Appendix 9.1

Ai Bridges Report

Report

Dernacart Wind Farm

Telecommunications Impact Study

Document Number:

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Executive Summary

Ai Bridges was commissioned by Statkraft Ireland to evaluate the possible effects that the proposed wind farm development at Dernacart, Co Laois could have on existing telecommunications networks. The requirement was to conduct field and desktop surveys to determine telecommunications network infrastructure that could be impacted by the proposed development. Consultations with telecom operators were also undertaken to assist in identifying network infrastructure that could be impacted by the proposed wind farm.

Two telecoms mast sites at Capard were identified as sites with network infrastructure which could potentially be impacted by the Dernacart development. A field survey of the mast structures at each of these mast sites was carried out. During the field survey, radio antennas with bearings in the direction of the wind farm were recorded. The findings of the Field Surveys can be found in Section 4 of this report.

During the consultation process, seventeen telecom operators were contacted. At the time of writing this report, ten of these operators have responded to the consultation request. The responses received from each of the telecom operators can be found in Section 3 of this report.

With the information obtained from the field survey and consultation process a desktop survey was carried out. The desktop survey indicates that at least two licensed PTP (point-to-point) microwave links could be impacted by the proposed wind farm development. The operators of these links have been contacted and possible mitigation measures have been proposed to offset the impact of the wind farm (see Section 6).

None of the Telecommunication Operators contacted during the consultation process raised any concerned regarding; License-exempt radio, TETRA, Aviation, GSM Access or 3G/4G Access network infrastructure.

Sections

Appendix

Section 1 - Wind Farm Site Information

1. Introduction

In this section a brief summary of the wind farm site is provided. Details regarding the site's geographic location and the turbine dimensions are presented.

1.1 Wind Farm Site Information

The proposed wind farm development is located 3km northwest of Mountmellick in County Laois. The proposed wind farm development consists of 8 wind turbines. The hub heights and rotor diameters of the turbines used for this study are shown below in Table 1. The turbine co-ordinates used in this study are provided in Appendix A.

Wind Farm	Number of Turbines	Turbine Hub Height	Turbine Rotor Diameter
Dernacart	8	99m	170m

Table 1. Dernacart Wind Farm Turbine Details

The location of the Dernacart wind farm development is shown below in Figure 1.

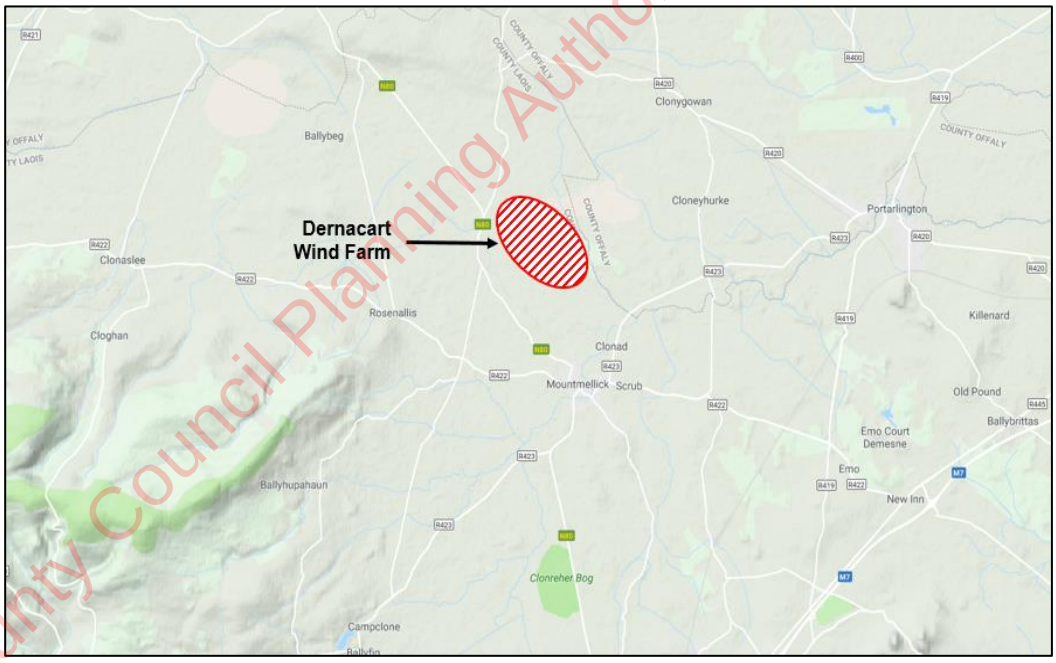


Figure 1. Location of Dernacart Wind Farm, County Laois.

Section 2 - Methodology

2. Introduction

In this section a brief summary of the Telecommunication Impact Study Methodology is provided.

2.1 Methodology

There are four primary stages in preparing and compiling a communication impact study:

- Telecom Operator Consultations
- Field Surveys
- Desktop Survey Network Modeling and Analysis
- Mitigation Measure Proposals
- Report Generation

A summary of each of these stages is provided below:

Telecom Operator Consultations

Consultations are commenced with telecom operators who are requested to raise any concerns they have regarding the impact of the proposed wind farm on their networks. The consultation process is used to assist in identifying telecoms infrastructure that could be impacted by the proposed wind farm development.

Field Surveys

Field surveys are undertaken and the co-ordinates of communication masts are recorded. During the field surveys of the communication sites, approximations of antenna size, bearing and height are made for the antennas installed on each of the masts surveyed.

Desktop Survey and Analysis

A desktop survey is carried out to plot the wind turbines in a radio planning tool. The radio planning tool uses GIS and terrain mapping databases to enable accurate modeling. A selection of mast-site coordinates is then obtained and inputs from various operators \ service providers are converted from Irish National grid (Easting and Northing in meters) to degrees minutes seconds format and then imported into the radio planning tool. This provides a means of graphically showing telecommunications sites in the vicinity relative to the Dernacart wind farm.

Figure 2 below shows the Dernacart wind turbines plotted in the radio planning tool. There are two telecommunication masts sites to the southwest within 10km of the proposed wind farm. These mast sites have been plotted relative to the wind farm and are also shown in Figure 2.

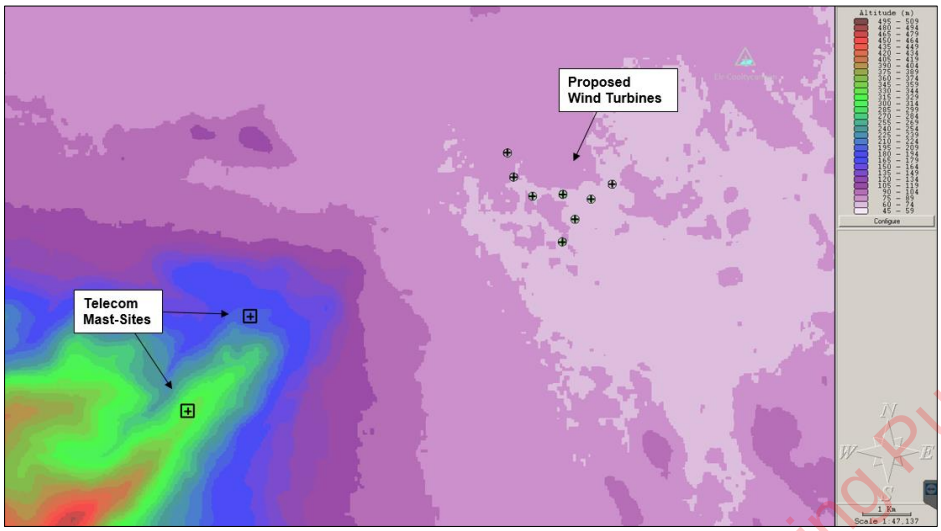


Figure 2. Turbine Network plotted in Radio Planning Software

The findings from the consultations and field surveys are collated and the communications networks requiring further analysis are identified. 3D network modeling is used to assess the impact of the turbines on the communications networks. The results from the network modeling are used to determine if mitigation measures are required. Figure 3 below shows an example of a turbine which has been modeled in 3D and shows its location relative to a point-to-point microwave radio link which passes within 100m of the turbine blade tip.

