

ADVERTISED PLAN

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Golden Plains Wind Farm

Appendix C.3: Electromagnetic Interference Impact Assessment



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Australia

DNV GL Energy
Renewables Advisory
Level 12, 350 Queen Street
Melbourne Victoria 3000
Australia

Date:	Our reference:	Your reference:	ABN 14 154 635 319
20 November 2020	PP329719-AUME-L-01-C	N/A	

RE: Electromagnetic Interference Review for the Golden Plains Wind Farm FINAL

Dear Kyle Sandona,

Golden Plains Wind Farm Management Pty Ltd (the "Customer") has instructed DNV GL Australia Pty Ltd (DNV GL) to carry out a supplementary review of electromagnetic interference (EMI) impacts for the proposed Golden Plains Wind Farm (the "Project"), based on a revised turbine layout and change in the turbine specifications provided by the Customer.

DNV GL has previously carried out an EMI assessment for the Project (the "previous assessment"), as reported in DNV GL report PP166023-AUME-R-02-E dated 9 February 2018, which formed part of the Project's Environment Effects Statement (EES). This letter summarises the results of a review (the "current review") of the expected change in EMI-related impacts compared to the previous turbine layout and specifications.

DNV GL notes the following regarding the current review:

- The revised layout considered in the current review (layout v39-01) consists of 215 turbines, which is 13 turbines less than the layout of 228 turbines considered in the previous assessment. However, while the overall number of turbines has decreased, there are some areas of the Project site where the aggregated radar cross section (RCS) of the turbines within a given area is likely to have increased compared to the previous layout. It is noted that the 215-turbine layout has been revised to address conditions in the Planning Permit for the Project and other constraints.
- The turbine specifications considered in the current review consist of a rotor diameter of 165 m, a hub height of 147.5 m, and an upper tip height of 230 m. The specifications considered in the previous assessment consisted of a rotor diameter of 150 m, a hub height of 155 m, and a tip height of 230 m. The increase in the turbine rotor diameter will increase the RCS of each individual turbine, and therefore also increase the aggregated RCS of the turbines in some areas of the Project site compared to the previous layout and specifications.
- The Customer has requested that the current review be carried out based on the information regarding radiocommunication licences, services, and coverage areas used in the previous assessment. Therefore, the results presented in this letter do not consider any potential changes in nearby licences and services (such as the existence or discovery of new services) since the previous assessment report was issued.

The key findings of the current review with respect to the change in turbine layout and specifications are:

- For *radiocommunication towers located within 2 km of the proposed turbine locations, meteorological radar, trigonometrical stations, citizen's band radio services, and satellite television and internet services*: no change in impact is expected. For all of these assets and services, impacts are either not expected or are considered unlikely.
- For *fixed point-to-point links and nearby emergency services*: impact is expected to be reduced. Three turbines in the previous 228-turbine layout were located within the diffraction exclusion zone for a point-to-point link operated by the Country Fire Authority. Turbines in the current 215-turbine layout are clear of the diffraction exclusion zones for all point-to-point links crossing the Project site, and are located at sufficient distances from the link endpoints to avoid reflection/scattering and near-field effects.
- For *fixed point-to-multipoint links*: it is not possible to evaluate the change in impact based on the currently available information. Additional information from the operators of these services is required to determine any potential relative change in impact. DNV GL understands that the Customer will consult with these operators in line with Permit Condition 35, and manage any potential impacts to services through appropriate mitigation measures.
- For *NBN fixed wireless internet services*: it is not possible to evaluate the change in impact based on the currently available information. A detailed line of sight analysis would be required to determine any potential relative change in impact. DNV GL understands that the Customer will consult with NBN Co in line with Permit Condition 35, and manage any potential impacts to services through appropriate mitigation measures.
- For *mobile phone services, wireless internet provided by mobile phone networks, and radio and television broadcasting services*: there may be reduced impact in some areas due to a reduction in the number of turbines and the potential for increased impact in other areas due to increased aggregated turbine RCS. Impacts to these services are considered unlikely in areas with good signal coverage, but may occur in areas with marginal reception if a turbine intercepts the signal between the user and the tower. However, DNV GL notes that the Planning Permit for the Project requires the Customer to undertake signal strength surveys for television, radio, and other potentially-affected services (Conditions 35 and 36). It is expected that any residual impacts to these services can be managed through the signal strength survey, including the consultation, mitigation and restoration process, as outlined in the Planning Permit.

