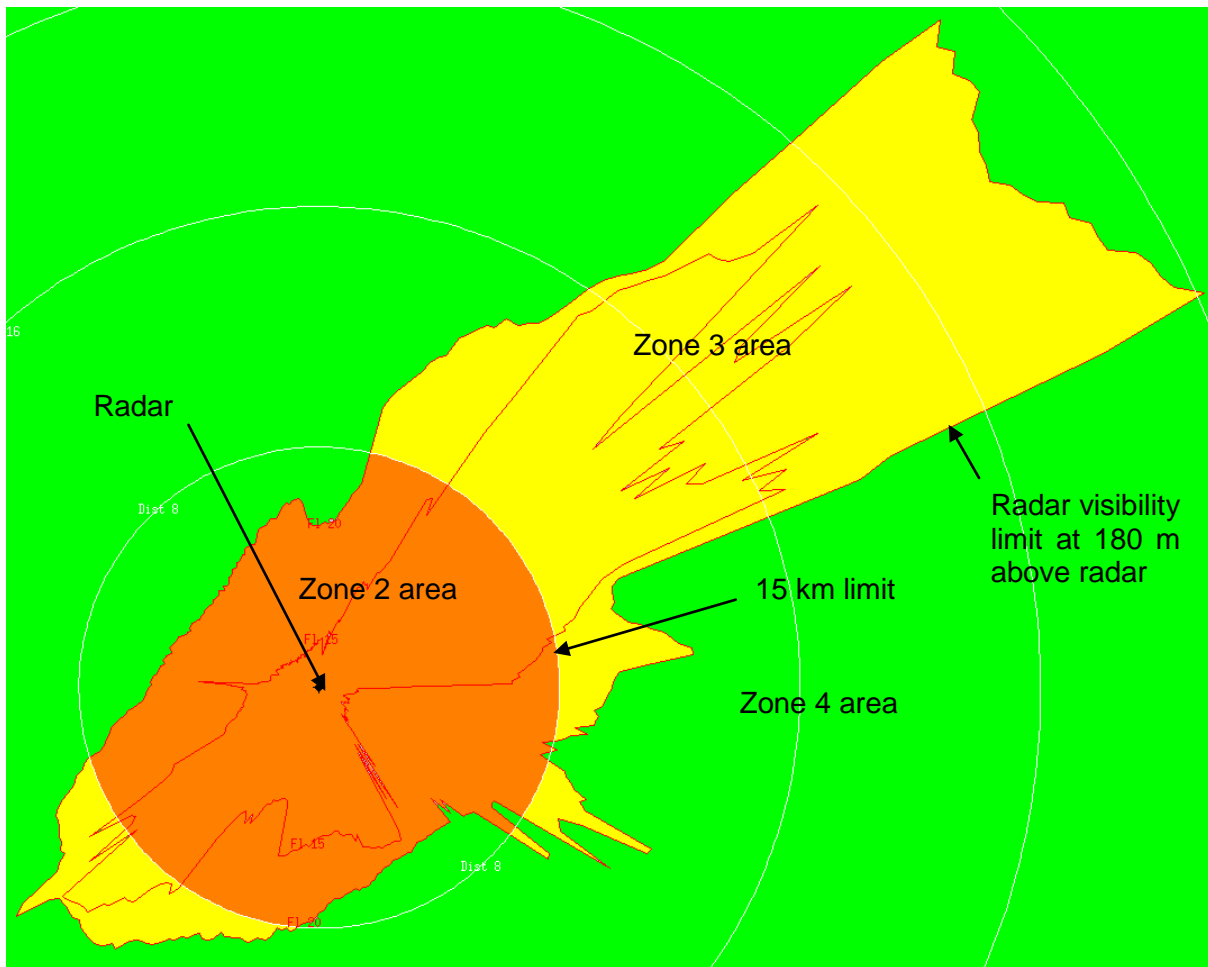


Figure 5: Example of zones at 180 m above a real radar

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.

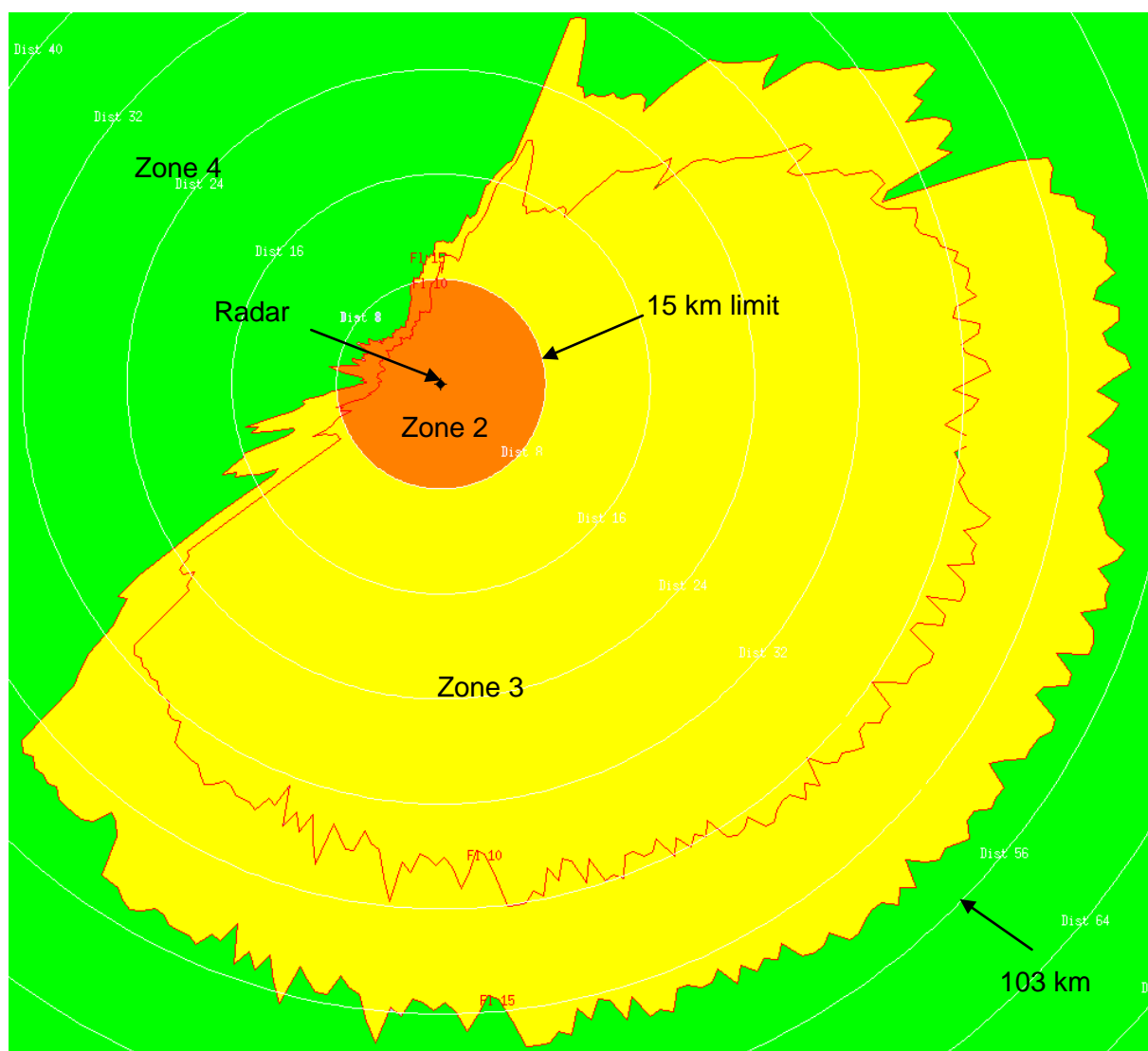


Figure 6: Example of zones at 320 m above a real radar

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.

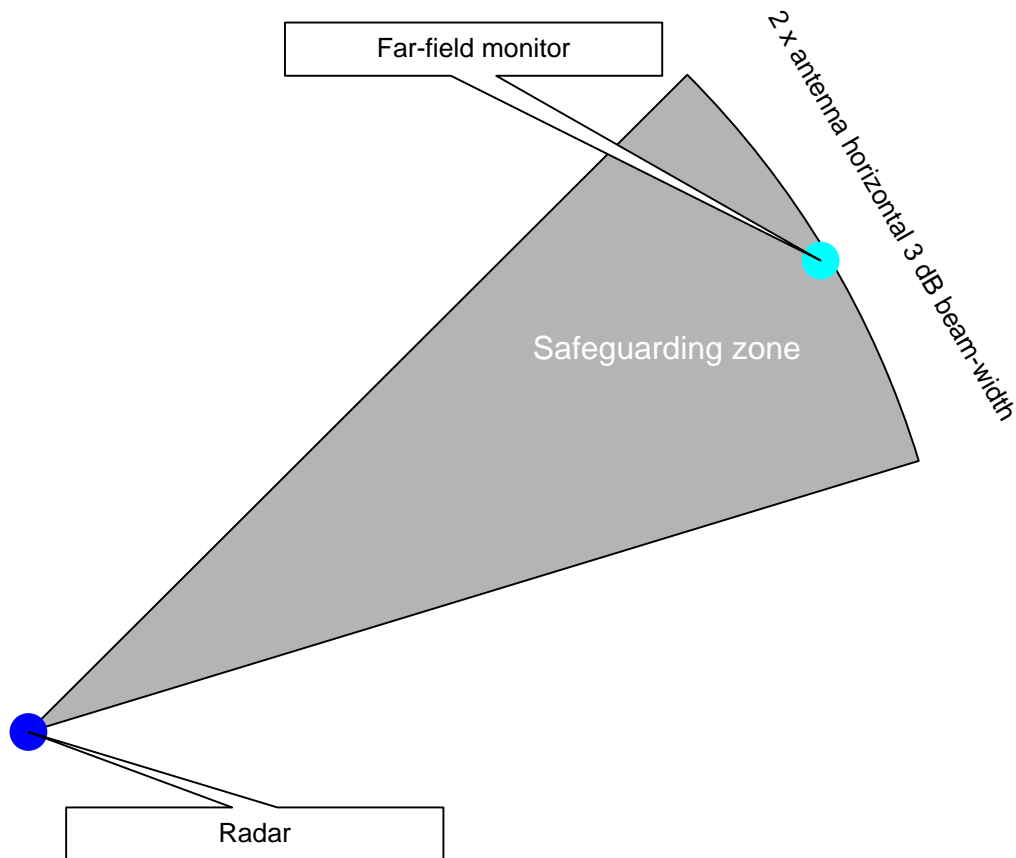


Figure 7: Recommended protection zone for far-field monitor

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.