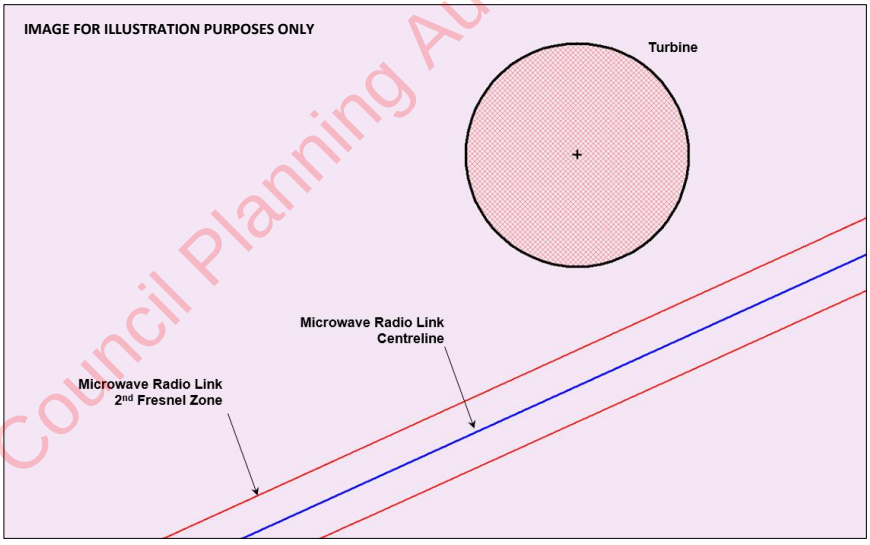


Figure 3. Radio link and turbine modelled in radio planning software

Mitigation Measure Proposals

Where mitigation measures are required, appropriate solutions are proposed to offset any impacts caused by the turbines.

Report Generation

The final stage of the communications impact study process is to collate the data and present the findings & analysis into a report for submission.

Section 3 - Telecom Operator Consultations

3. Introduction

In this section the consultation process undertaken with telecom operators is described. The response received from each operator is also provided.

3.1 Telecom Operator Consultations

Consultations in October 2019 were undertaken with telecom network operators to assist in identifying telecommunication infrastructure that could be impacted by the proposed wind farm. The operators were requested to raise any concerns they may have regarding impacts to their networks due to the proposed wind farm development. Table 2 lists the telecom operators contacted and the issues raised by the operators.

Note: The telecom operators listed below were first contacted in relation to this wind farm in January 2019 when the development was called "*Baybridge Wind Farm*". The most recent correspondence with the Telecom Operators was to inform them of the name-change to "Dernacart Wind Farm" and to provide them with the most recent Turbine network layout.

ID	Operator	Response Received (Yes/No)	Issues raised by Operator
1	Airspeed / Enet	Yes	No issues
2	An Garda Síochána	No	No response received.
3	Broadcast Authority of Ireland (BAI)	No	No response received.
4	BT Ireland	Yes	No Issues.
5	Eir/Meteor	Yes	Eir have raised concerns regarding one microwave radio link. (Capard – Cooltycannon)
6	OpenEir	Yes	OpenEir raised a concern regarding one microwave radio link; however, they have stated that they expect this link to be decommissioned in the next few months.
7	ESB Services	No	No response received.
8	HSE	No	No response received.
9	Irish Aviation Authority (IAA)	No	No response received.
10	Imagine Broadband	Yes	No Issues.
11	Laois County Council	No	No response received.
12	Ripplecom	No	No response received.
13	2RN	Yes	No Issues.
14	Tetra Ireland (TI)	Yes	No Issues.
15	Three Ireland	Yes	No Issues.
16	Virgin Media	Yes	No Issues.
17	Vodafone	Yes	Vodafone Ireland have raised concerns regarding one microwave radio link. (Capard – Clonyquin)

Table 2. Telecom Operators Consulted

The responses received from each of the Telecom Operators are provided in Sections 3.1.1 to 3.1.17 that follow.

3.1.1 Airspeed / Enet Response to Consultations

Enet provided the following email response to consultations:

> *"The below turbine location changes shouldn't affect us"*

3.1.2 An Garda Síochána

To date no response has been received.

3.1.3 Broadcast Authority of Ireland (BAI)

To date no response has been received.

3.1.4 BT Ireland

BT Ireland provided the following email response to consultations:

> *"I can confirm development will have no impact on the BT radio network."*

3.1.5 Eir/Meteor Response to Consultations

Eir provided the following email response to consultations:

> *"We are still being impact on our TXN path by Turbine3 as you determined, I see you have dropped T9 can T3 not be dropped or relocated outside the buffer area."*
>
> *"Link 1:*
> *End point 1 - 53°10'31.20"N 007°16'55.88"W, (Cooltycannon)*
> *End point 2 – 53° 6'37.48"N 007°27'13.17"W (Capard) "*

3.1.6 OpenEir Response to Consultations

OpenEir provided the following email response to consultations:

> *"I checked the new Turbine locations and the only possible impact on the eir radio network is T8 which overlaps link L5215/39. However I am nearly certain that this link will be ceased in the next few months."*

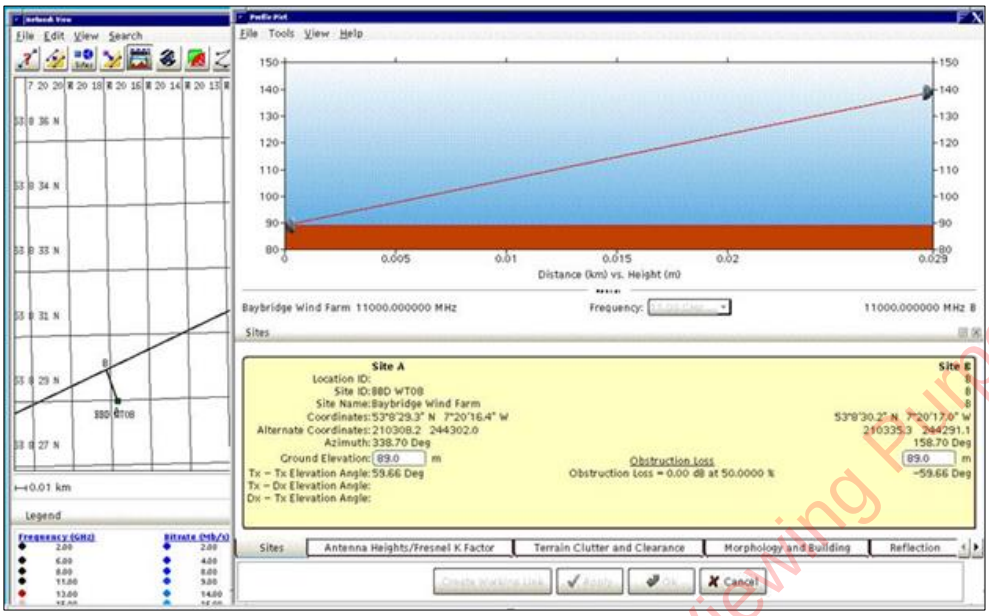


Figure 4. Graphic provided by OpenEir

3.1.7 ESB Telecoms Response to Consultations

To date no response has been received.

3.1.8 HSE to Consultations

To date no response has been received.