The results of the current review are summarised in the table on the following pages.

Yours sincerely

for DNV GL Australia Pty Ltd

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Summary of EMI review results for the proposed Project

Licence/service type	Review findings (current turbine layout and specifications)	Expected impact		Expected change in impact	Expected cumulative impact
		EES layout and specifications	Current layout and specifications		
Radiocommunication towers	One tower (Site ID 138482) located within 2 km of proposed turbine locations, approximately 1.6 km from turbine WTG122	Unlikely	Unlikely	No change expected	Unlikely
Fixed point-to-point links	<p>Four links crossing Project boundary</p> <p>Diffraction effects</p> <p><i>Country Fire Authority</i></p> <p><u>Lismore – Corindhap Link:</u> No turbines in exclusion zone</p> <p><u>Mount Kinross – Corindhap Link:</u> No turbines in exclusion zone</p> <p><i>Optus</i></p> <p>No turbines in exclusion zone</p> <p><i>Powercor Australia</i></p> <p>No turbines in either DNV GL exclusion zone or alternative exclusion zone requested by Powercor</p>	<p>Potential for interference to Mount Kinross – Corindhap link</p>	Unlikely	Reduced impact expected	Unlikely
		Unlikely	Unlikely	No change expected	Unlikely
		Unlikely	Unlikely	No change expected	Unlikely
		Unlikely	Unlikely	No change expected	Unlikely
Fixed point-to-multipoint links	<p>276 assignments within 75 km of Project boundary</p> <p>Three base stations within 20 km of Project boundary:</p> <p>Central Highlands Region Water (site IDs 45665 and 204824)</p> <p>Powercor Australia (site ID 9026481)</p>	<p>Mapping of link paths required to determine impacts</p> <p>Potential for interference</p>	<p>Mapping of link paths required to determine impacts</p> <p>Potential for interference</p>	Not possible to evaluate change expected based on available information; Customer to consult with operators to identify potential change in impact and manage potential impacts through mitigation measures	Potential for increased interference at site ID 45665

**Summary of EMI review results for the proposed Project
(continued)**

Licence/service type	Review findings (current turbine layout and specifications)	Expected impact		Expected change in impact	Expected cumulative impact
		EES layout and specifications	Current layout and specifications		
Other licence types	Base to mobile station style communications: unlikely to be affected (see "Emergency services", "Mobile phones", "Radio broadcasting", "Television broadcasting") Aeronautical and radiodetermination: to be considered as part of an aviation impact assessment	-	-	-	-
Emergency services	Point-to-point links: two CFA links crossing boundary (see "Fixed point-to-point links" for details)	Potential for interference to CFA Mount Kinross – Corindhap link	Unlikely	Reduced impact expected	Unlikely
	Base to mobile station style communications: one CFA site within 2 km of Project (see "Radiocommunication towers" for details)	Unlikely	Unlikely	No change expected	Unlikely
Aircraft navigation systems and radar	To be considered as part of an aviation impact assessment	-	-	-	-
Meteorological radar	Nearest station: "Melbourne", 79 km from Project Unlikely to be affected	Unlikely	Unlikely	No change expected	None
Trigonometrical stations	20 stations within 20 km of Project boundary Electronic equipment: unlikely to be affected Sight lines to other stations: may be blocked by turbines	Unlikely	Unlikely	No change expected	Unlikely
Citizen's band radio	Unlikely to be affected	Unlikely	Unlikely	No change expected	None