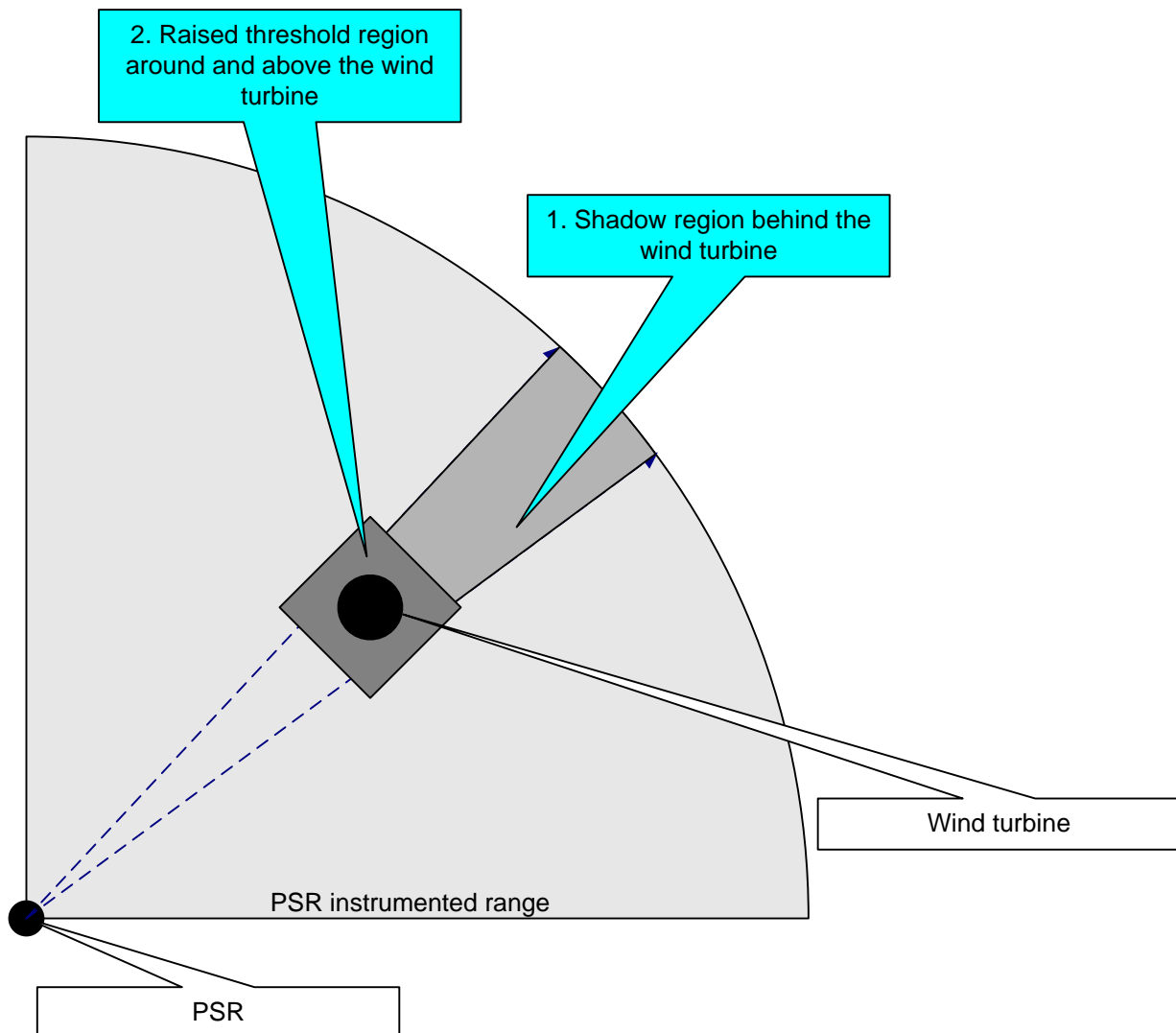


Figure 8: Shadow region behind a wind turbine and raised threshold region around and above a wind turbine

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 turbine³ is typically one to sixteen⁴ 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	
Non cooperative surveillance sensor	Blank PSR transmission in an azimuth sector		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			May need to be combined with in-fill PSR/MSPSR in blanked sector(s).
	Suppress PSR radar returns in range-azimuth sector		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			May need to be combined with in-fill PSR/MSPSR in blanked sector(s).
	Improve PSR anti wind turbine clutter capabilities		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
	Strengthen primary track initiation conditions		<input checked="" type="checkbox"/>					At mono-radar tracker or at multi-sensor tracker level.
	Adapt PSR overload prevention facilities				<input checked="" type="checkbox"/>			
	Upgrade PSR processing capabilities				<input checked="" type="checkbox"/>			
	Upgrade PSR output interface capabilities				<input checked="" type="checkbox"/>			
	In-fill PSR (inc. 3D PSR)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
	In-fill MSPSR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				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	
Cooperative surveillance system	Blank SSR transmission in an azimuth sector						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> May need to be combined with in-fill SSR/WAM/ADS-B in blanked sector(s)
	In-fill SSR					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	In-fill WAM ⁵					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	In-fill ADS-B					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Provided that aircraft are ADS-B equipped
	Improve SSR anti-reflection capabilities						<input checked="" type="checkbox"/>	At SSR level and/or at multi-sensor level
Operation	Move ATC route	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
	Change airspace classification or apply MTZ ⁶	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Move wind turbines out of critical areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Change wind farm layout	<input checked="" type="checkbox"/>						Affects Region 2 only, see § 4.3.1.
	Reduce number of wind turbines in radar line of sight				<input checked="" type="checkbox"/>			
	Reduce wind turbine radar reflectivity		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	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 options⁵ 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:

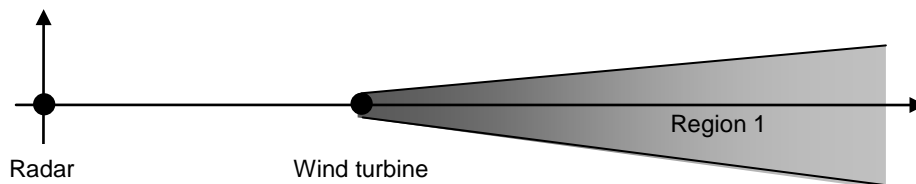


Figure 9: Top-view of wind turbine shadow

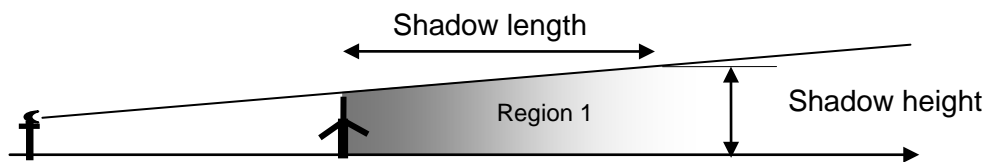


Figure 10: Side-view of wind turbine shadow

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.

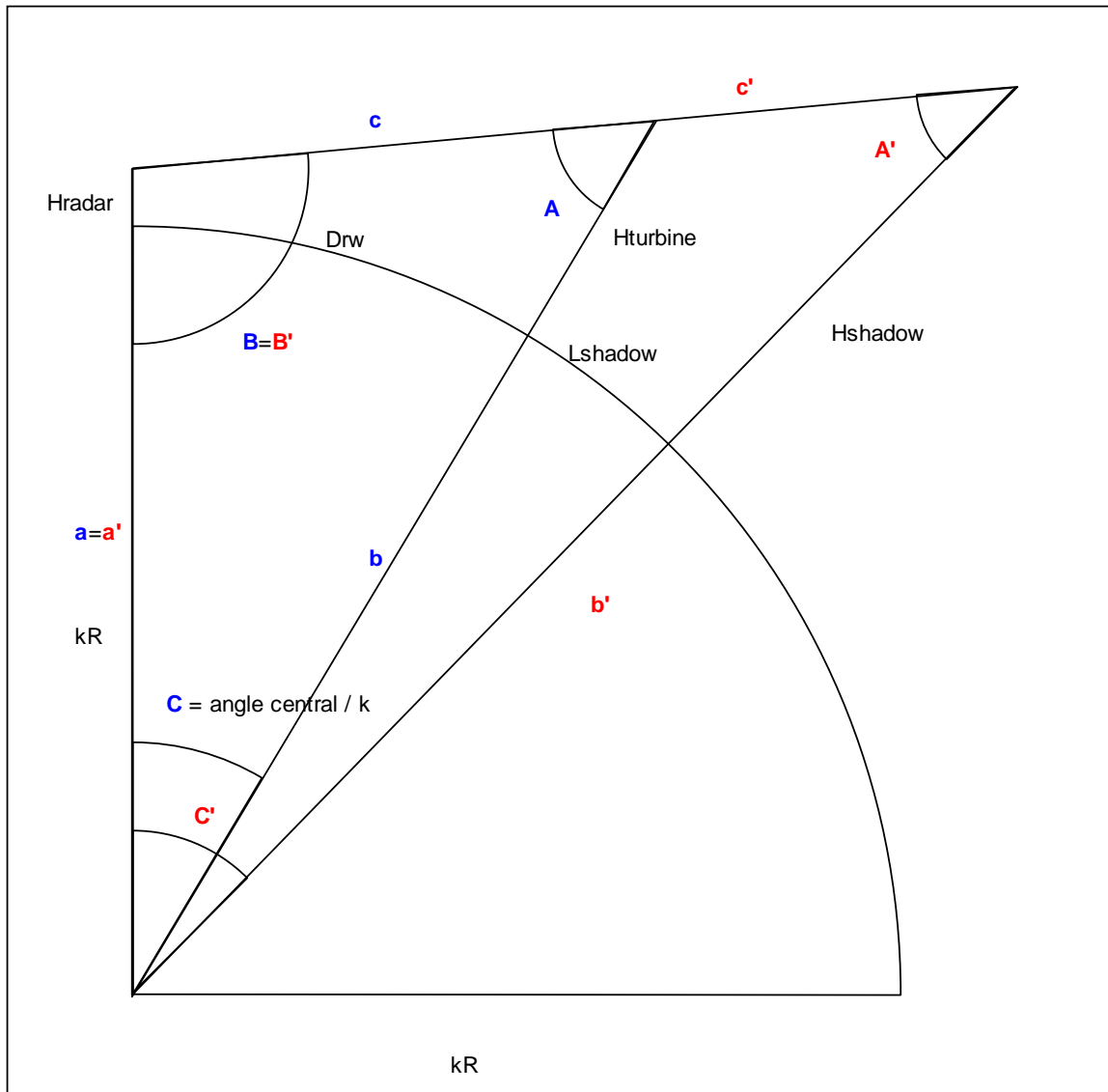


Figure 11: Principle of shadow height calculation

Taking into account that:

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

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

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

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

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

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

$$B' = B$$

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

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

Where D_{rw} is the distance between the radar and the wind turbine, R is the radius of the earth and L_{shadow} is the length of the shadow zone.

