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Liverpool Range Wind Farm Noise Impact Assessment - Amendment

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Liverpool Range Wind Farm

Noise Impact Assessment - Amendment

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
640.10487-R02-v0.2	3 February 2017	Gustaf Reutersward	Jim Antonopoulos	Gustaf Reutersward

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting), has been engaged by Epuron Pty Ltd (Epuron) as the acoustical consultants for the proposed Liverpool Range Wind Farm.

SLR Consulting completed the original Noise Impact Study (ref: SLR Report 640.10487-R1R4 dated 12 March 2014) for the proposed Liverpool Range Wind Farm in 2014, which formed part of the Environmental Impact Assessment for the proposed project.

Subsequent to the original Noise Impact Study a few updates to the project have occurred and these are addressed in this report, including:

- The proposed layout has been reduced by six WTGs,
- The proposed positions of approximately 20 WTGs have been relocated,
- Further background noise monitoring has been undertaken,
- Feedback received from the Department of Planning and Environment (DPE) and the Environmental Protection Agency (EPA).

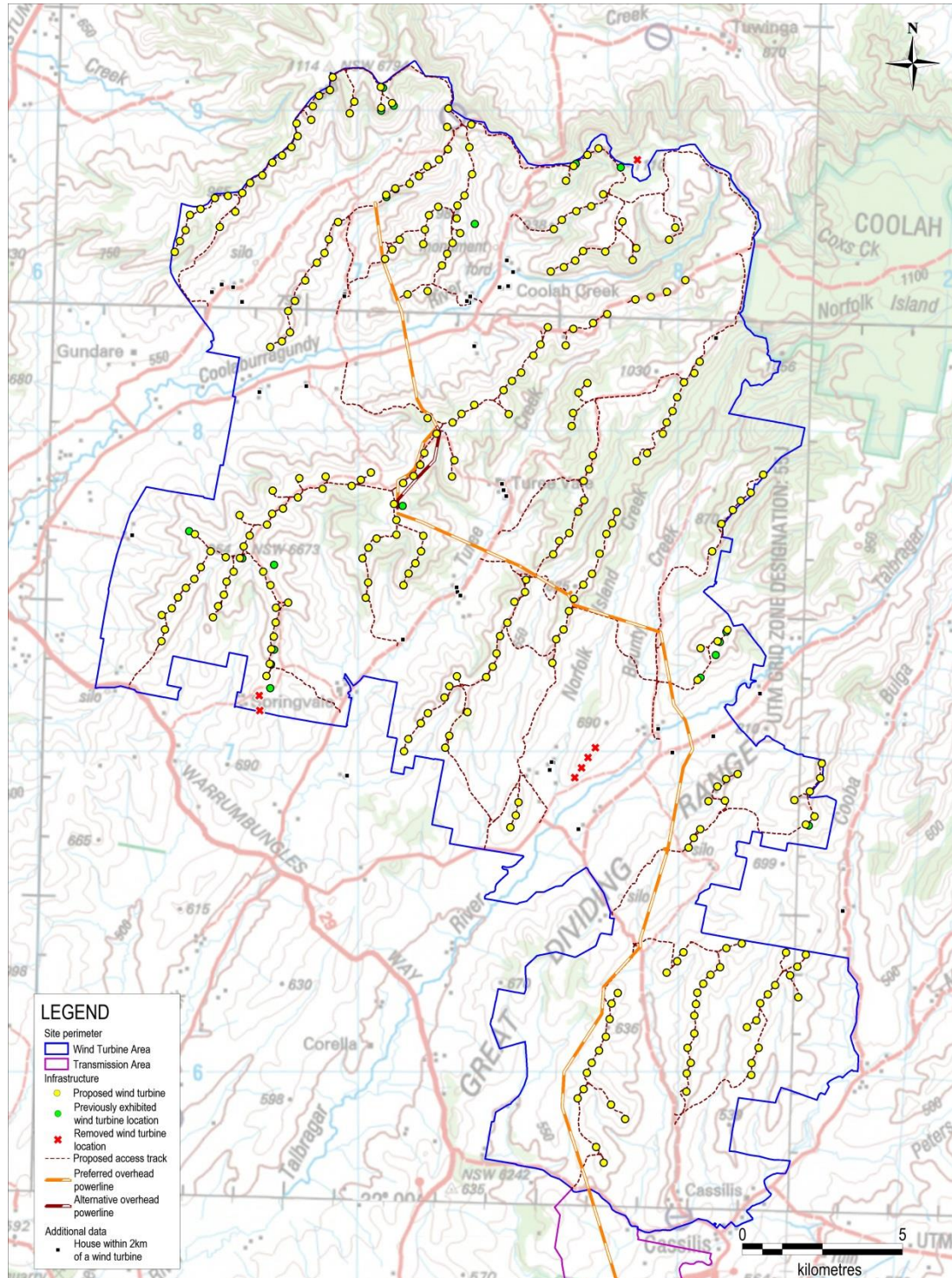
Detailed in this report are the implications due to the above changes with respect to the potential noise impacts of the project.