**Summary of EMI review results for the proposed Project
(continued)**

Licence/service type	Review findings (current turbine layout and specifications)	Expected impact		Expected change in impact	Expected cumulative impact
		EES layout and specifications	Current layout and specifications		
Mobile phones	Fair to good coverage across site Unlikely to be affected, may experience interference in areas with marginal coverage	Potential for interference in areas of marginal coverage	Potential for interference in areas of marginal coverage	Reduced number of turbines in some areas of the site may reduce impact, but increased aggregated turbine RCS in other areas may have potential to increase impact Customer to undertake signal strength survey including consultation and mitigation, and manage any impacts to services through this process	Potential for increased interference where there are multiple turbines between the tower and the user
Wireless internet	Likely service providers: National Broadband Network (NBN), mobile phone networks NBN: currently available in areas surrounding Project May be affected	Potential for interference to signals from the Rokewood NBN tower Detailed line of sight analysis required to determine likely impact	Potential for interference to signals from the Rokewood NBN tower Detailed line of sight analysis required to determine likely impact	Reduced number of turbines in some areas of the site may reduce impact, but increased aggregated turbine RCS in other areas may have potential to increase impact Customer to undertake signal strength survey including consultation and mitigation, and manage any impacts to services through this process	Potential for increased interference to signals from the Rokewood NBN tower
Satellite television and internet	Satellites transmitting Australian television channels or providing internet to Australian customers: no signals intercepted	None	None	No change expected	None

**Summary of EMI review results for the proposed Project
(continued)**

Licence/service type	Review findings (current turbine layout and specifications)	Expected impact		Expected change in impact	Expected cumulative impact
		EES layout and specifications	Current layout and specifications		
Radio broadcasting	<p>AM signals: unlikely to be affected</p> <p>FM signals: may experience interference (low level hiss or distortion) in close proximity to turbines</p> <p>Digital radio signals: not available in vicinity of Project</p>	Potential for interference	Potential for interference	<p>Reduced number of turbines in some areas of the site may reduce impact, but increased aggregated turbine RCS in other areas may have potential to increase impact</p> <p>Customer to undertake signal strength survey, including mitigation and restoration, and manage any impacts to services through this process</p>	None
Television broadcasting	<p>Digital signals: may experience interference in areas with poor or marginal reception</p> <p><i>Ballarat tower: 'variable' to 'good' coverage in region</i></p> <p>Customer to undertake signal strength survey (as required by Permit Conditions 35 and 36) and manage any impacts to services through this process</p>	Potential for interference to 65 dwellings (including 38 host dwellings)	Potential for interference to 61 dwellings (including 37 host dwellings)	<p>Reduced number of turbines in some areas of the site may reduce impact, but increased aggregated turbine RCS in other areas may have potential to increase impact</p> <p>Customer to undertake signal strength survey, including mitigation and restoration, and manage any impacts to services through this process</p>	Potential for increased interference at dwellings located to the southwest and northeast



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Date: 19 March 2021
Our reference: PP329719-AUME-L-02-A

Re: Review of proposed meteorological mast positions for the Golden Plains Wind Farm with respect to fixed point-to-point radiocommunication links

Dear Kyle Sandona,

Golden Plains Wind Farm Management Pty Ltd (the "Customer") has instructed DNV Australia Pty Ltd (DNV) to carry out a review of the proposed meteorological mast ("met mast") locations for the Golden Plains Wind farm (the "Project") with respect to the radiocommunication links crossing the Project site.

DNV has previously carried out an electromagnetic interference (EMI) assessment for the Project (the "EMI assessment"), as reported in DNV GL report PP166023-AUME-R-02-E dated 9 February 2018, which formed part of the Project's Environmental Effects Statement (EES). This letter summarises the results of a review (the "current review") of the proposed met mast locations in relation to the fixed point-to-point radiocommunication links that were identified in the EMI assessment as crossing the Project site.

The Customer has requested that the current review be carried out based on the information regarding radiocommunication licences used in the EMI assessment. Therefore, the results presented in this letter do not consider any potential changes in the point-to-point links crossing the Project boundary (such as the existence of new links) since the EMI assessment report was issued.