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

$$H_{shadow} = b' - k \cdot R \quad \text{Equation 1}$$

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.

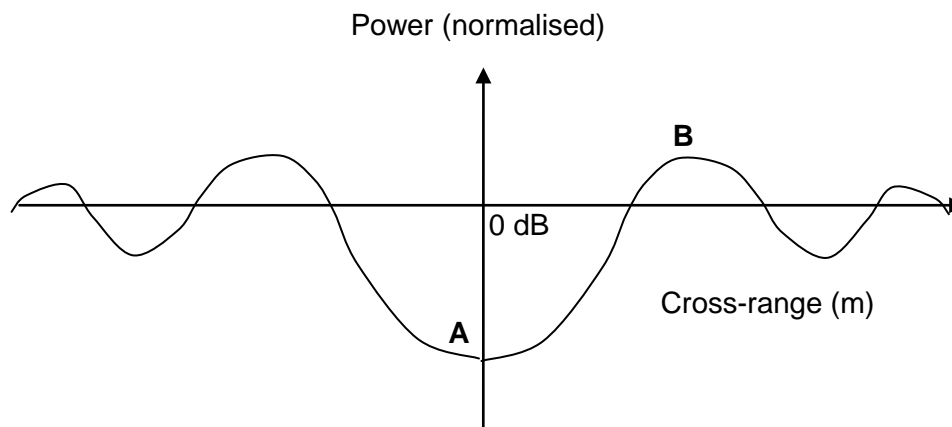


Figure 12: Diagram of a cross-section of a shadow

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 = $\lambda/2$, they combine constructively to give a maxima. Note that successive maxima are odd multiples of $\lambda/2$, where path difference = $(2n+1)\lambda/2$. 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:

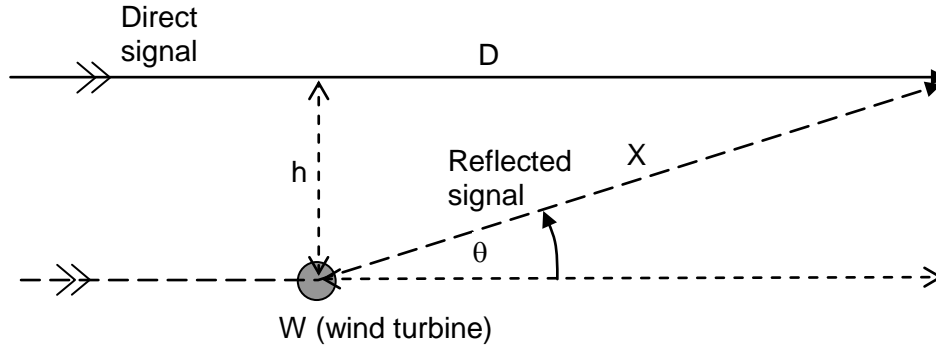


Figure 13: Path difference geometry for shadow width calculation

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

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

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 = $\lambda/2$ and solving for the half-width, h:

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

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

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

$$h = \sqrt{\lambda \cdot D} \quad \text{Equation 5}$$

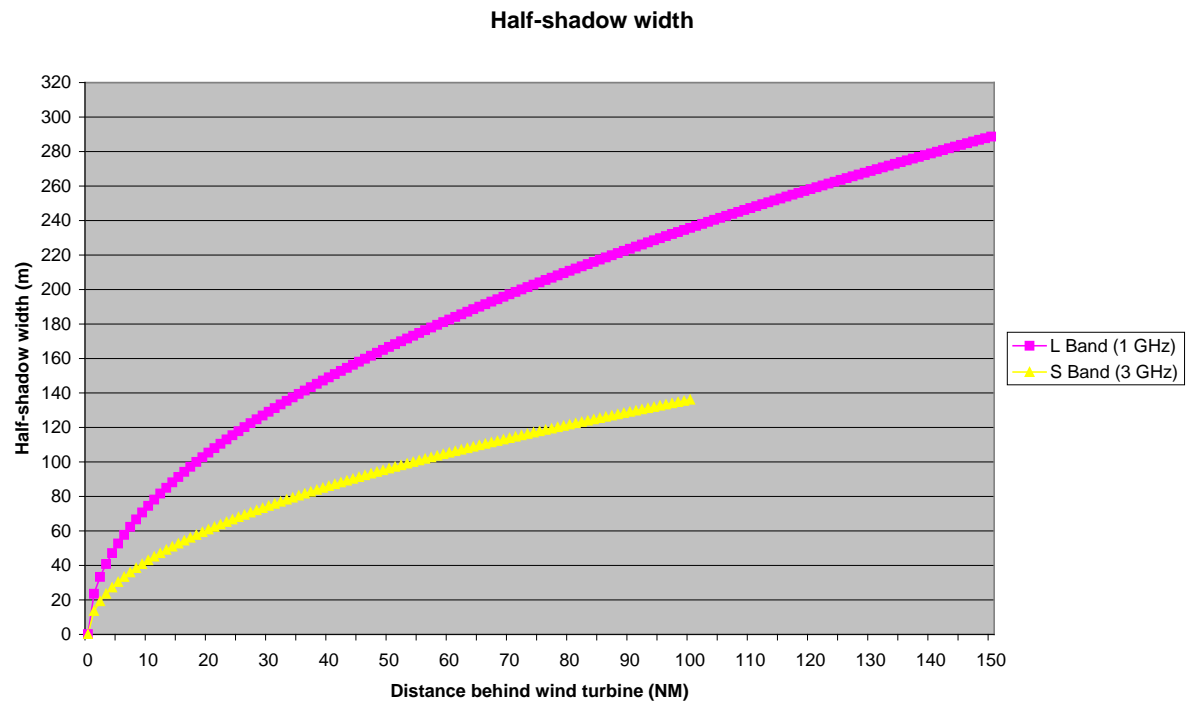


Figure 14: Half-shadow width as a function of D

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:

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

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.

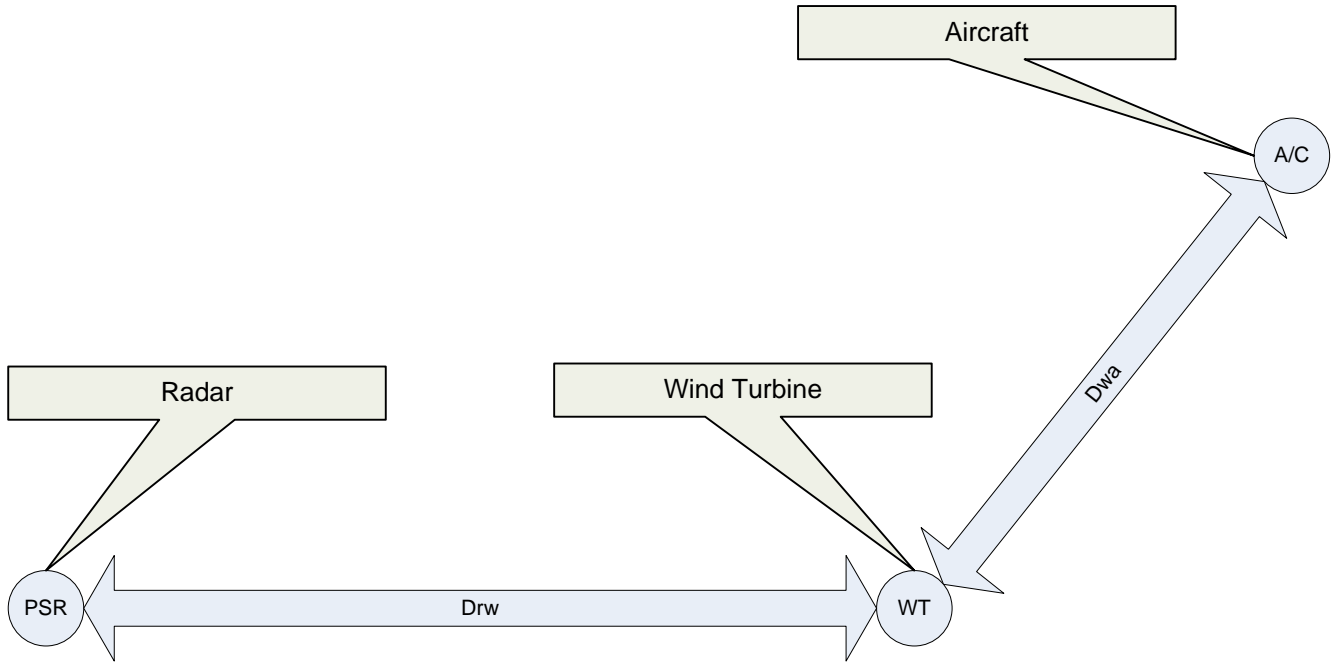


Figure 15: PSR reflection case 1

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:

$$P_{ref} = \frac{\sigma_a \cdot \sigma_{w1} \cdot \sigma_{w2} \cdot F_{rw}^2 \cdot F_{wa}^2 \cdot G_t \cdot P_t \cdot G_r \cdot \lambda^2}{(4\pi)^5 \cdot D_{rw}^4 \cdot D_{wa}^4} \quad \text{Equation 7}$$

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.

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

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

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

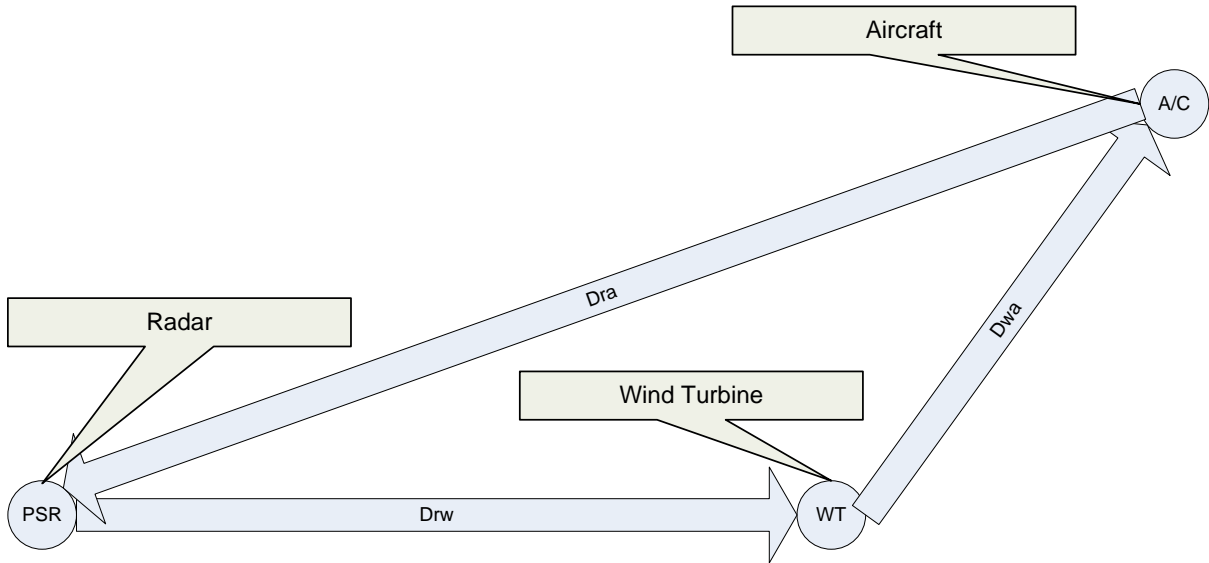


Figure 16: PSR reflection case 2

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:

$$P_{ref} = \frac{\sigma_{a2} \cdot \sigma_{w1} \cdot F_{rw} \cdot F_{wa} \cdot F_{ar} \cdot G_t \cdot P_t \cdot G_{rs} \cdot \lambda^2}{(4\pi)^4 \cdot D_{rw}^2 \cdot D_{wa}^2 \cdot D_{ra}^2} \quad \text{Equation 10}$$

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.