2 MODIFICATIONS TO PROPOSED WIND FARM LAYOUT

Subsequent to the original Noise Impact Study the proposed layout of the wind farm has been further optimised. A total of six (6) WTGs have been removed from the layout, which now totals 282 WTGs. The WTGs were removed from the layout primarily to reduce potential impacts associated with a local airstrip and noise and shadow flicker impacts at residence F7-3.

The modifications to the proposed layout are shown on the map in **Figure 1**.

Figure 1 Changes to proposed wind farm layout



For the majority of receptors surrounding the wind farm the proposed modifications to the layout will result in a negligible change in noise level, e.g. no change from that predicted in the original assessment.

For some receptors the deletion of some WTGs or the increased offset distance will result in a marginal reduction in noise levels, e.g. marginally lower from that predicted in the original assessment.

On this basis the overall findings of the original noise assessment still stand. Notwithstanding the above, it is anticipated that once a finalised layout and WTG model has been determined a revised noise impact assessment will be prepared and submitted.

3 ADDITIONAL BASELINE NOISE MONITORING

Subsequent to the original noise assessment further baseline noise monitoring has been completed by Epuron at two locations following the advice of the EPA (ref: DOC 14/17303-1, SF14/390), which recommended the following.

1. Undertake the additional monitoring referred to above or provide sufficient justification for not performing further background noise monitoring in Zone 3, as the number of valid data points used is significantly less than that recommended by the SA EPA guidelines, and the predicted impact at receiver D4-9 is greater than $L_{Aeq(10min)}$ 35 dBA and the criteria applied to other receiver zones;

Supplementary baseline noise monitoring in Zone 3 has been undertaken in June-July 2015 at:

- Location D4-6 (complimenting the data set collected in the original noise assessment)
- Location D4-9

The measurement location, monitoring period, and serial number of the Type 2 RION NL42 noise loggers used by Epuron for all testing are summarised in **Table 1**, along with the number of valid data points for each location.

The SA EPA Guideline recommends a set of approximately 2,000 valid data points. Any data points adversely affected by extraneous noise were excluded.

The measured background noise levels (L_{A90}) are then plotted against the 80 meter wind speed to obtain a background versus wind speed characteristic.

The line of best fit for the data set is then determined, as required by the SA EPA Guideline, using a linear, second order (quadratic) or third order (cubic) polynomial. The Guideline requires that the correlation coefficient (R^2 value) for each line type be reported and the line of best fit with the highest correlation coefficient used. At each location the cubic polynomial gave the highest correlation and was therefore used for the line of best fit.

Table 1 Measurement Details for each Location

Measurement Location	Measurement Period	Noise Logger Model # Serial number	Total No. of monitoring intervals	No. of valid data points		Correlation Coefficient (R^2)		
				All	Night	Linear	Quad.	Cubic
D4-6*	18/10/2012 to 1/11/2012 & 15/06/2015 to 28/07/2015	RION NL42 S/N 810841	2046 + 6188	1504 + 5180	687 + 1987	0.2054	0.2355	0.2376
D4-9*	15/06/2015 to 28/07/2015	RION NL42 S/N 810839	6040	5041	1922			