Physical obstructions can potentially cause interference to fixed point-to-point links through diffraction of the signals. Diffraction effects are typically avoided by keeping obstructions outside an exclusion zone defined in terms of the Fresnel zones for the link. For a static structure such as a met mast, it may be acceptable for a portion of the first Fresnel zone to be obstructed without detrimentally affecting the signal. However, in this case the second Fresnel zone has been used as a conservative estimate of the clearance required to avoid diffraction effects. DNV has established a diffraction exclusion zone for each link crossing the Project site based on the second Fresnel zone of the lowest frequency for that link, as described in the EMI assessment. An additional buffer of 25 m was also added to the exclusion zone to account for possible inaccuracies in the radiocommunication tower locations. The diffraction exclusion zones established by DNV for the links crossing the Project site are shown in Figure 1.

Also shown in Figure 1 is an alternative exclusion zone requested by Powercor for the link that they operate, based on the first Fresnel zone for a 850 MHz link. DNV has applied an additional buffer of 25 m to the requested exclusion zone to account for possible inaccuracies in the tower locations.

DNV Headquarters, Veritasveien 1, P.O.Box 300, 1322 Høvik, Norway. Tel: +47 67 57 99 00. www.dnv.com



Page 2 of 3

As shown in Figure 1, the proposed met mast locations are all well clear of the diffraction exclusion zones derived by DNV and the alternative exclusion zone requested by Powercor for the point-to-point links crossing the Project site. Therefore, DNV does not expect that the met masts will cause interference to the identified point-to-point links.

Sincerely
for DNV Australia Pty Ltd

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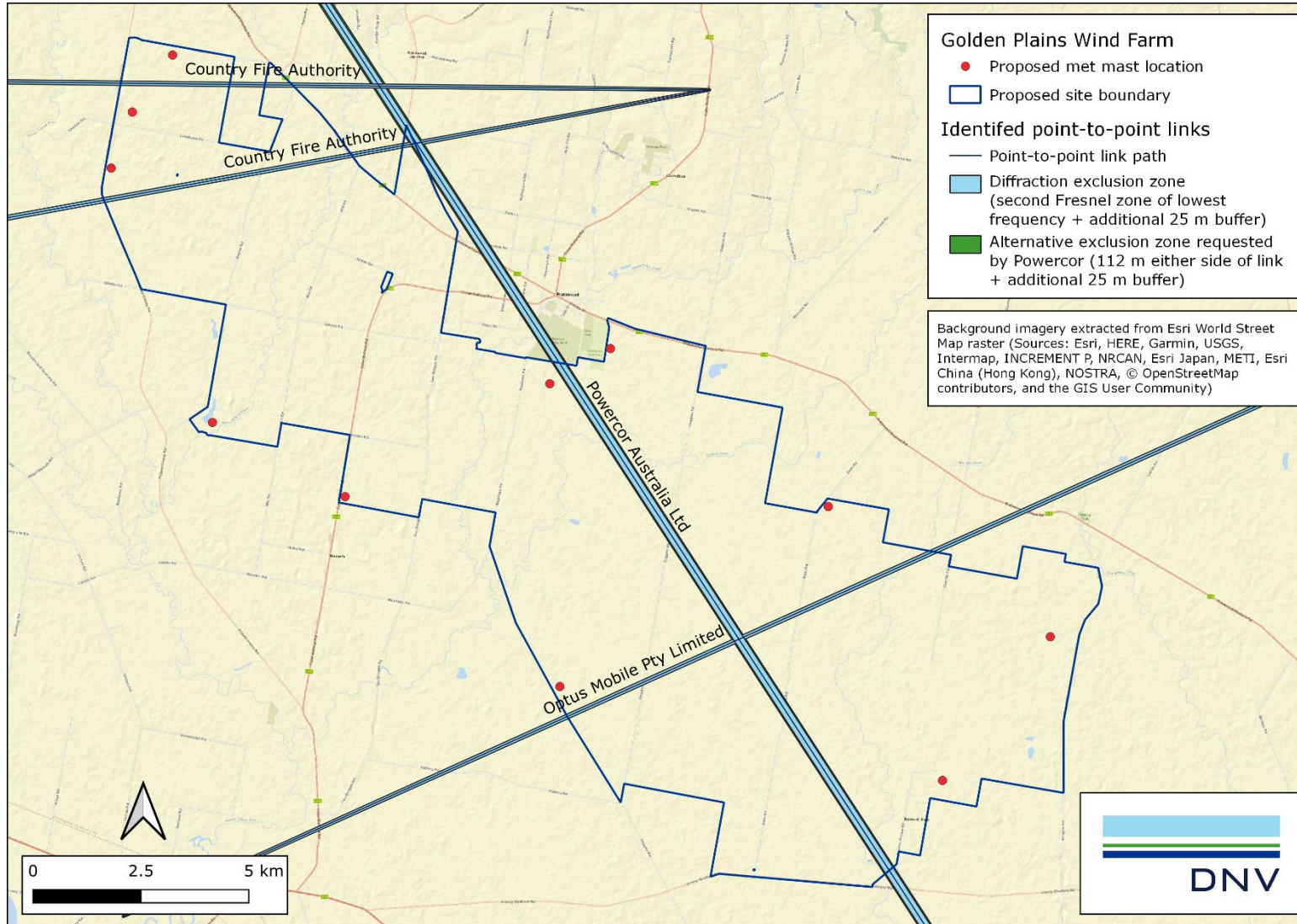