3.1.9 Irish Aviation Authority (IAA) Response to Consultations

To date no response has been received.

3.1.10 Imagine Broadband Response to Consultations

Imagine Broadband provided the following email response to consultations:

> *"I can confirm that there are no existing/planned microwave links on the Imagine broadband network that will be effected by the planned Dernacart wind farm development."*

3.1.11 Laois County Council Response to Consultations

To date no response has been received.

3.1.12 Ripplecom Response to Consultations

To date no response has been received.

3.1.13 2RN Response to Consultations

2RN provided the following email response to consultations:

> *"The modifications to the proposed Windfarm will not affect 2rn's fixed links but may cause interference to terrestrial television viewers to the west of the site if they receive their signal from Kippure."*

3.1.14 Tetra Ireland (TI) Response to Consultations

Tetra Ireland provided the following email response to consultations.

> *"We anticipate no impact from development at the proposed locations. Can you ensure the proposal is also reviewed by eir."*

3.1.15 Three Ireland Response to Consultations

Three Ireland provided the following email response to consultations:

> *"Many thanks for the updated turbine layout for this development which I've used to updated our planning tool.*
>
> *Following the revision to the layout, T8 is the closest to one of our links (a 15GHz link from Ridge Of Capard to Portarlington Pharmacy) but as it's 147m north of the link, there should be no impact."*

3.1.16 Virgin Media Response to Consultations

Virgin Media provided the following email response to consultations:

> *"Virgin Media have Microwave links in the area. I have attached two screen shots showing images of position of the Dernacart Wind Farm Development Turbine 8 in relation to one of our links. The distance between the link path and T8 is approx. 330m. The position of T8 would not cause any issue at this distance from the link path but we would need to be informed of any further change in Turbine locations so that we can plot and run interference test."*

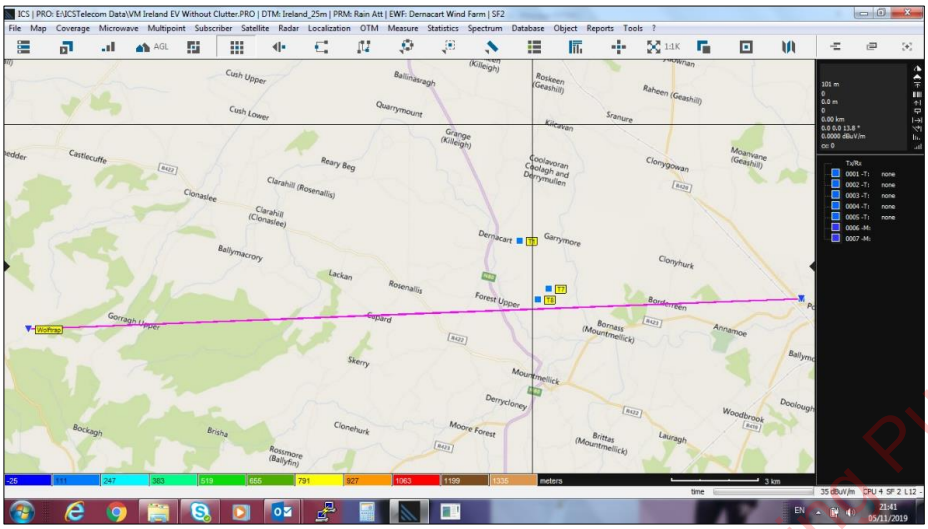


Figure 5. Graphic provided by Virgin Media

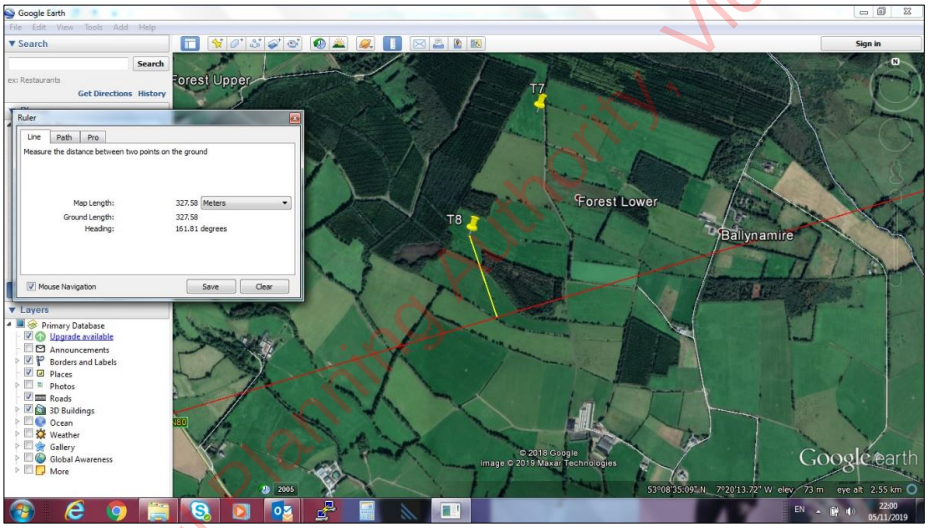


Figure 6. Graphic provided by Virgin Media

3.1.17 Vodafone Ireland Response to Consultations

Vodafone Ireland provided the following email response to consultations:

> *"Thank you for the revised turbine coordinates. Only Turbine T04 is of concern, all other revised turbine locations are fine.*
>
> *With respect to T04, mitigation is still contingent on the confirmation of an alternative positive Line of site (LOS). This has yet to be confirmed, but terrain data looks promising towards Portarlington which is 5km south west of Clonyquin. If confirmed and mitigation is agreed than we can de-risk the impact of turbine T04.*

Presently, the location of T04 is in breach of the exclusion zones of +30m perpendicular distance from the 1st Fresnel zone max diameter and the rotor tip. In saying that it looks like, assuming accuracy of co-ordinates that the rotor edge will be just outside the microwave Fresnel zone (I have assumed a 90m rotor diameter), so with careful implementation, T04 may not impact on this microwave, however, it is extremely tight and a high degree of accuracy on current proposals would need to be achieved, to avoid any impact. (Note, there's a slight offset in the turbine locations in the below screenshot due to excel calculation limits, actual centre point of T04 is where the pin is dropped)

If you need any further information, please do not hesitate to contact me."

Figure 7. Graphic provided by Vodafone

Note: In the email response received from Vodafone, they have assumed a turbine rotor diameter of 90m; however, the actual rotor diameter that is being proposed at Dernacart is 170m. Desktop Analysis (Section 5.1.2) indicates that with a 170m rotor diameter, there is a high probability that the operation of this link will be impacted by turbine T04.

Section 4 - Field Surveys

4. Introduction

To identify telecommunication networks that may be impacted by the proposed wind farm development (including networks not identified in during the telecom consultation process) field surveys were carried out. There are two telecoms mast site within 10km to the southwest of proposed wind farm. These are the two telecom mast site at Capard (Site A & Site B). Sections 4.1 – 4.2 that follow outlines the findings from the field survey of each of these telecoms mast sites.

4.1 Capard Mast-Site A

The first telecommunications mast site at Capard is located approximately 8km southwest of Dernacart and consists of four separate communications masts. Each of the telecom masts are mapped relative to the Dernacart turbines in Figure 8 below. The field survey findings for each of these four masts are presented in Sections 4.1.1 to 4.1.4 that follow.

Figure 8. Capard Mast Site A

4.1.1 Capard Site A - Mast #1

The survey of this mast found that there are number of licensed PTP microwave radio links operating from this structure. A summary of the field survey findings are shown in Table 3 below.