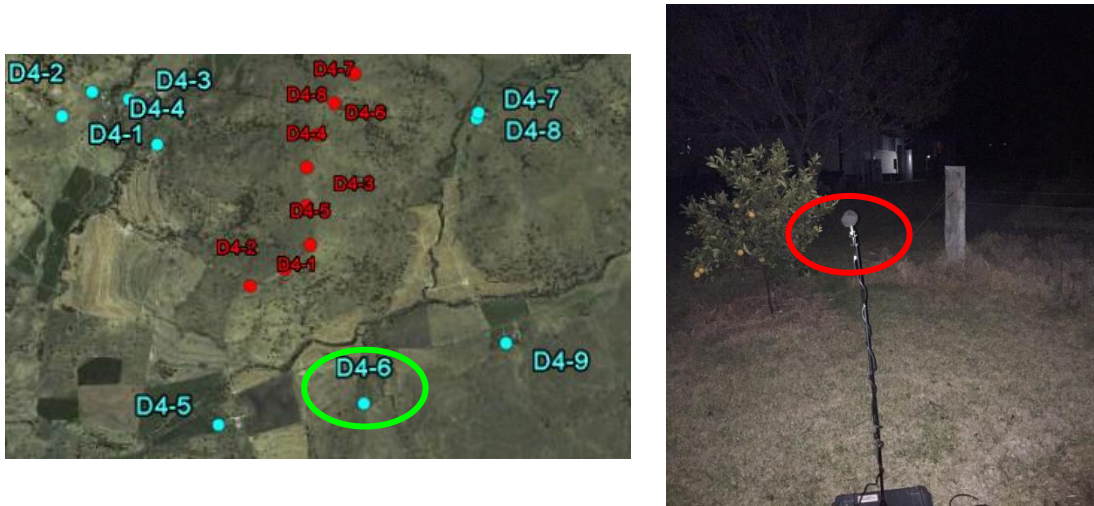
Note that '*' denotes a project involved location

1.1 Location D4-6 – Zone 3

Location D4-6 is located to the north of the proposed wind farm allotment, between the ridges for turbines D4-1, D4-2 and D5-21 and D5-22. The nearest proposed turbine to this location is approximately 1.6 km away.

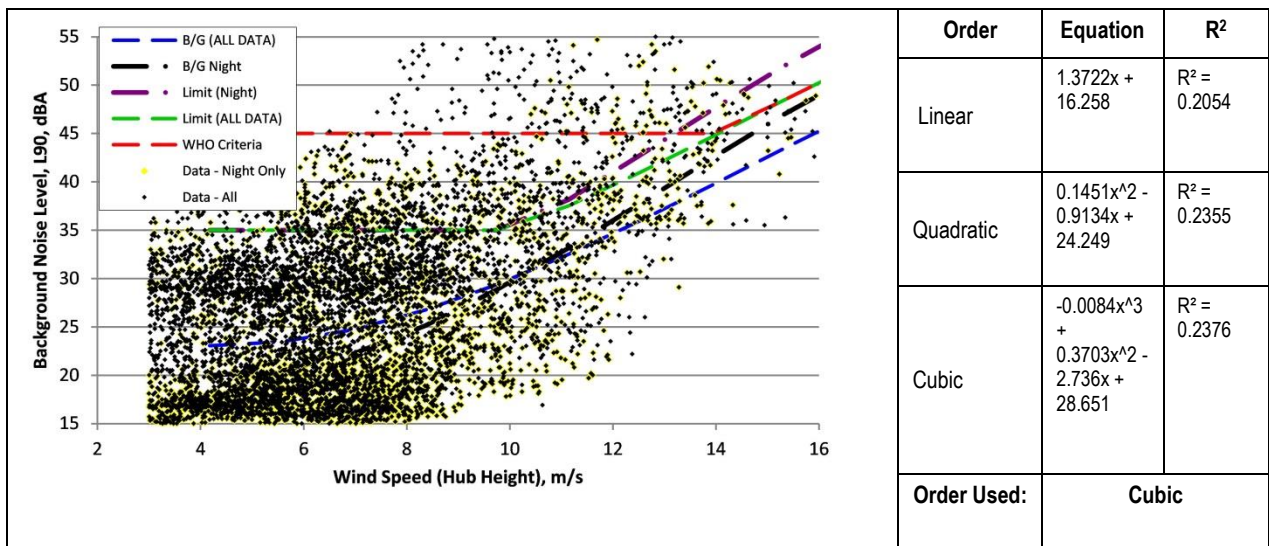
This residence is occupied by one of the landowners that make up part of the proposed Liverpool Range Wind Farm site and is therefore considered 'project involved'.

Figure 2 Map and photo of Location D4-6



The results of the background noise monitoring showing the data points, line of best fit and criteria curve for Zone 3 are shown in **Figure 3**.