Figure 1 Proposed met mast locations in relation to the fixed point-to-point radiocommunication links crossing the Project boundary

From: [Jo Oppenhuis](#)
To: [Kyle Sandona](#)
Cc: [Simon Clifton](#); [Insightly \(Save copy to Insightly\) \(kyles-QOHLKX1@mailbox.insight.ly\)](#)
Subject: RE: Golden Plains Wind Farm - Central Highlands Water Communications Assets
Date: Wednesday, 15 April 2020 1:45:38 PM

Kyle,

Thank you for enquiry.

I can confirm that there have been no additional Radio links added to our network in this area, therefore we do not anticipate there will be any impact on our assets.

Kind regards,



Jo Oppenhuis

Team Leader IT Services - SCADA

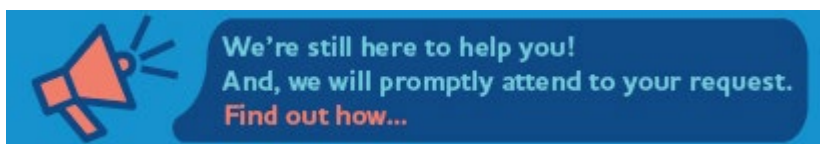
Central Highlands Water

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From: Kyle Sandona [mailto:kyles@w-wind.com.au]
Sent: Tuesday, 14 April 2020 11:12 AM
To: Jo Oppenhuis <jo.oppenhuis@chw.net.au>
Cc: Simon Clifton <Simonc@w-wind.com.au>; [Insightly \(Save copy to Insightly\) \(kyles-QOHLKX1@mailbox.insight.ly\)](#) <kyles-QOHLKX1@mailbox.insight.ly>
Subject: Golden Plains Wind Farm - Central Highlands Water Communications Assets

Attn: Jo Oppenhuis, Central Highlands Region Water Corporation

Dear Jo,

Apologies for not calling to discuss this before sending it through, but I couldn't find your contact number anywhere. Please don't hesitate to call me on 0401 552 780 if you would like to discuss in more detail or if we can be of any assistance at all.

I am writing to you on behalf of Golden Plains Wind Farm Management Pty Ltd (GPWFM), the developer of the Golden Plains Wind Farm (the Project).

We understand Central Highlands Region Water Corporation (CHW) was approached by DNV GL on 13 July 2018 regarding potential impacts on CHW's radio communication assets in the vicinity of the Project. I have attached a copy of DNV GL's previous correspondence (Ref: PP166023-AUME-...) for your information.

Conditions in the Project's planning permit have subsequently resulted in adjustments to the Project's layout and the relocation of wind turbines and ancillary infrastructure within the site. Importantly, the site boundary has not changed and all infrastructure is located within the original site boundary.