Figure 9. Capard Site A - Mast #1

Mast ID	Microwave radio links observed with a bearing in direction of Dernacart Wind Farm
Capard Site A - Mast #1	11

Table 3. Field Survey Summary – Capard Site A Mast #1

4.1.2 Capard Site A - Mast #2

The survey of this mast found that there are number of licensed PTP microwave radio links operating from this structure. A summary of the field survey findings are shown in Table 4 below.

Figure 10. Capard Site A - Mast #2

Mast ID	Microwave radio links observed with a bearing in direction of Dernacart Wind Farm
Capard Site A - Mast #2	2

Table 4. Field Survey Summary – Capard Site A Mast #2

4.1.3 Capard Site A - Mast #3

The survey of this mast found that there are number of licensed and unlicensed PTP microwave radio links operating from this structure. A summary of the field survey findings are shown in Table 5 below.

Figure 11. Capard Site A - Mast #3

Mast ID	Microwave radio links observed with a bearing in direction of Dernacart Wind Farm
Capard Site A - Mast #3	7

Table 5. Field Survey Summary – Capard Site A Mast #3

4.1.4 Capard Site A - Mast #4

The survey of this mast found that there is one license-exempt microwave radio link operating from this structure. A summary of the field survey findings are shown in Table 6 below.

Figure 12. Capard Site A - Mast #4

Mast ID	Microwave radio links observed with a bearing in direction of Dernacart Wind Farm
Capard Site A - Mast #4	0

Table 6. Field Survey Summary – Capard Site A Mast #3

4.2 Capard Mast-Site B

The telecommunications mast site at Capard B is located approximately 6km southwest of Dernacart and consists of a single communications mast. This telecom mast is mapped relative to the Dernacart wind turbines in Figure 13 below. The field survey findings for this mast site are presented in Section 4.2.1 that follows.

Figure 13. Telecoms Mast at Capard Site B

4.2.1 Capard Site B - Mast #1

The survey of this mast found that there were several licensed PTP microwave radio links operating from this mast. A summary of the field survey findings are shown in Table 7 below.

Figure 14. Capard Site B - Mast #1

Mast ID	Microwave radio links observed with a bearing in direction of Dernacart Wind Farm
Capard Site B - Mast #1	7

Table 7. Field Survey Summary – Capard Site B Mast #1

Section 5 - Desktop Survey Analysis

5. Introduction

Based on the findings obtained during field surveys and the telecom operator consultation process, an analysis of the telecom networks operating in the vicinity of Dernacart was carried out. Six telecommunications technologies were considered for analysis:

- 5.1 Licensed Transmission Networks
- 5.2 License-exempt Telecommunications Networks
- 5.3 GSM Networks
- 5.4 3G/4G Networks
- 5.5 Tetra Network
- 5.6 Aviation Telecommunications Network

Sections 5.1 to 5.6 below outline the desktop survey analysis findings for each of the technologies listed above.

5.1 Licensed Transmission Networks

Table 8 below lists the licensed radio links that required a desktop analysis. The results of the desktop analysis* for these links are provided in Sections 5.1.1 to 5.1.2.

Link ID	Operator	Link Description
1	Eir	PTP microwave radio link from Capard to Cooltycannon (15GHz assumed)
2	Vodafone	PTP microwave radio link from Capard to Clonyquin (15GHz)

Table 8. Licensed Radio Links requiring Analysis

Note: Findings from the field survey of the telecom masts at Capard indicate that there may be more than two Licensed PTP Microwave radio links passing through/near the proposed wind farm. At the time of writing, only two telecom operators (Eir and Vodafone) have raised any concerns in relation to the development; however, not all of the telecom operators contacted have responded to consultations.

It should also be noted that OpenEir have stated that they have an existing PTP link that crosses the wind farm but that the link is due to be decommissioned in the next few months. For this reason the OpenEir link has not been considered for additional analysis in this report.

** The Desktop Survey Analysis findings are subject to accuracy of the information (GPS co-ordinates, turbine dimensions, etc.) provided to Ai Bridges.*

5.1.1 Link 1 Analysis (Capard to Cooltycannon – Eir)

Figure 15 below shows Eir's microwave radio link between Capard and Cooltycannon.

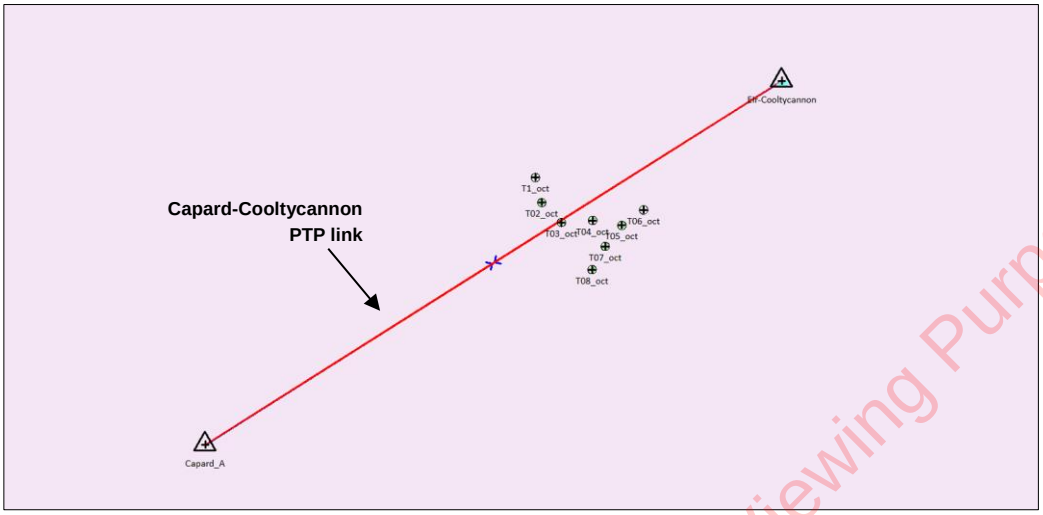


Figure 15. Eir's Link from Capard to Cooltycannon.

Figure 16 below shows a close-up view of the Eir link relative to the nearest Dernacart turbine. Desktop survey analysis indicates that this link is likely to be impacted by the Dernacart wind farm development.

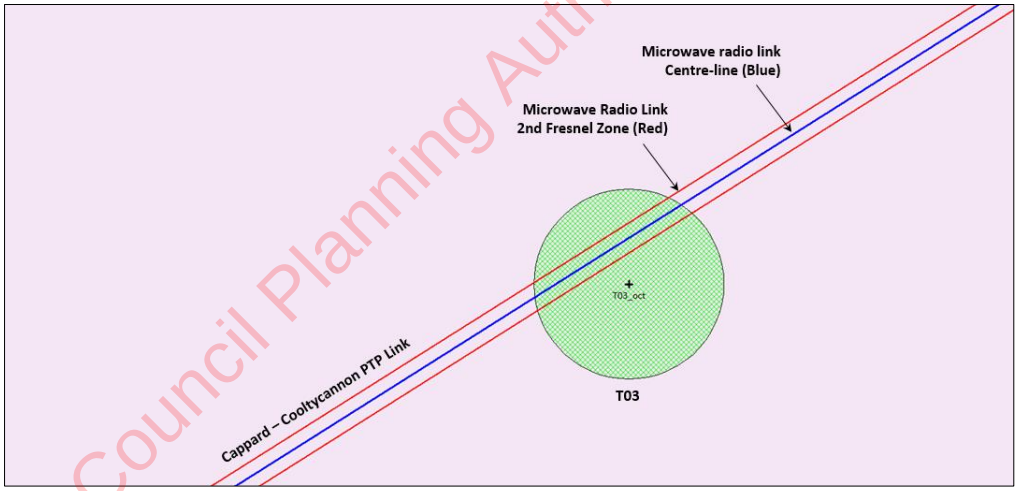


Figure 16. Close-up view of Eir's Link from Capard to Cooltycannon.