Figure 3 Background Noise Measurements and Noise Criteria Curve – Location D4-6



1.2 Location D4-9

Location D4-9 is located approximately 1.5 km to the east of location D4-6, between the ridges for turbines D4-1, D4-2 and D5-21 and D5-22. The nearest proposed turbine to this location is approximately 2.2 km away.

It is understood that the land-owner of receptor D4-9 will now have 'project involved' status and a corresponding noise agreement.

Figure 4 Map and photo of Location D4-9

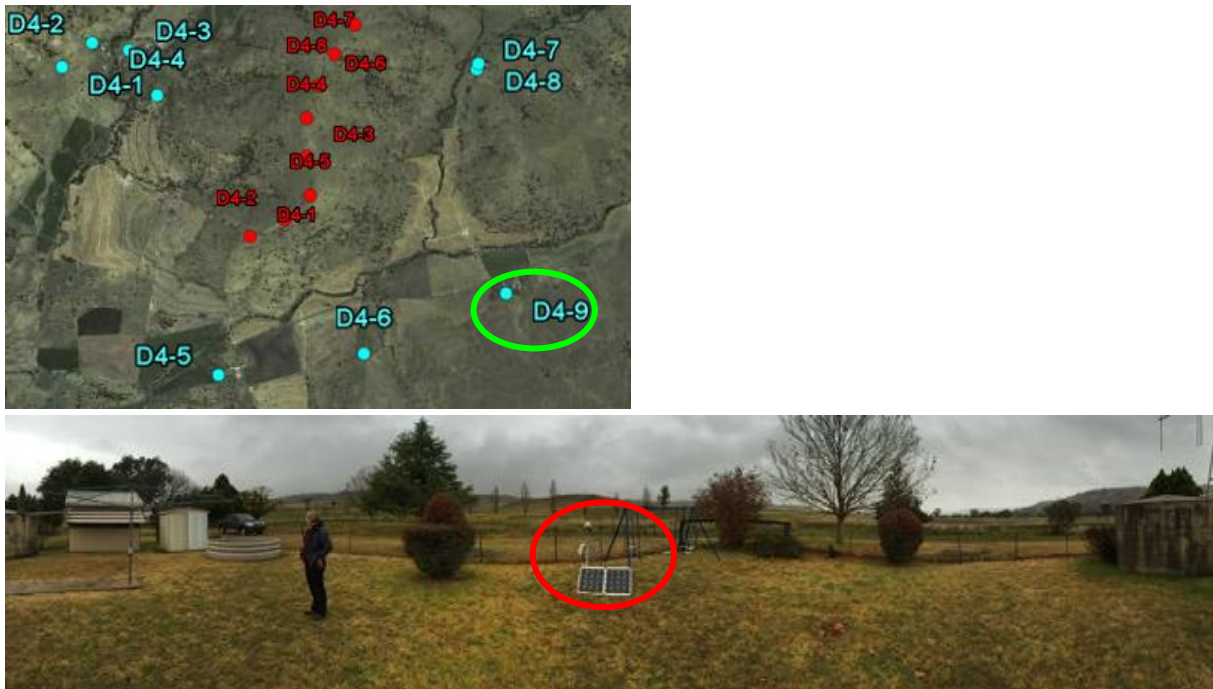
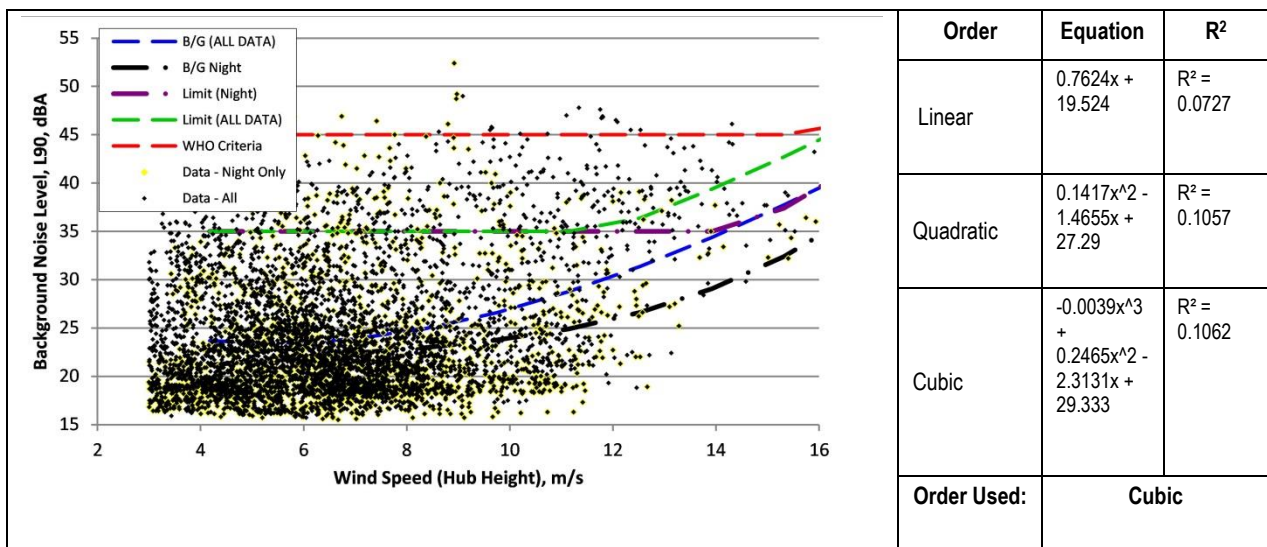