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

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

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

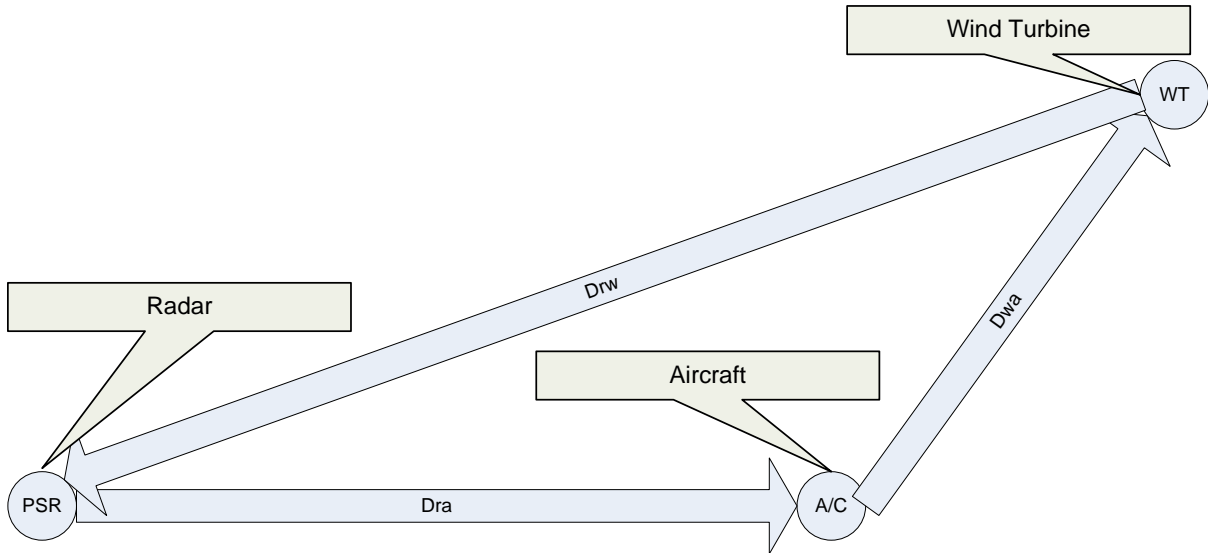


Figure 17: PSR reflection case 3

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:

$$P_{ref} = \frac{\sigma_{a1} \cdot \sigma_{w2} \cdot F_{ra} \cdot F_{aw} \cdot F_{wr} \cdot G_t \cdot P_t \cdot G_{rs} \cdot \lambda^2}{(4\pi)^4 \cdot D_{ra}^2 \cdot D_{wa}^2 \cdot D_{rw}^2} \quad \text{Equation 13}$$

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.

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

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

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

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.

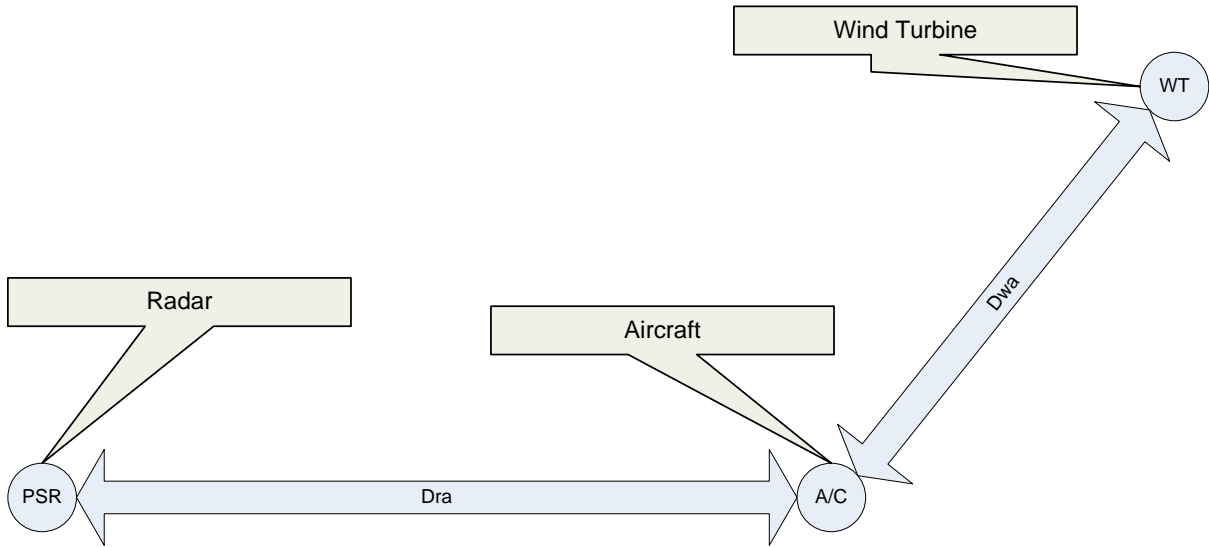


Figure 18: PSR reflection case 4

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:

$$P_{ref} = \frac{\sigma_w \cdot \sigma_{a1} \cdot \sigma_{a2} \cdot F_{ra}^2 \cdot F_{aw}^2 \cdot G_t \cdot P_t \cdot G_r \cdot \lambda^2}{(4\pi)^5 \cdot D_{ra}^4 \cdot D_{wa}^4} \quad \text{Equation 16}$$

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.

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

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

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

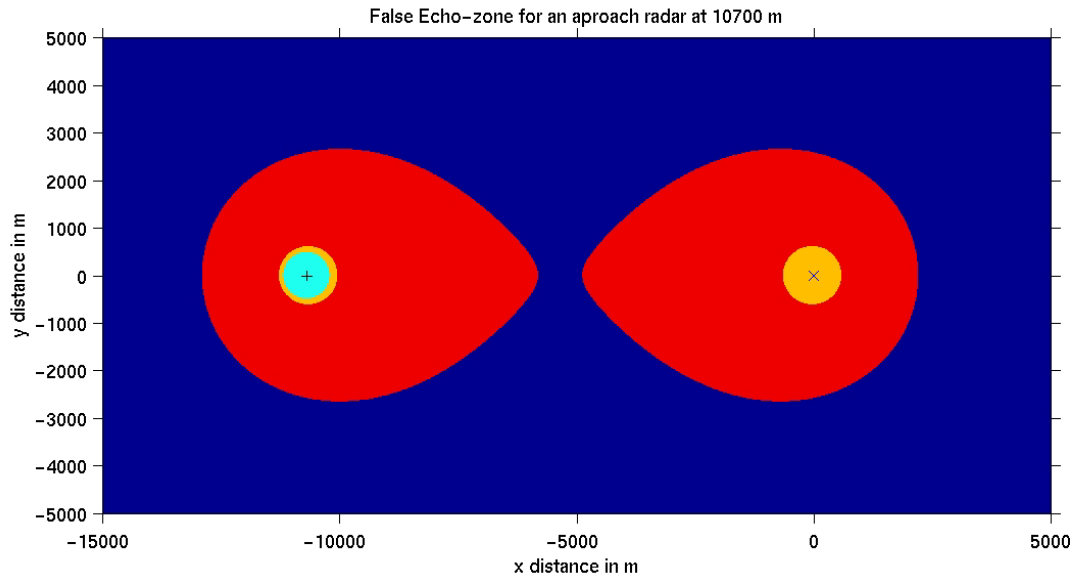


Figure 19: Example of calculation of aircraft locations where reflection can occur (horizontal)

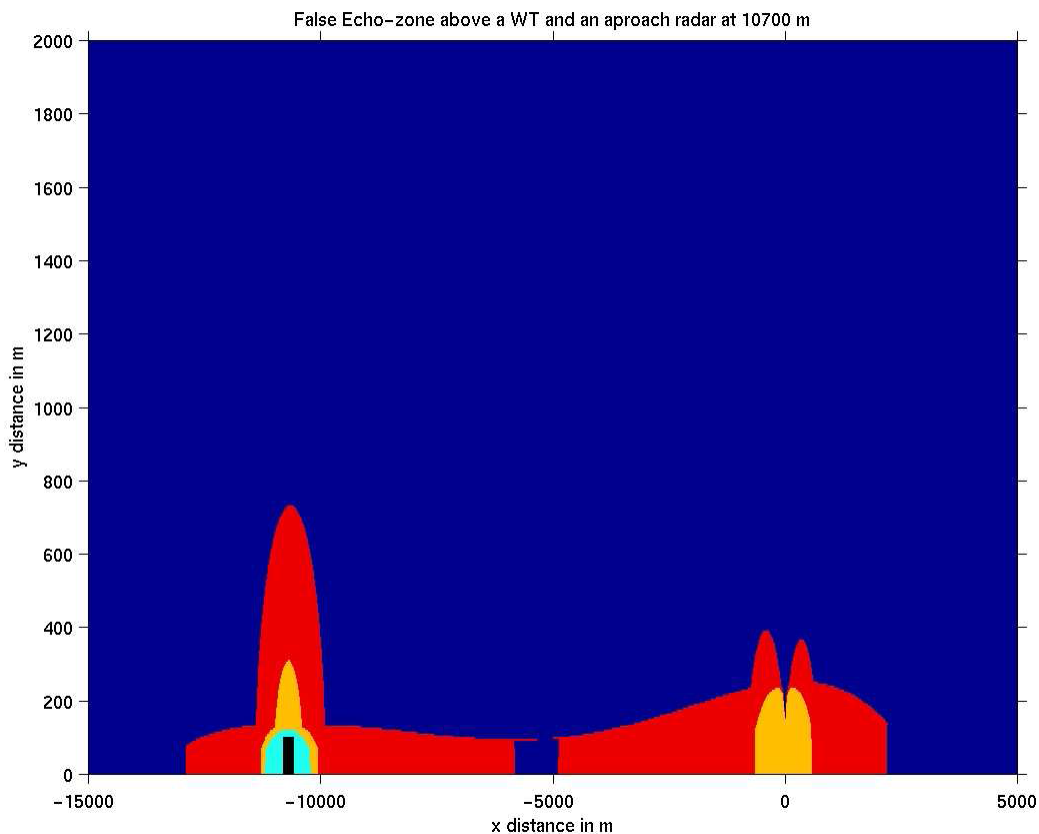


Figure 20: Example of calculation of aircraft locations where reflection can occur (vertical)