Table 9 below provides a brief summary of the desktop survey analysis of Link 1.

Operator	Eir
Link Description	Licensed PTP microwave radio link from Capard – Cooltycannon
Wind Farm Impacts	**Likely to be impacted by Turbine T03**

Table 9. Link 1 - Analysis Summary

** Every microwave radio link has multiple Fresnel Zones (1st Fresnel Zone, 2nd Fresnel Zone, 3rd Fresnel Zone, etc). In radio frequency analysis, it is normal to use the 1st Fresnel Zone in radio interference calculations; however the 2nd Fresnel Zone is sometimes used to provide worse-case-scenario results as it encompasses a larger area around the centerline of the microwave link.*

5.1.2 Link 2 Analysis (Capard to Clonyquin – Vodafone Ireland)

Figure 17 below shows Vodafone's microwave radio link between Capard and Clonyquin.

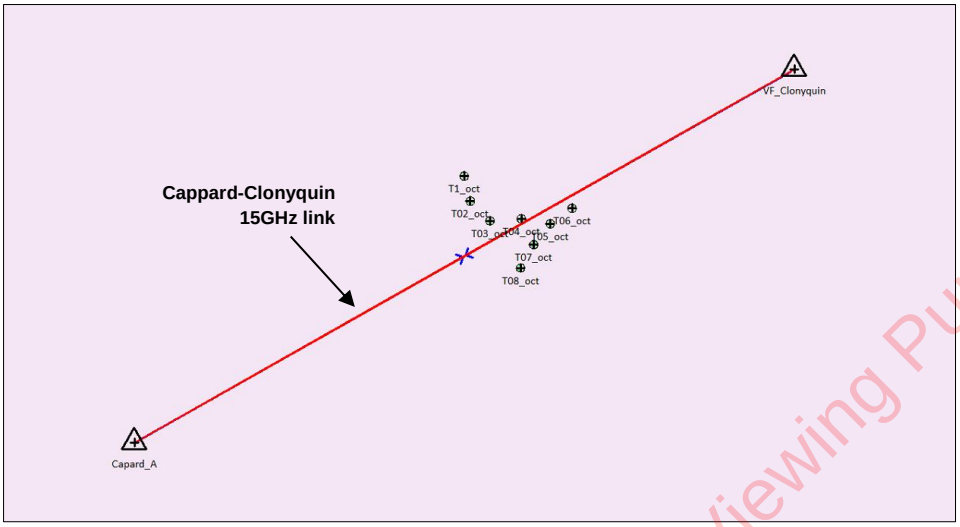


Figure 17. Vodafone's Link from Capard to Clonyquin.

Figure 18 below shows a close-up view of the Vodafone link relative to the nearest Dernacart turbine. Desktop survey analysis indicates that there is a high probability that the operation of this link could be impacted by turbine T04.

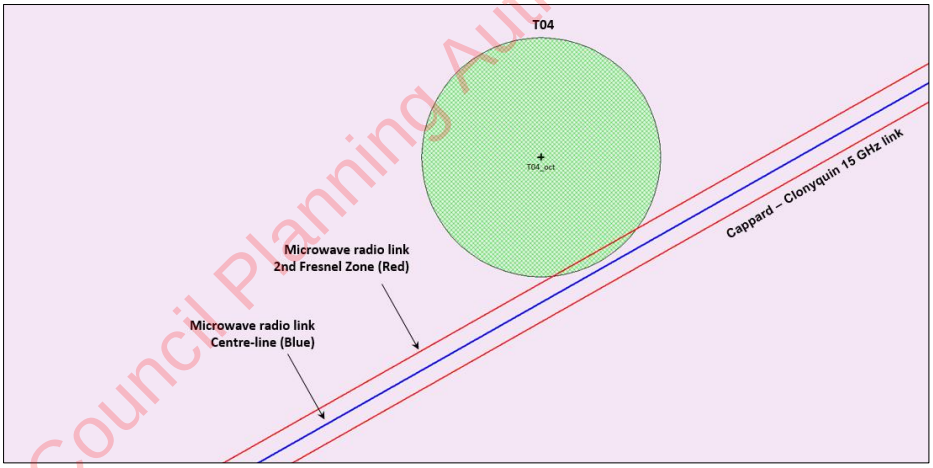


Figure 18. Close-up view of Vodafone's Link from Capard to Clonyquin.

Table 10 below provides a brief summary of the desktop survey analysis of Link 2.

Operator	Vodafone Ireland
Link Description	Licensed PTP microwave radio link from Capard – Clonyquin
Wind Farm Impacts	**Possibly impacted by Turbine T04**

Table 10. Link 2 - Analysis Summary

** Every microwave radio link has multiple Fresnel Zones (1st Fresnel Zone, 2nd Fresnel Zone, 3rd Fresnel Zone, etc). In radio frequency analysis, it is normal to use the 1st Fresnel Zone in radio interference calculations; however the 2nd Fresnel Zone is sometimes used to provide worse-case-scenario results as it encompasses a larger area around the centerline of the microwave link.*

5.2 License-Exempt Telecommunications Networks

No license-exempt network infrastructure was identified during the Telecom Operator consultation process. However, it should be noted that during the field survey of Capard, a number of unlicensed radio antennas were observed with bearings in the general direction of the wind farm. Figure 19 below shows the license-exempt telecoms equipment which is installed on Capard Site B Mast #3. This license-exempt telecoms equipment is possibly owned / operated by a local wireless Internet service provider.

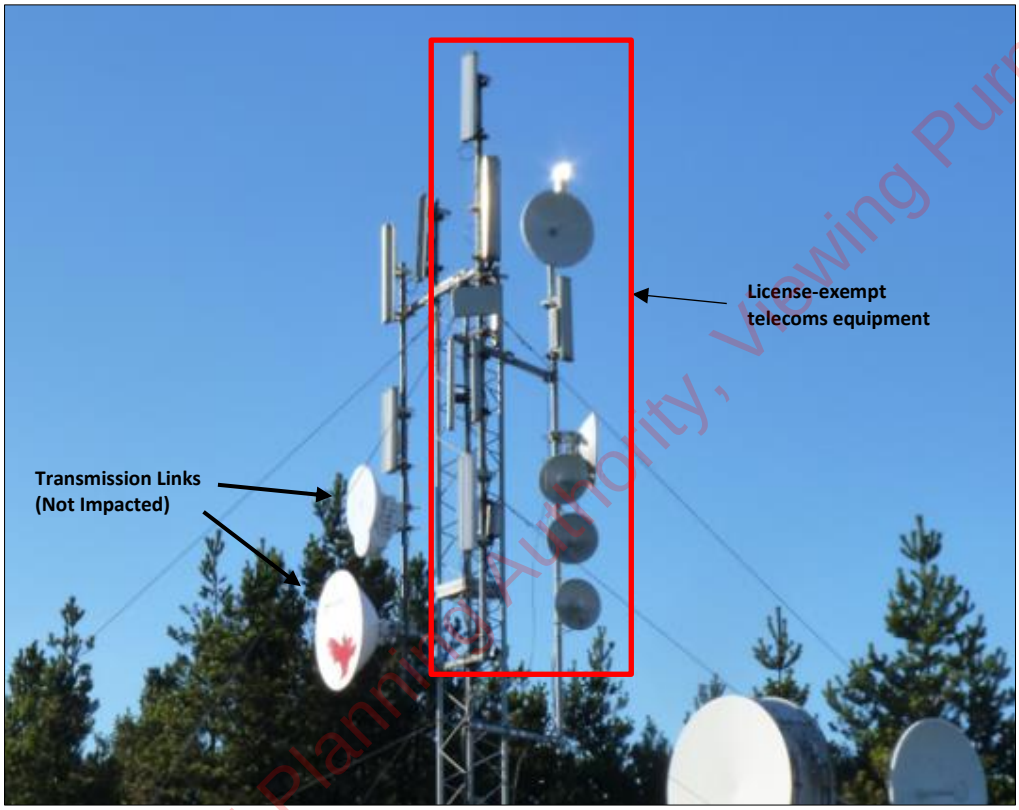


Figure 19. License-exempt telecoms equipment at Capard Site A – Mast #3

5.3 GSM Access Network

None of the telecom operators contacted during the consultation process have stated any concerns regarding their GSM Access Networks.