CHW Assets

We understand CHW operates a number of radiocommunication assets in the vicinity of the Project. Based on advice from Trenton Gilbert at DNV GL and your previous feedback dated 18 July 2018, we understand that CHW did not have any radio links crossing the Project site at the previous date of assessment.

-

It would be greatly appreciated if you could confirm that CHW has not recently installed any new links that cross the Project site. This will allow us to again confirm that there will be no impacts to CHW's assets as a result of the Project. Alternatively if CHW has installed new links that cross the site, we would be happy to provide our site infrastructure layout to allow CHW to undertake a detailed assessment.

Please do not hesitate to contact either myself or Simon Clifton (cc'd) if you require any further information. We look forward to your reply.

Kind regards,

Kyle Sandona

PROJECT MANAGER

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From: [Devadason, Sam](#)
To: [Kyle Sandona](#)
Cc: [Insightly \(Save copy to Insightly\) \(kyles-QOHLKX1@mailbox.insight.ly\)](#)
Subject: RE: Golden Plains Wind Farm - Powercor communications assets
Date: Wednesday, 2 December 2020 10:00:18 AM
Attachments: [image002.png](#)

Hi! Kyle


I have taken a look at the transmission line Pole locations in the pics in your e-mail – the poles have varying clearance from the first Fresnel zone boundary – 15mt, 17mt, 18mt, 32mt, 42mt, 73mt, 92mt along the transmission line routes criss-crossing the Fresnel zones. **The transmission line pole locations should not cause issues for the radio link operational performance as they are all well outside the first Fresnel zone.**

Other factors in the evaluation are that the transmission pole offers only a slim line pole silhouette obstruction (height 20mt??) along the radio propagation path which is not significant unlike the turbines which are more imposing with height as well as rotating blades which present greater obstruction and disturbance to the radio propagation.

So the transmission pole clearances from first Fresnel zone is acceptable and do not present any radio performance degradation.

I believe you have optimised the spans over the Fresnel zone crossings to give the best clearance possible. If you group the 15mt, 17mt & 18 mt clearances as a group to examine if the spans can space out more to give clearance > 30mt – this could be a further optimisation. However I would think that you have optimised these spans as much as possible. Also it is not necessary to go to this step unless this further optimisation is achievable without great expense and re-work. **As it stands the positioning of transmission poles is fine and will not degrade radio performance over the path.**

Kind Regards

Sam Devadason
Communication Network Engineer
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 [Teams Chat](#)

From: Kyle Sandona <kyles@w-wind.com.au>
Sent: Wednesday, 2 December 2020 9:25
To: Devadason, Sam <SDevadason@powercor.com.au>
Cc: Insightly (Save copy to Insightly) (kyles-QOHLKX1@mailbox.insight.ly) <kyles-qohlkx1@mailbox.insight.ly>
Subject: Golden Plains Wind Farm - Powercor communications assets

Hi Sam,

I hope you're well. Since your last review of the Golden Plains Wind Farm layout in April we have made some changes to the overhead transmission line and pole locations, so I was hoping you could review the new locations (below) and confirm that they are acceptable to Powercor?

In accordance with your previous advice, we have made sure all of the poles are outside the first Fresnel zone and in where possible we have tried to keep the poles outside the second Fresnel zone. We are proposing seven (7) poles within the second Fresnel zone as shown below. For clarity, all wind turbines and blades are outside the second Fresnel zones.

The first Fresnel zone is shown in red/orange below. The second Fresnel zone is shown in yellow.

[Poles S14 and S15](#)

S14 is 92m clear of the first Fresnel zone. S15 is 42m clear of the first Fresnel zone.

-



Poles W6 and W7

W6 is 18m clear of the first Fresnel zone. W7 is 17m clear.



Poles W12, W13 and W14

W12 is 32m clear of the first Fresnel zone. W13 is 73m clear. W14 is 15m clear.



I have also attached a Google Earth KMZ file showing the pole locations if you would like to review them in detail (see [gpwf_internaloverheadtransmissionlinepoles_v39-02.kmz](#)).

Please don't hesitate to call if you would like to discuss. Thanks in advance for your assistance.

Kind regards,

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