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.
$F_{wa} = F_{aw}$	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 items⁸:

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 :

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

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;

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

Replacing A_e with its actual value gives:

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

Replacing P with the terms of Equation 19 gives:

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

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

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

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_{wr}	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

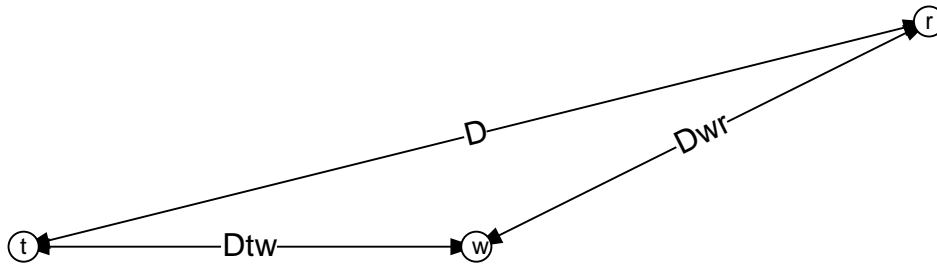


Figure 21: Direct and reflected signal paths

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:

$$D_{wr} = \sqrt{\frac{\sigma \cdot F_{tw} \cdot F_{wr} \cdot G_{tw} \cdot G_{wr} \cdot P_t \cdot \lambda^2}{(4\pi)^3 \cdot D_{tw} \cdot P_{thresh}}} \quad \text{Equation 24}$$

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:

$$\frac{P_{direct}}{P_{ref}} = \frac{F_{dir} \cdot G_t \cdot G_r \cdot 4\pi \cdot D_{tw}^2 \cdot D_{wr}^2}{\sigma \cdot G_{tw} \cdot G_{wr} \cdot D^2 \cdot F_{tw} \cdot F_{wr}} \quad \text{Equation 25}$$

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

$$\frac{P_{ref}}{P_{direct}} = \frac{\sigma \cdot G_{tw} \cdot G_{wr} \cdot D^2 \cdot F_{tw} \cdot F_{wr}}{F_{dir} \cdot G_t \cdot G_r \cdot 4\pi \cdot D_{tw}^2 \cdot D_{wr}^2} \quad \text{Equation 26}$$

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

$$G_{tw} = G_t$$

$$G_{wr} = G_r$$

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

$$F_{dir} = F_{tw} \cdot F_{wr}$$

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

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

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

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

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

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

Which can be rearranged to give:

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

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 μ s (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 μ s) 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 μ s.

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:

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

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

$$P_t = 2 \text{ kW} = 2000 \text{ W}$$

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

$$\sigma = 35 \text{ dBm}^2 = 10^{3.5} \text{ m}^2$$

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

$$G_{wr} = 1$$

$$D_{wr} = 5250 \text{ m}$$

$$\lambda = 0.2913 \text{ m (corresponding to 1030 Mhz)}$$

It gives:

$$D_{tw} = 15698 \text{ m}$$

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 μ s = 75 m) between the direct and the reflected signals as illustrated on Figure 22 below.

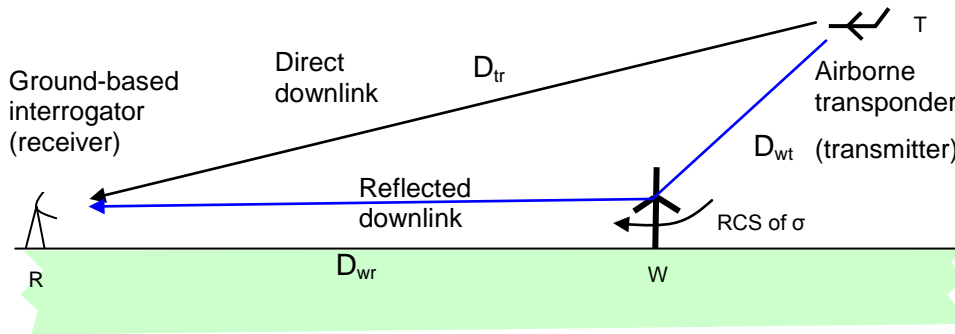


Figure 22: SSR downlink reflection

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:

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

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

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

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

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. $\sigma = 35 \text{ dBm}^2$).

$$D_{wr} = 5016 \text{ m}$$

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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www.eurocontrol.int

From: [IWT Info](#)
To: [Emily Lynch](#)
Subject: Re: 200513-Knockshanvo Wind Farm- Scoping
Date: Tuesday 24 January 2023 10:33:45
Attachments: [image001.jpg](#)

Dear Emily,

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 Mon, 23 Jan 2023 at 15:35, Emily Lynch <elynch@mkoireland.ie> wrote:

Dear Sir/Madam,

Please find attached a scoping document for FuturEnergy Irelands (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare. The proposed site covers an area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number and layout of turbines will be defined during the upcoming project design stages.

The following application will be seeking determination from An Bord Pleanala in relation to the developments Strategic Infrastructure Development Status. If the Proposed Development does not fall under Section 182A of the Planning and Development Act 2000, an application for planning permission for any relevant works will be made to Clare County Council.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the proposed project.

If you have any queries, please do not hesitate to contact me.

Kind regards,

Emily

Emily Lynch (BSc)

Graduate Environmental Scientist

MKO

Tuam Road, Galway, H91 VW84



Offices in Galway and Dublin

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

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

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Facebook: IrishWildlifeTrust

Twitter: @irishwildlife

Phone: 01 445 7259 (landline available Wednesday-Thursday 9:30 to 5pm)

From: [Enda Broderick](#)
To: [Eoin O'Sullivan](#)
Cc: [Barry O'Donovan](#)
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 23 October 2020 12:34:48
Attachments: [image001.jpg](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)

Hi Eoin

No we don't have a presence in that area at the moment.

Kind regards,

Enda Broderick

Managing Director

Lighthouse Networks Ltd.

signature_613546488



East Point Business Park

Loughrea - Co. Galway

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Mob +353 (0) 86-8676410

Web www.lightnet.ie

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Date: Friday 23 October 2020 at 11:37

To: Enda Broderick <enda@lightnet.ie>

Cc: Barry O'Donovan <barry@lightnet.ie>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Enda

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Lighthouse Networks Ltd has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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Your Ref: 200513-Knockshanvo Wind Farm

Our Ref: G Pre00015/2023 (Please quote in all related correspondence)

15 March 2023

MKO
Tuam Road
Galway
H91 VW84

Via email: elynych@mkoireland.ie

Proposed Pre Planning Development: FuturEnergy Irelands (FEI): construction of a wind energy development: Knockshanvo, approximately 3km south of Broadford, 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 headings.

Archaeology

The National Monuments Service of the Department of Housing, Local Government and Heritage has reviewed the '*Environmental Impact Assessment Scoping Report*' for the proposed Knockshanvo Wind Farm.

The information provided is not sufficiently detailed to allow for a full assessment of the archaeological implications of this proposal, however the Department wishes to advise that, as part of EIA requirements, your client is obliged to retain the services of a Consultant Archaeologist to carry out an Archaeological Impact Assessment (AIA) as part of the overall Cultural Heritage Impact Assessment of the proposed development, which should be integrated into the finalised Environmental Impact Assessment Report (EIAR). In this regard, the Department awaits the results of the Cultural Heritage Impact Assessment (CHIA) and full EIAR for the scheme before commenting further.

Further to the above, and by way of general archaeological advice, please note that, whilst the proposed development site (PDS) may or may not contain within it known or subsurface Recorded Monuments and/or Archaeological sites that may require assessment as part of the overall CHA, the PDS itself is located within a wider area of known archaeological settlement and activity (the Department initial review of the Record of Monuments and Places, www.archaeology.ie and cartographic sources). All of these Recorded Monuments, both within and outside the PDS, are subject to statutory protection in the Record of Monuments and Places, established under section 12 of the National Monuments Act 1930-



2014. Therefore the CHIA should include an assessment of the possible effects of the proposal on the wider archaeological landscape. It is of importance that the study area for the CHIA should be of sufficient size and extent to support this.

The Department advises that the CHIA should incorporate a robust desk-study supported by a comprehensive field inspection as well as a visual impact assessment (to assist in identifying any possible impacts to the setting of sites or monuments).

In this respect it should be noted that, in addition to site-specific vulnerabilities to impact on setting, many monument types – for example prehistoric monuments such as Standing Stone Alignments, Standing Stone Rows, Single Standing Stones, as well as some megalithic tombs – are often considered to represent a wide area of associated archaeological settlement and activity. As a result, the bunding/stockpiling of materials, intrusion into viewsheds, etc., may have a negative visual impact on such monuments and may diminish or interrupt alignment views and alter key aspects of their original function and layout. The Visual Impact Assessment should:

- Set out the key characteristics of the monument(s) and its surroundings that contribute to its setting and the degree to which this setting is integral to the significance and appreciation of the monument.
- Assess the effects of the development – both positive and negative – on these key characteristics. The development should be considered in terms of its location and siting relative to the monument as well as its form, appearance and permanence.
- Be supported by appropriate illustrations of the monument, its setting and the development.

The Department further advises that the following is also carried out as part of the overall CHIA to ensure a comprehensive assessment of the proposed development:

- The desk-study and field inspection regime should inform:
 - Targeted non-intrusive advance geophysical survey or prospection (such as Ground Penetrating Radar Survey);
 - Targeted advance archaeological test excavation.
- Any and all intrusive advance investigations (such as, but not limited to, ground investigations for soils/geology/hydrogeology) carried out as part of the EIA and/or design process should be subject to a programme of archaeological monitoring by a suitably qualified archaeologist licensed under the National Monuments Act.

The results of these investigations should inform the EIA process and be incorporated within the EIA Report. The Department is happy to provide further advice and clarification, as and if required, in relation to the preparation of suitably comprehensive assessments as outlined above, with particular regard to the scope and locations for any advance non-intrusive prospection or advance test excavation that would be appropriate to inform the assessment of this proposed scheme.



Notwithstanding the above, the Department awaits the submission of this assessment before commenting further.

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 for consideration;

- 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 constitute a minimum of two years to allow for an accurate determination of site usage. 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.