5.4 3G/4G Access Network

None of the telecom operators contacted during the consultation process have stated any concerns regarding their 3G/4G Access Networks.

5.5 TETRA Network

In their response to consultations TETRA Ireland raised no concerns in relation to the proposed wind farm development.

5.6 Aviation Telecommunications Network

When safeguarding surveillance systems from the possible impacts of wind farms, the IAA (Irish Aviation Authority) utilises guidance material prepared by The European Organisation for the Safety of Air Navigation (EUROCONTROL). The EUROCONTROL guidance material defines the following four zones:

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 (500metres).

Zone 2: Detailed Assessment Zone (PSR and SSR).

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

Zone 3: Simple Assessment Zone (PSR only).

Beyond the detailed assessment zone is a region within which a simple assessment of PSR performance should be sufficient to enable the surveillance data provider to assess the application.

Zone 4: Accepted Zone (PSR 15km and SSR 16km).

Beyond the simple assessment zone are areas within which no assessments may be required and within which air navigation service providers would be unlikely to raise objections to wind farms on the basis of impact on surveillance services.

Tabled 12 and 13 below show the Assessment Zone arrangement for the two types of aviation radar surveillance systems; Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR).

Zone	Description
Zone 1 - Safeguarding	0 - 500m
Zone 2 - Detailed Assessment	500m - 15km and in radar line of sight
Zone 3 - Simple Assessment	Further than 15km and in radar line of sight
Zone 4 - No Assessment	Not in radar line of sight

Table 11. PSR Zone Arrangements

Zone	Description
Zone 1 - Safeguarding	0 - 500m
Zone 2 - Detailed Assessment	500m - 16km and in radar line of sight
Zone 4 - No Assessment	Further than 16km or not in radar line of sight

Table 12. SSR Zone Arrangements

Figure 20 below shows the Dernacart wind farm development relative to its nearest airports / aerodromes. The nearest airport/airfield to Dernacart is Ridge Aviation which is located 9km to the southeast of the proposed wind farm. There are no PSR or SSR radar systems at this airfield. The nearest PSR / SSR system is located at Dublin airport which is in excess of 75km from the proposed wind farm (i.e. EUROCONTROL Assessment Zone 4 – No assessment required).

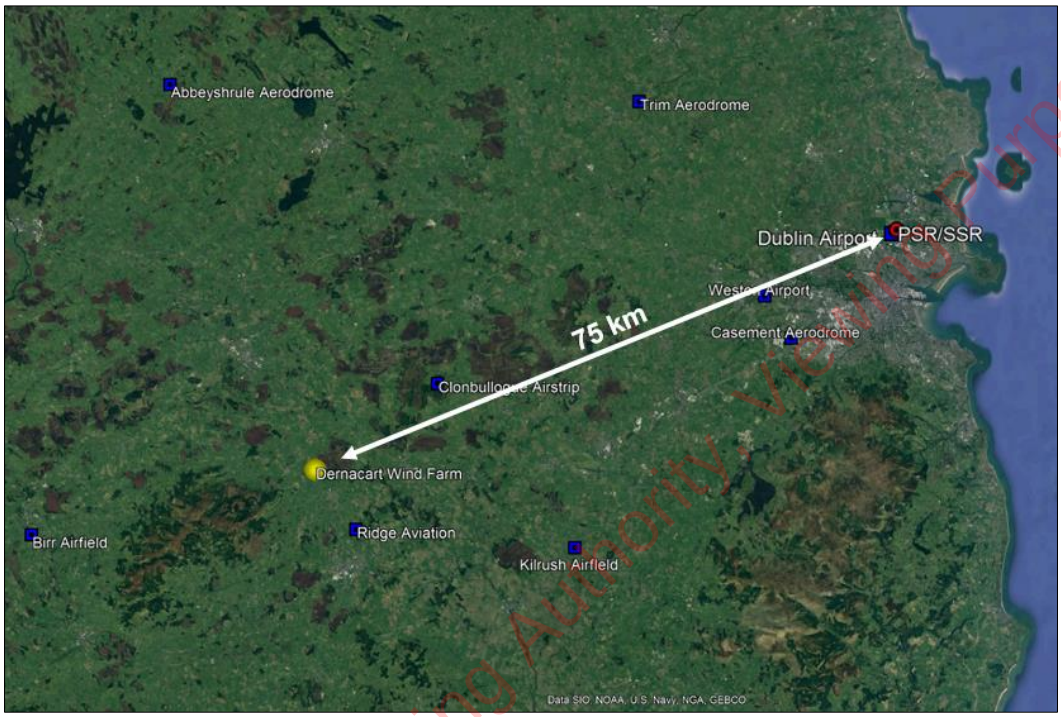


Figure 20. Dernacart wind farm relative to its nearest airports / aerodromes

As there are no aviation radar navigational equipment (PSR or SSR) in close proximity to the Dernacart development there should be no impact to the IAA telecommunications network.

Section 6 - Mitigation Measures

6. Introduction

The following sections outline where mitigation measures are needed and the mitigation solutions available to the wind farm developer. The radio links that may require mitigation are listed below in Table 13.

Link ID	Link Description	Mitigation Required
1	Capard - Cooltycannon (Eir Licensed PTP Link)	Network analysis shows that the operation of this link is likely to be impacted and mitigation measures are likely to be required.
2	Capard – Clonyquin (Vodafone Licensed PTP Link)	Network analysis shows that there is a serious risk that the operation of this link will be impacted and mitigation measures are likely to be required.

Table 13. Radio links requiring mitigation

6.1 Mitigation Solution – Eir Link (Capard – Cooltycannon)

The correspondence between Ai Bridges and Eir in relation a possible mitigation measure for the Eir link between Capard and Cooltycannon is presented below. The proposed mitigation is to reroute the link for Cooltycannon (OY_4718) to another Eir site away from the wind farm area.

Email received from Eir - 09 May 2019

> The cost of the survey would be €2570.00 for a full line of sight survey to be carried out, the cost of the design and implementation of the reroute link could only be determinate on the results of the survey report.
>
> Kind regards,
> John.

Email sent to Eir - 08 May 2019

> Hello John,
>
> I am following up from your email below.
> Our client is now looking to complete their EMI and EIS environmental impact studies and they have enquired as to the expected cost of the implementation costs of a relay site mitigation measure
>
> Would you be able to provide the expected survey costs so that you can determine the full costs of mitigation.
>
> Best Regards,
> Kevin Hayes,
> Ai Bridges Ltd.,

Email received from Eir - 30 April 2019

Hi Kevin,

We wouldn't want a relay option as it would add another extra txn HOP on the path, but we could look at rerouting the link for OY_4718 to another Eir site away from the windfarm area.

The cost of line of sight survey and implementation would have to be covered by your client. We would know the full cost until the initial line of sight survey is carried out.

Kind regards,
John.

6.2 Mitigation Solution – Vodafone Link (Capard – Clonyquin)

The correspondence between Ai Bridges and Vodafone Ireland in relation a possible mitigation measure for the Vodafone link between Capard and Clonyquin is presented below. The proposed mitigation is to reroute the link to Clonyquin from another Vodafone site (at Portarlington) away from the wind farm area.