Of particular note for this proposed development are Hen Harrier. There was a confirmed breeding pair and one probable nesting pair on Slieve Bernagh recorded last year, 2022. The proposed site is approx. 7km at the nearest point from the probable breeding area. There is also one pair of breeding Peregrines above Broadford, approx. 2km to the nearest point of the proposed site.

- 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 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.

There are a number of Lesser Horseshoe SAC's in the vicinity of the proposed development. Of particular importance is Danes Hole, Poulnalecka SAC [000030] and the Ratty River Cave SAC [002316]. There was a significant number of bats recorded hibernating in the winter roosts in 2023, and breeding in the maternity roosts in 2022 at these sites.

- 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 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 floodwater 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.



- The Department highlights the status of two of the NHAs to the North of the proposed site – Cloonlough More Bog NHA (002307) and Doon Lough NHA (000337). They are currently due to be de-designated.
- Peat stability should be assessed where required.
- Marsh fritillary surveys should be carried out as per standard Marsh Fritillary Larval Web Survey methodology.
- 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 ponticum* 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, Carrowmagowan 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. The appropriate assessment cannot have lacunae and should reach complete, precise and definitive findings and conclusions as to the effects of the plan or project on a European site(s).

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,

A handwritten signature in black ink, appearing to read 'Diarmuid Buttiner', is placed above the printed name.

Diarmuid Buttiner
Development Applications Unit
Administration

From: [Adrian Carroll](#)
To: [Eoin O'Sullivan](#)
Cc: [Denis Herlihy](#); [Licensing](#)
Subject: RE: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Monday 9 November 2020 12:52:29
Attachments: [image005.png](#)
[image006.png](#)
[image007.png](#)
[image008.png](#)
[image010.png](#)
[image011.png](#)
[image012.png](#)
[image001.png](#)
[image002.jpg](#)

Hi Eoin,

None of our links will be impacted.

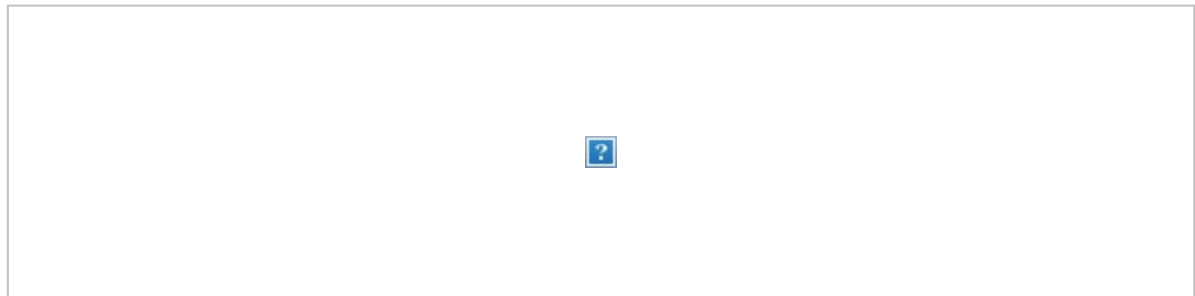
Regards,

Adrian Carroll | Network Operations Manager

T: 061 5711561 **M:** 086 8372264

E: adrian.carroll@ripplecom.net | **W:** ripplecom.net

Houston Hall, Raheen Business Park, Limerick, V94 PKF1



From: Eoin O'Sullivan <eosullivan@mkofireland.ie>
Sent: 09 November 2020 10:25
To: Adrian Carroll <adrian.carroll@ripplecom.net>
Cc: Denis Herlihy <denis.herlihy@ripplecom.net>; Licensing <licensing@ripplecom.net>
Subject: FW: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Adrian

Further to my email below, can you please confirm whether Ripplecom has any links in the area as indicated on the attached mapping?

Thank you

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Eoin O'Sullivan

Sent: 23 October 2020 11:36

To: adrian.carroll@ripplecom.net; licensing@ripplecom.net

Cc: Denis Herlihy <denis.herlihy@ripplecom.net>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Adrian,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Ripplecom has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin

Eoin O'Sullivan MSc. CWEM CEnv



Senior Environmental Scientist

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From: [Thomas Barry](#)
To: [Eoin O'Sullivan](#)
Subject: FW: FROM QUARANTINE: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Tuesday 27 October 2020 07:22:24
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.jpg](#)

Eoin,

We anticipate no impact from the development as proposed. Can you ensure the proposal is also reviewed by eir.

Regards,
Tom

From: Derek Rosarius
Sent: Friday 23 October 2020 12:07
To: Thomas Barry
Subject: FROM QUARANTINE: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

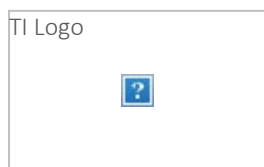
Regards

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 | W: www.tetraireland.ie/



From: Eoin O'Sullivan [<mailto:eosullivan@mkoireland.ie>]
Sent: Friday 23 October 2020 11:36
To: Thomas Barry
Subject: EXTERNAL MAIL:- Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

**CAUTION: This mail is from outside Tetra.
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Dear Tom,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse

Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Tetra Ireland has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: [Alister Cole](#)
To: [Eoin O'Sullivan](#)
Cc: [Sean Kelly](#); [DL Estates ROI](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 30 October 2020 10:18:41
Attachments: [image004.jpg](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)

Hi Eoin,

Apologies for the delayed response.

I have reviewed the proposed windfarm at Violet Hill and 3Ireland currently have one Microwave link traversing the area, but this is due to be decommissioned before year end. There are no other links that will be affected or any new links planned which could potentially be affected.

Best regards,

Alister

Description: 3 Logo



Alister Cole
Transmission Engineer

Mobile: 086 6024556
Email: Alister.Cole1@three.ie

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: 23 October 2020 14:21
To: Alister Cole <Alister.Cole1@three.ie>
Cc: Sean Kelly <Sean.Kelly2@three.ie>
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Alister,

Please find attached the KML.

Regards

Eoin

Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist
MKO



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From: Alister Cole <Alister.Cole1@three.ie>

Sent: 23 October 2020 11:52

To: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Cc: Sean Kelly <Sean.Kelly2@three.ie>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

Would you please be able to supply a google earth file as well?

Best regards,

Alister

Description: 3 Logo



Alister Cole
Transmission Engineer

Mobile: 086 6024556

Email: Alister.Cole1@three.ie

From: Alan Hutchinson <alan.hutchinson@three.ie>

Sent: 23 October 2020 11:45

To: Alister Cole <Alister.Cole1@three.ie>; Eoin O'Sullivan <eosullivan@mkoireland.ie>

Cc: Krzysztof Szpak <Krzysztof.Szpak2@three.ie>

Subject: FW: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Alister,

Can you please look after this request please?

Thanks,
Alan.

Alan Hutchinson
RAN Programme and Commercial Manager

+353(0) 86 814 5316
alan.hutchinson@three.ie



From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: 23 October 2020 11:36
To: Gerry Callan <Gerry.Callan@three.ie>
Cc: Alan Hutchinson <alan.hutchinson@three.ie>; DL Estates ROI <Estates@three.ie>; Krzysztof Szpak <Krzysztof.Szpak2@three.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Gerry,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Three has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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To: [Eoin O'Sullivan](#)
Cc: [Feargal Lennon](#)
Subject: FW: [External] 200513 - Proposed Knockshanvo WF Scoping Document FAO/ Environmental Department CRM:059500420
Date: Friday 21 April 2023 09:20:32
Attachments: [image001.jpg](#)

FYI

Kind regards,
Daire.

Daire O'Shaughnessy
Environmental Scientist

MKO

Tuam Road, Galway, H91 VW84

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



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From: Jonathan Sheehan <Jonathan.sheehan@tipperarycoco.ie>
Sent: Wednesday, April 19, 2023 11:20 AM
To: Daire O'Shaughnessy <doshaughnessy@mkoireland.ie>
Subject: RE: [External] 200513 - Proposed Knockshanvo WF Scoping Document FAO/ Environmental Department CRM:059500420

You don't often get email from jonathan.sheehan@tipperarycoco.ie. [Learn why this is important](#)

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good morning Mr. O'Shaughnessy,

Apologies for the late reply, as there was an error with the original attachments, but this has been corrected.

Thank you very very much for contacting Tipperary County Council and for your email along with the documents relating to the proposed Windfarm for Knockshanvo, Broadford, Co. Clare.

I have forward this email on to a number of Senior Management Staff and Staff members from within the Planning and Environment & Climate Action Sections.

Thank you again for contacting Tipperary County Council.

Kind regards,

Jonathan Sheehan

Clerical Officer, Environment & Climate Action Section

----- Original Message -----

From: Daire O'Shaughnessy

Received: Mon Apr 17 2023 16:49:35 GMT+0100 (GMT Daylight Time)

To: Customer Service Desk; Customer Service Desk

Cc: eosullivan@mkofireland.ie; fleannon@mkofireland.ie

Subject: [External] 200513 - Proposed Knockshanvo WF Scoping Document FAO/ Environmental Department

CAUTION FROM TIPPERARY COUNTY COUNCIL IT SECTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Sir/Madame,

Please find attached a scoping document for FuturEnergy Irelands (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare. The proposed site covers an area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number and layout of turbines will be defined during the upcoming project design stages.

The following application will be seeking determination from An Bord Pleanala in relation to the developments Strategic Infrastructure Development Status. If the Proposed Development does not fall under Section 182A of the Planning and Development Act 2000, an application for planning permission for any relevant works will be made to Clare County Council.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the proposed project.

If you have any queries, please do not hesitate to contact me.

Can you please acknowledge receipt of this scoping document once it has been received by the relevant department.

Kind regards,
Daire.

Daire O'Shaughnessy
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

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



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From: [Rachel Hennessy](#)
To: [Eoin O'Sullivan](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Wednesday 28 October 2020 15:42:18
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin,

From the information provided it does not appear we have any links in this area that would be impacted.

Kind regards,
Rachel

Rachel Hennessy

Towercom

M: +353 (0)86 843 9587

E: rachel.hennessy@towercom.ie

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Friday 23 October 2020 11:36
To: Rachel Hennessy <RHennessy@towercom.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Rachel

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Towercom has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Senior Environmental Scientist

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Eoin O'Sullivan

From: INFO <Information@tii.ie>
Sent: Monday 15 April 2024 10:08
To: Eoin O'Sullivan
Subject: TII Ref: TII23-124659 - EIAR Scoping - Knockshanvo Wind Farm, Co. Limerick Your Ref: 200513

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Dear Mr. O'Sullivan,

Thank you for your further correspondence of 9 April 2024 which outlines pre-planning proposals for access to the N69, at Court, Co. Limerick, for the purposes of access for a temporary transition compound to facilitate turbine blade delivery to the Knockshanvo Wind Farm. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII's previous correspondence in relation to EIAR Scoping for the proposed Knockshanvo Wind Farm of 24 October 2023 and 21 February 2024, also refer to and remain the position of TII. In relation to proposals included in your correspondence of 9 April 2024, for access to the N69, national road, TII outlines the following observations.

The information provided with your referral indicates that the subject site is reliant on direct access to the N69, national secondary road, at a location where TII's records indicate a 100kph speed limit applies. The route concerned is a high-speed section of national road and is part of the EU TEN-T Comprehensive Network.

Official policy in relation to development involving access to national roads and development along such roads is set out in the Section 28 Ministerial Guidelines 'Spatial Planning and National Roads Guidelines for Planning Authorities' (DoECLG, 2012). Section 2.5 of the Guidelines state that the policy of the planning authority will be to avoid the creation of any additional access points from new development or the generation of increased traffic from existing accesses to national roads, to which speed limits greater than 60kph apply

The pre-application documentation of 9 April 2024 does not demonstrate that the proposed development adheres to the above provisions of official policy. Such provisions of official policy are reflected in the Limerick Development Plan and therefore, based on the information provided, the proposals also appear to conflict with the adopted Development Plan for the area.

In summary, the development proposed accesses a high speed 100kph section of national road and, based on the information provided, has not demonstrated that the development adheres to the provisions of official policy included in the 'Spatial Planning and National Roads Guidelines for Planning Authorities' (DoECLG, 2012) and the adopted County Development Plan.

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.

I hope that this information is of assistance to you.

Yours sincerely,

Andrew Moore
Regulatory & Administration Executive

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Tuesday, April 9, 2024 4:27 PM
To: INFO <Information@tii.ie>
Subject: RE: 200513 - EIAR Scoping - Knockshanvo Wind Farm, Co. Clare - Temporary Transition Compound

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eosullivan@mkoireland.ie. [Learn why this is important](#)

Dear Sir or Madam

Further to the correspondence below, please find attached an additional scoping request with regard to the proposed temporary transition compound for Knockshanvo Wind Farm.

I trust the above is in order, however if you have any questions, please do not hesitate to contact me.

Kind regards,
Eoin

Eoin O'Sullivan CWEM CEnv
Project Director - Environment

MKO

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From: Shaun Doolin <sdoolin@mkoireland.ie>
Sent: Wednesday, February 21, 2024 9:08 AM

Dear Mr. Doolin,

Thank you for your correspondence of 4 October 2023 regarding the above. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII wishes to advise that it is not in a position to engage directly with planning applicants in respect to proposed developments. 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 road 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 the 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, including the potential haul route.
- The developer should assess visual impacts from existing national roads.
- The developer should have regard to any Environmental Impact Assessment Report/Statement 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 conducting Environmental Impact Assessment, should have regard to TII Publications (formerly DMRB and the 'Manual of Contract Documents for Road Works').
- The developer, in conducting Environmental Impact Assessment, 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 Road Authority (NRA), 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., NRA, 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 roads network. TII acknowledges reference to the TTA Guidelines in Section 6.2.4.14 of the EIAR Scoping Report.

The scheme promoter is also advised to have regard to Section 2.2 of TII's 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.
- Section 6.2.4.1.4 of the EIAR Scoping Report states that only a 'geometric assessment' of the turbine delivery route, including site entrances and their capacity to accommodate the abnormal loads associated with the development, will be undertaken.

TII recommends that that applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. In relation to any proposed haul route, where abnormal 'weight' loads are proposed, separate structure approvals/permits and other licences may be required. All national road 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 are identified.

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.

Where temporary works within any MMarC Contract Boundary are required to facilitate the transport of turbine components to site, the applicant/developer shall contact thirdpartyworks@tii.ie in advance, as a works specific Deed of Indemnity will be needed by TII before the works can take place.

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 the grid connection proposals included in the EIAR Scoping Report only advise that two potential grid connection routes have been identified, a dedicated 110kV looped connection into Ardnacrusha 110kV substation and a dedicated 110kV connection to Drumline 110kV substation.

The Drumline 110kV substation is located in close proximity to the N18, national primary road, and it is unclear if the proposed grid connection routing will impact the existing national road. Therefore, please note, 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 the 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 and therefore, avoid grid connection routing proposals along national roads.

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.

Where grid connection involves proposals to cross a motorway, Works Specific Deeds of Indemnities, arrangements for third party access or consent from TII in accordance with Section 53 of the Roads Act, 1993, is required. Arrangements for third party access are also

likely to be required. Contact should be made to 'thirdpartyworks@tii.ie' to progress this element when proposals for the crossings have been developed.

General requirements for directional drilling under a motorway include:

- The launch and reception pits for the crossing are located outside the Motorway boundary.
- The cabling will be installed at such depth so as not to conflict with the drainage for the Motorway.
- Neither the works nor the cable crossing will damage or interfere with the Motorway.
- Any maintenance and/or future planned upgrades of the cabling at the crossing location can be carried out without access to the motorway boundary.
- There are no bolted joints in that part of the crossing within the motorway fence-line.
- A pre and post construction survey shall be required along the length of the crossing over the extents of the motorway boundary.
- Specific requirements may also arise for these proposed works.

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 practise.

I hope that this information is of assistance to you.

Yours sincerely,

Andrew Moore
Senior Regulatory & Administration Executive

From: INFO <Information@tii.ie>
Sent: 21 February 2024 07:45
To: Shaun Doolin
Subject: RE: TII23-124659 - EIAR Scoping - Knockshanvo Wind Farm, Co. Limerick

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Dear Mr. Doolin,

Thank you for your further correspondence of 19 January and 1 February 2024 regarding the above. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII advises that the following Technical and Standard documents should be consulted in the preparation of your EIAR:

- 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document' (PE-ENV-01106) (TII, 2022), which is accessible via this [link](#), and
- 'Air Quality Assessment of Proposed National Roads' (PE-ENV-01107) (TII, 2022), which is accessible via this [link](#).

These documents refer to the 2014 IAQM guidance document referenced in your correspondence.

I hope that this information is of assistance to you.

Yours sincerely,

Andrew Moore
Senior Regulatory & Administration Executive

From: Shaun Doolin <sdoolin@mkofireland.ie>
Sent: Thursday, February 1, 2024 12:21 PM
To: INFO <Information@tii.ie>
Cc: Eoin O'Sullivan <eosullivan@mkofireland.ie>
Subject: RE: TII23-124659 - EIAR Scoping - Knockshanvo Wind Farm, Co. Limerick

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Good afternoon,

Could you please provide an update on the below request regarding the relevant air quality guidance for our EIAR to consider?

Kind regards,
Shaun

Shaun Doolin
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

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



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From: Shaun Doolin
Sent: Friday, January 19, 2024 2:40 PM
To: INFO <Information@tii.ie>

Cc: Eoin O'Sullivan <eosullivan@mkofireland.ie>

Subject: RE: TII23-124659 - EIAR Scoping - Knockshanvo Wind Farm, Co. Limerick

Good afternoon,

Thank you for your detailed response below to our scoping request.

Following from this, could you please confirm as per your below email and the TII Planning Guidelines webpage, that the '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*' (National Road Authority (NRA), 2006) is still the best-practice relevant guidelines to consider in this EIAR?

I've noted that other EIARs have considered the '*Guidance on the assessment of dust from demolition and construction Version 1.1*' (Institute of Air Quality Management (IAQM), 2014), and I am looking for some clarity on what TII currently views to be the best-practice relevant guidance for our EIAR to consider.

Kind regards,
Shaun

Shaun Doolin
Environmental Scientist

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Tuam Road, Galway, H91 VW84

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From: INFO <Information@tii.ie>

Sent: Tuesday, October 24, 2023 3:21 PM

To: Shaun Doolin <sdoolin@mkofireland.ie>

Subject: TII23-124659 - EIAR Scoping - Knockshanvo Wind Farm, Co. Limerick

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Dear Mr. Doolin,

Thank you for your correspondence of 4 October 2023 regarding the above. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII wishes to advise that it is not in a position to engage directly with planning applicants in respect to proposed developments. 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 road

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 the 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, including the potential haul route.
- The developer should assess visual impacts from existing national roads.
- The developer should have regard to any Environmental Impact Assessment Report/Statement 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 conducting Environmental Impact Assessment, should have regard to TII Publications (formerly DMRB and the 'Manual of Contract Documents for Road Works').
- The developer, in conducting Environmental Impact Assessment, 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 Road Authority (NRA), 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., NRA, 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 roads network. TII acknowledges reference to the TTA Guidelines in Section 6.2.4.14 of the EIAR Scoping Report.

The scheme promoter is also advised to have regard to Section 2.2 of TII's 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.
- Section 6.2.4.1.4 of the EIAR Scoping Report states that only a 'geometric assessment' of the turbine delivery route, including site entrances and their capacity to accommodate the abnormal loads associated with the development, will be undertaken.

TII recommends that that applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. In relation to any proposed haul route, where abnormal 'weight' loads are proposed, separate structure approvals/permits and other licences may be required. All national road 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 are identified.

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.

Where temporary works within any MMaRC Contract Boundary are required to facilitate the transport of turbine components to site, the applicant/developer shall contact thirdpartyworks@tii.ie in advance, as a works specific Deed of Indemnity will be needed by TII before the works can take place.

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 the grid connection proposals included in the EIAR Scoping Report only advise that two potential grid connection routes have been identified, a dedicated 110kV looped connection into

Ardnacrusha 110kV substation and a dedicated 110kV connection to Drumline 110kV substation.

The Drumline 110kV substation is located in close proximity to the N18, national primary road, and it is unclear if the proposed grid connection routing will impact the existing national road. Therefore, please note, 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 the 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 and therefore, avoid grid connection routing proposals along national roads.

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.

Where grid connection involves proposals to cross a motorway, Works Specific Deeds of Indemnities, arrangements for third party access or consent from TII in accordance with Section 53 of the Roads Act, 1993, is required. Arrangements for third party access are also likely to be required. Contact should be made to 'thirdpartyworks@tii.ie' to progress this element when proposals for the crossings have been developed.

General requirements for directional drilling under a motorway include:

- The launch and reception pits for the crossing are located outside the Motorway boundary.
- The cabling will be installed at such depth so as not to conflict with the drainage for the Motorway.
- Neither the works nor the cable crossing will damage or interfere with the Motorway.
- Any maintenance and/or future planned upgrades of the cabling at the crossing location can be carried out without access to the motorway boundary.
- There are no bolted joints in that part of the crossing within the motorway fence-line.
- A pre and post construction survey shall be required along the length of the crossing over the extents of the motorway boundary.
- Specific requirements may also arise for these proposed works.

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 practise.

I hope that this information is of assistance to you.