Email received from Vodafone - 12 September 2019

Sent: 12 September 2019 17:21
Subject: RE: Baybridge Wind Farm Development - Co Laois

Hi Kevin,

As the network topology is today, these remedial costs are fine, should they be required.

Many Thanks,
Gavin

Email sent to Vodafone - 12 September 2019

From: Kevin Hayes <khayes@aibridges.ie>
Sent: Thursday 12 September 2019 08:54
Subject: RE: Baybridge Wind Farm Development - Co Laois

Hello Gavin,

I am just following up from the email correspondence below in relation to the Baybridge Wind Farm Development.

I would be grateful if you could revert with an update as to the remediation proposals discussed in July.

Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,

Email sent to Vodafone - 15 July 2019

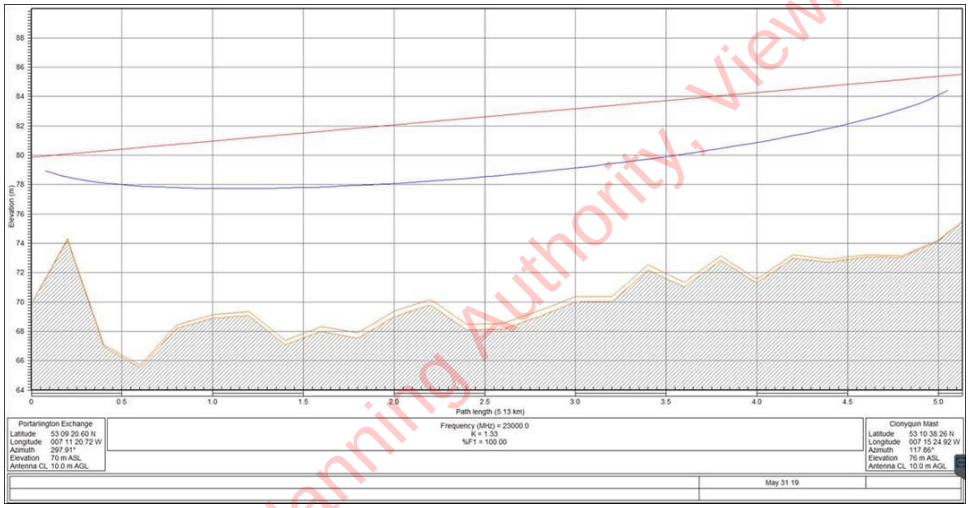
From: Kevin Hayes
Sent: 15 July 2019 11:19
Subject: RE: Baybridge Wind Farm Development - Co Laois

Hello Gavin,

I am following up from our most recent call on the pre-planning application in relation to a proposed wind farm ay Baybridge that has the postennial to impact the Cappard to Cloney Quin links, see attached the visual of the communications links as per last discussions with regarding to a “re-direct of radio services” to Partarlingon on the basis of fibre availability in the coming 3 – 4 years. We have also completed a desktop analysis and the proposed mast in Portarlington offers a viable option for

remediation and this would be subject to a LOS survey as discussed. Also as per discussions we have provisioned for survey \ remedial estimate costs for € 12K – 15 K

Would you be available later today to discuss?



Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
Mob : +353 86 1084703
FAX : +353 65 6848769
Email : khayes@aibridges.ie
Web : www.aibridges.ie

Section 7 - Conclusions

7. Conclusions

From the findings made in this report the following conclusions have been made:

- There are two telecommunication mast sites in the vicinity of the proposed Dernacart development. The mast sites are located at Capard which is approximately 7km southwest of Dernacart.

- The results from field surveys and telecom operator consultations indicate that at least two Licensed PTP microwave links are potentially impacted by the proposed wind farm development. In the event that a wind turbine is erected in a location that would block a microwave link path, the operation of the link could be impacted.

- The licensed PTP links which are potentially impacted by the proposed wind farm are listed below in Table 14 along with the proposed mitigation solutions.

Link Operator	Link Description	Impact of Wind Farm	Proposed Mitigation Measure
Eir	PTP microwave radio link from Capard to Cooltycannon	Potentially impacted by turbine T03.	Re-route radio link to Cooltycannon via alternative Eir Feeder site.
Vodafone	PTP microwave radio link from Capard to Clonyquin	Potentially impacted by turbine T04.	Re-route radio link to Clonyquin via alternative Vodafone Feeder site (at Portarlington).

Table 14. Microwave Radio Links potentially impacted by Dernacart wind farm

- The findings of the aviation study show that the nearest radar navigational equipment (PSR or SSR) is located at Dublin airport which is over 75km from Dernacart. As there are no airports or PSR/SSR systems in close proximity to the Dernacart development there should be no impact to the IAA telecommunications network.

- None of the Telecommunications Operators contacted during the consultation process have raised any concerns regarding License-exempt, GSM, 3G/4G or TETRA network infrastructure.

APPENDIX A – Dernacart Wind Farm Turbine Co-ordinates

Appendix A – Dernacart Wind Farm Turbine Co-ordinates

The turbine co-ordinates used in this report are listed in ITM format in Table A-1

ID	E	N
T01	643101	712155
T02	643230	711660
T03	643625	711270
T04	644248	711316
T05	644829	711222
T06	645258	711533
T07	644501	710805
T08	644243	710340

Table A-1 Dernacart Turbine Co-ordinates

Appendix 9.2

2rn Protocol Agreement

Block B, Cookstown Court,
Old Belgard Road, Tallaght,
Dublin 24, Ireland
Tel: +353 (0)1 208 2259
E-mail: 2rn@2rn.ie

Protocol Agreement

between

Dernacart Wind Farm Limited

and

2rn

concerning the wind farm at:

Dernacart, Co. Laois

"Developer":	Dernacart Wind Farm Limited, Building 4200, Cork Airport Business Park Cork 12 D23C Registered No. 660499
"2RN":	RTÉ Transmission Network DAC trading as "2RN", Montrose, Donnybrook, Dublin 4. Registered No. 364909
"Development":	Proposed development by way of initial construction or intensification of use of a wind farm at Dernacart, Co. Laois
"Viewer(s)":	Proprietor (or agent of proprietor) of a private residence or business premises where a television set, for which a current television licence is held, is used and/or a broadcast radio receiver.
"Local Dealer":	Local dealer being a television engineer / dealer carrying on business in the vicinity of the development and may be nominated by the wind farm developer.

Interference on Viewers' Television Sets and/or Broadcast Radio Receivers

1. When 2RN is put on notice, whether by telephone or written communication, that a viewer is having problems with their reception, 2RN will undertake a preliminary assessment, over the telephone or by other means of communication, and ascertain whether or not the wind farm is a likely cause of the interference complained of.

2. If 2RN believes the interference is wind farm related, the viewer will be asked to contact the wind farm developer. Then the developer will arrange for a local dealer to visit the viewer.

3. Both parties to this protocol note that the type of interference caused by electromagnetic disturbance emanating from wind farms manifests itself in very specific ways on television sets and broadcast radio receivers.

4. The local dealer will arrange directly with the viewer to make a visit to the viewer's house and assess the cause of the interference. The local dealer will take whatever steps are necessary to remedy the interference.

5. The local dealer will prepare a brief report in writing which will be sent to the developer. If the local dealer is of the view that the interference is due to interference from the development, the dealer will send an invoice in respect of the site visit and remedial work to the developer. The developer is the party primarily liable for the discharge of any amounts due in respect of any such site visit and remedial work. If the local dealer identifies that the problem is due to some other cause, the local dealer will invoice the viewer in the usual way.

6. Where the reception interference problem affects a number of viewers in the same vicinity, and this is identified by the local dealer and/or 2RN, it may be that it will be necessary for 2RN to develop an existing alternative or additional transposer site within that locality.

7. The developer in this instance will be responsible for all the costs associated with the development of the new transposer site, where this transposer site is necessitated by the presence of the development.

8. The maximum expenditure incurred by 2RN in the provision of the new transposer site (arising from section 6) will be €150,000, (such figure to be index linked upwards only – by reference to the Consumer Price Index published by the Central Statistics Office, calculated on the basis of the average increase over the 12-month period preceding demand for reimbursement by 2RN). A detailed estimate is to be submitted to the Developer in advance for comment, within a reasonable timeframe.

9. If the cost of acquiring and developing a new transposer site exceeds the sum of €150,000 the developer and 2RN will enter into negotiations to ascertain how the cost of remedying the problem being experienced by viewers in the locality might most equitably be met. The developer, however, shall be the party primarily liable for the discharge of any amounts due in respect of the acquisition and development of a new transposer site to the extent that such an acquisition and development is attributable to the presence of the development.

10. Where the acquisition and development of a transposer site is additional to the transposer(s) serving the locality prior to the commencement of operation of the development, the developer shall be liable to reimburse to 2RN the ongoing operational costs of the said additional transposer for so long as same shall be necessary to counteract the interference with viewers' reception caused by the development, up to a maximum of €15,000 per annum (such figure to be index linked – upwards only – by reference to the Consumer Price Index published by the Central Statistics Office, calculated on the basis of the average increase over the 12 month period preceding demand for reimbursement by 2RN).

11. The developer will be entitled to see copies of operational costs to the extent that company confidentially is not breached. All the 2RN costs involved in investigation and reports associated with the proposed development shall be covered by the developer if it is found that the said development is the cause of the interference.

12. The developer shall be entitled to retain its own engineer to inspect and report on the source of interference and if a transposer site is built, 2RN undertakes to facilitate access to the installation in question for the purposes of carrying out any such inspection and/or tests necessary.

13. The developer will indemnify 2RN fully in respect of damage to the person or property of any such engineer or inspector as retained by the developer, or any other agent or licensee of the developer involved in or associated with such inspection and/or tests. The developer will ensure that competent personnel only are deployed onto 2RN property under the terms of this clause and hereby indemnify 2RN in respect of any damage to 2RN's property or personnel caused by the negligence of such engineer, inspector or other agent or licensee.

Interference with 2RN installations (to include transmitter stations, transposers and, if applicable, links stations

14. Where 2RN detects interference with the reception of a receive and/or transmission signal at a transposer site, 2RN will investigate the cause of the interference and report in writing to the developer if 2RN determines that the interference is attributable in whole or in part to the development.

15. The developer shall be entitled to retain its own engineer to inspect and report on the source of interference and 2RN undertakes to facilitate access to the installation in question for the purposes of carrying out any such inspection and/or tests necessary.

16. The developer will indemnify 2RN fully in respect of damage to the person or property of any such engineer or inspector as retained by the developer, or any other agent or licensee of the developer involved in or associated with such inspection and/or tests. The developer will ensure that competent personnel only are deployed onto 2RN's property under the terms of this clause and hereby indemnify 2RN in respect of any damage to 2RN's property or personnel caused by the negligence or such engineer, inspector or other agent or licensee.

17. Engineers representing both 2RN and (if applicable) the developer, will agree on remedial works (e.g. reorientation of reception antennas) and the cost of same. 2RN shall carry out the necessary remedial works and the cost of same shall be discharged/reimbursed to 2RN by the developer (subject to the provisions below).

    In the following paragraph, the term "installation" shall mean one or more installation sites if applicable.

18. In the event that an additional or alternative installation is required in order to overcome reception or transmission problems caused exclusively by the development, 2RN shall identify a new location for such installation, within a reasonable timeframe.

19. The developer shall be responsible for all costs associated with the development of the new installation (e.g. repeat broadcasting station), where the new installation is necessitated exclusively because of interference caused by the development. The developer shall be liable for such costs up to a maximum of €150,000 (such figure to be index linked – upwards only – by reference to the Consumer Price Index published by the Central Statistics Office, calculated on the basis of the average increase over the 12-month period preceding demand for reimbursement by 2RN). Where the likely costs of such additional or alternative installation exceed €150,000 (as adjusted), 2RN and the Developer shall negotiate and determine between them how the costs of this new development might most equitably be met. The projected costs are to be submitted to and agreed with the developer prior to development of the new installation, within a reasonable timeframe.

20. Where the acquisition and development of a transposer site is additional to the transposer(s) serving the locality prior to the operation of the development, the

developer shall be liable to reimburse to 2RN the ongoing operational costs of the said additional transposer for so long as same shall be necessary to counteract the interference with viewers' reception caused by the development, up to a maximum of €15,000 per annum (such figure to be index linked – upwards only – by reference to the Consumer Price Index published by the Central Statistics Office, calculated on the basis of the average increase over the 12-month period preceding demand for reimbursement by 2RN.

21. The developer will be entitled to see copies of operational costs to the extent that company confidentially is not breached. All the 2RN costs involved in investigation and reports associated with the proposed development shall be covered by the Developer if it is found that the said development is the cause of the interference.

22. The parties agree that any dispute which arises concerning the interpretation of this Agreement shall first be referred to: -

    (a) in the case of 2RN, the Executive Director for the time being; and
    (b) in the case of the Developer, the Executive Director for the time being;

    and such persons shall use all reasonable commercial efforts to resolve any such dispute within ten (10) Business Days.

23. If the dispute is not resolved by the relevant parties within the time period referred to above then save in respect for a dispute referable to the Expert, the parties may by agreement in writing attempt to settle all other disputes by mediation in accordance with the rules of the International Centre for Dispute Resolution (ICDR). To initiate the mediation a party must give notice in writing to the other party to the dispute requesting mediation and a copy of the request must be sent to ICDR. The mediation will start not later than 20 days after the date of such notice. The commencement of mediation will not prevent the parties commencing or continuing court proceedings. Unless otherwise agreed between the parties

    (a) the mediator will be nominated by ICDR;

    (b) the costs of the mediator shall be borne and discharged as to 50% by the Company and as to the remaining 50% by the Developer, and

    (c) the mediation shall be conducted in Dublin, Ireland, at a venue agreed upon by the parties and the mediator or, failing such agreement, at a venue selected by the mediator in his/her discretion.

24. If a dispute or difference arises between the parties that is technical in nature the parties may refer such dispute, by agreement in writing between the parties, for final determination to the Expert (as hereinafter defined).

25. The expert for the purposes of this Clause shall be an independent party who has expertise in the area giving rise to the dispute (the "Expert") appointed by the agreement by the parties, or in default of agreement on such appointment, on the application of either party, by the President for the time being of the Institute of Engineers of Ireland or his duly appointed deputy, who shall carry out his functions in accordance with the following:

(a) in making a determination, the Expert shall act as an expert and not as an arbitrator and his decision shall (in the absence of manifest error (and the Expert shall give reasons for his determination)) be final and binding on the parties;

(b) the Expert shall afford both parties a reasonable opportunity to be heard and to state their respective cases and to advance arguments or evidence in support of their respective positions;

(c) each party shall bear the costs and expenses of all counsel and other advisers, witnesses and employees retained by it and the costs and expenses of the Expert shall be borne by the parties in the proportions the Expert may direct, or in the absence of direction, equally.

26. This Agreement shall be governed by and construed in accordance with the laws of Ireland. Subject always to clauses 20, 21 and 22 above, each of the parties agrees that the courts of Ireland are to have exclusive jurisdiction to settle any dispute arising out of or in connection with this Agreement.

Dated this 13th day of November 2019

Signed for and on behalf of 2RN

(Authorised signatory)

Signed for and on behalf of the Developer

(Authorised signatory)