Yours sincerely,

Andrew Moore
Senior Regulatory & Administration Executive

From: Shaun Doolin <sdoolin@mkofireland.ie>
Sent: Wednesday, October 4, 2023 5:19 PM
To: Landuse Planning <LandUsePlanning@tii.ie>
Cc: Eoin O'Sullivan <eosullivan@mkofireland.ie>
Subject: FW: 200513-Knockshanvo Wind Farm- Scoping

You don't often get email from sdoolin@mkofireland.ie. [Learn why this is important](#)

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Good afternoon,

Please see the below email and attached scoping document for FuturEnergy Ireland's (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare.

The Proposed Development site entrance is located on the R465, approximately 3 km north of the junction with the R471 Regional Road.

It is proposed that wind turbine components will be delivered to the site of the Proposed Development from Shannon Foynes Port, Co. Limerick.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the Proposed Development.
If you have any queries, please do not hesitate to contact me.

Kind regards,
Shaun

Shaun Doolin
Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

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



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From: Emily Lynch
Sent: Monday, January 23, 2023 3:41 PM
To: landuseplanning@tii.it
Subject: 200513-Knockshanvo Wind Farm- Scoping

Dear Sir/Madam,

Please find attached a scoping document for FuturEnergy Irelands (FEI) proposed construction of a wind energy development at Knockshanvo, approximately 3km south of Broadford, Co. Clare. The proposed site covers an

area of approximately 931 hectares. At this scale the site has the potential to accommodate a wind energy development in excess of 50 Megawatts. The number and layout of turbines will be defined during the upcoming project design stages.

The following application will be seeking determination from An Bord Pleanála in relation to the developments Strategic Infrastructure Development Status. If the Proposed Development does not fall under Section 182A of the Planning and Development Act 2000, an application for planning permission for any relevant works will be made to Clare County Council.

As part of the scoping exercise for the proposed development, we would welcome any comments in relation to the proposed project. If you have any queries, please do not hesitate to contact me.

Kind regards,
Emily

Emily Lynch (BSc)
Graduate Environmental Scientist

MKO
Tuam Road, Galway, H91 VW84

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soiléir go bhfuil gá gníomhú go práinneach.

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[Protection/?set-lang=ga](#)

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leis faoi rún agus beartaithe lena n-úsáid ag an duine aonair nó ag an eintiteas a bhfuil siad dírithe chuige/chuici amháin. Más rud é go bhfuair tú an ríomhphost seo trí bhotún, cuir sin in iúil do postmaster@tii.ie, le do thoil, agus scríos an ríomhphost bunaidh agus aon cheangaltáin.

From: [Kyrl Cahill](#)
To: [Eoin O'Sullivan](#)
Cc: [Ellen Costello](#); joen@live95fm.ie
Subject: Re: FW: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Wednesday 11 November 2020 15:35:51
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin

Thanks for reaching out to us about this. There is no standard buffer or set back distance as such for our links. They are low power 1.4GHz point to point links so as long as the link path doesn't get blocked we would have no issues. On this occasion both of our link paths are pointing in the opposite direction away from your wind farm so we have no cause for concern here. You would need to be putting out a lot of interference on the 1.3 and 1.4Ghz bands and within roughly 1km of our links to cause us any real concern.

Hope the above helps?

Let me know if you require more detail as I can reach out to our links manufacturer if needs be.

Kind regards,
Kyrl

On Tue, 10 Nov 2020 at 12:58, Eoin O'Sullivan <eosullivan@mkofireland.ie> wrote:

Hi Kyrl,

Thank you for providing the coordinates for the links. Is there a standard buffer or set back distance that will need to be applied to the link?

Thank you

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Nash, Joe <joe.nash@live95fm.ie>
Sent: 10 November 2020 12:38
To: Eoin O'Sullivan <eosullivan@mkofireland.ie>

Subject: Fwd: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Good afternoon,

Please see feedback below from our engineer at Treaty Radio Ltd t/a Live 95. While this shouldn't cause any issues, we obviously

reserve the right to come back to you, if any difficulties do emerge.

Engineer Kyril Cahill can be contacted for further information at Kyril.Cahill@96fm.ie.

Regards,

Joe.

----- Forwarded message -----

From: Kyril Cahill

Date: Mon, 9 Nov 2020 at 16:04

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

To: Nash, Joe <joe.nash@live95fm.ie>

Hi Joe

Details of our links are below. The link paths are pointing in the opposite direction of the proposed wind farm so it shouldn't cause us any issues here.

Both links are Point to Point.

Link Type	Transmitter Location	Freq	Receiver Location	Distance
P2P	Live95, Dock Road, Limerick (E157180 N156787)	1.3 GHz	Woodcock Hill (E153443 N163361)	7.6 km
P2P	Woodcock Hill (E153443 N163361)	1.4 GHz	Barna, Newcastle West (E123000 N129500)	45 km

Feel free to pass on my details should they wish to ask any further questions.

Kind regards,

Kyril

On Mon, 9 Nov 2020 at 12:40, Nash, Joe <joe.nash@live95fm.ie> wrote:

Hi Kyril,

Please see below.

Can you come back to me with this information, when you can?

Thanks,

Joe.

----- Forwarded message -----

From: **Eoin O'Sullivan** <eosullivan@mkofireland.ie>

Date: Mon, 9 Nov 2020 at 10:16

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

To: joen@live95fm.ie <joen@live95fm.ie>

Dear Joe,

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Treaty Radio Ltd has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me,

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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--

Joe Nash
Station Director
Live 95
Radio House
Dock Rd
Limerick
P: 061 461 904
F: 061 41 95 95

Live 95's Limerick Today Show, weekday mornings, 9 to 12



--

Kyrl Cahill
Head of Engineering & IT

Cork's 96FM & C103, Broadcasting House, Patrick's Place, Cork. T23 E183
T 021 4551596 **DDI** 021 4555 721
E Kyrl.Cahill@96fm.ie



--

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Cork's 96FM & C103, Broadcasting House, Patrick's Place, Cork. T23 E183
T 021 4551596 **DDI** 021 4555 721
E Kyrl.Cahill@96fm.ie



From: [Declan Campbell](#)
To: [Eoin O'Sullivan](#); [Conor Pendlebury](#)
Subject: RE: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Monday 9 November 2020 10:25:58
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Eoin,

We've nothing in this area.

Declan

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>
Sent: Monday 9 November 2020 10:22
To: Declan Campbell <dcampbell@digiweb.ie>; Conor Pendlebury <Conor.Pendlebury@viatel.com>
Subject: RE: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Declan/Conor,

Further to my email below, can you please confirm whether Viatel Ltd has any links in the area as indicated on the mapping?

Thank you

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: Eoin O'Sullivan
Sent: 23 October 2020 11:36
To: Declan Campbell <dcampbell@digiweb.ie>; Conor Pendlebury - VTL <conor.pendlebury@viatel.com>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Declan

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Viatel has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

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From: [Liam Allister](#)
To: [Eoin O'Sullivan](#)
Cc: [Cathal O'Donnell](#); [Mark Nolan](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Friday 23 October 2020 13:30:59
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Eoin,

Virgin Media do not have any microwave links in the area outlined.

Regards,

Liam Allister | B2B Access Network Transmission Engineer,

Virgin Media | John F Connelly Road, Churchfield, Cork.

Liam.allister@virginmedia.ie

From: Eoin O'Sullivan [mailto:eosullivan@mkoireland.ie]
Sent: 23 October 2020 11:36
To: Liam Allister <Liam.Allister@virginmedia.ie>
Cc: Cathal O'Donnell <Cathal.ODonnell@virginmedia.ie>; Mark Nolan <Mark.Nolan@virginmedia.ie>
Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Dear Liam

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Virgin Media has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin

Eoin O'Sullivan MSc. CWEM CEnv
Senior Environmental Scientist

MKO



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From: [Lyons, Sean, Vodafone Ireland \(External\)](#)
To: [Eoin O'Sullivan](#); [Byrne, Fiona, Vodafone Ireland \(External\)](#)
Cc: [Byrne, Gavin, Vodafone Ireland](#); [Ellen Costello](#)
Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development
Date: Tuesday 27 October 2020 16:23:23
Attachments: [image005.png](#)
[image006.png](#)
[image007.png](#)
[image008.png](#)
[image009.jpg](#)

Hi Eoin,

Rule of thumb is 100m from end of tip of the blade, to the fresnel zone of the link.



Sean Lyons

Transmission Program Manager

Converged Transmission

Technology- NET

+353877758117

sean.lyons@vodafone.com

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No. 326967

vodafone.ie

The future is exciting.

Ready?

C2 General

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: Tuesday 27 October 2020 15:26

To: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Byrne, Fiona, Vodafone Ireland (External) <fiona.byrne2@vodafone.com>

Cc: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>; Ellen Costello <ecostello@mkoireland.ie>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cyber Code and report suspicious emails.

Hi Sean,

Thank you for coordinates. Is there a standard Vodafone set back distance or buffer that needs to be applied to the link?

Thank you

Eoin



Senior Environmental Scientist

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From: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>

Sent: 27 October 2020 15:22

To: Eoin O'Sullivan <eosullivan@mkoireland.ie>; Byrne, Fiona, Vodafone Ireland (External) <fiona.byrne2@vodafone.com>

Cc: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>

Subject: RE: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

Hi Eoin,

Having analysed the location of the proposed development, I can say that the following links are in the area:

CE034 Oatfield ESB (52.7719, -8.6928) – CE066 Quin (52.7837, -8.8532)

CE058 Knocksis (52.8013, -8.6653) – CE066 Quin (52.7837, -8.8532)

cid:image009.jpg@01D6AC7D.6A3CFE80





Sean Lyons

Transmission Program Manager

Converged Transmission

Technology- NET

+353877758117

sean.lyons@vodafone.com

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No. 326967

vodafone.ie

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Ready?

C2 General

From: Eoin O'Sullivan <eosullivan@mkoireland.ie>

Sent: Friday 23 October 2020 11:37

To: Byrne, Fiona, Vodafone Ireland (External) <fiona.byrne2@vodafone.com>

Cc: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Byrne, Gavin,
Vodafone Ireland <gavin.byrne@vodafone.com>

Subject: Re: 200513 - Violet Hill, Co. Clare - Proposed Renewable Energy Development

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Dear Liam

We are working on a constraints study for a proposed wind farm at Knockshanvo and adjacent townlands, which is located approximately 3 km south of Broadford, approximately 3.5 km southeast of Kilkishen and 4 km northeast of Sixmilebridge, Co. Clare. The Irish Transverse Mercator coordinates for the site centre are E554266 N669733. A site location map and a shape file is also attached.

Could you let me know please if Vodafone Ireland has any links in this area, and we will incorporate these into our constraint map?

Many thanks. If you have any queries please do not hesitate to contact me.

Kind Regards,

Eoin



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