Figure 5 Background Noise Measurements and Noise Criteria Curve – Location D4-9



The updated monitoring data has generally resulted in lower background noise regression curves.

3.1 Updated Assessment Graphs for Zone 3

The additional baseline noise data regression has been incorporated in the original assessment process and the applicable limits generated for Zone 3 (based on receptor D4-6) and receptor D4-9.

The updated noise assessment graphs are included for Zone 3 and receptor D4-9 in **Figure 6** and **Figure 7** respectively.

There are no exceedances of the SA EPA Criteria anticipated.

Figure 6 Assessment Graph for Zone 3

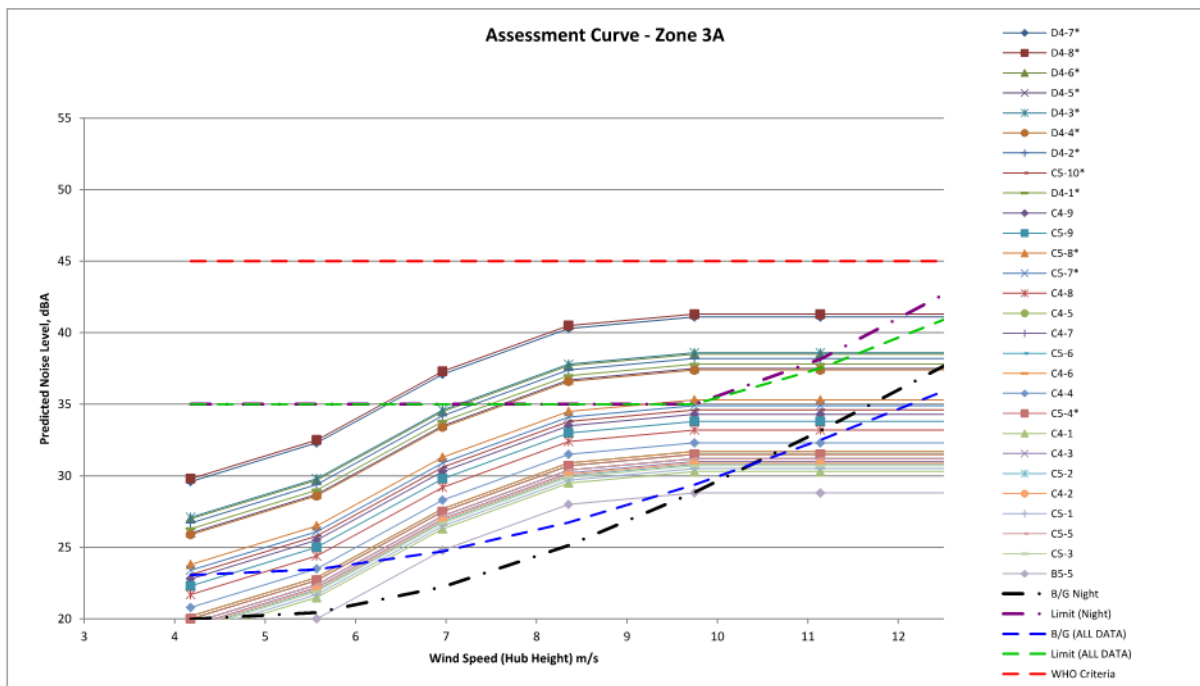
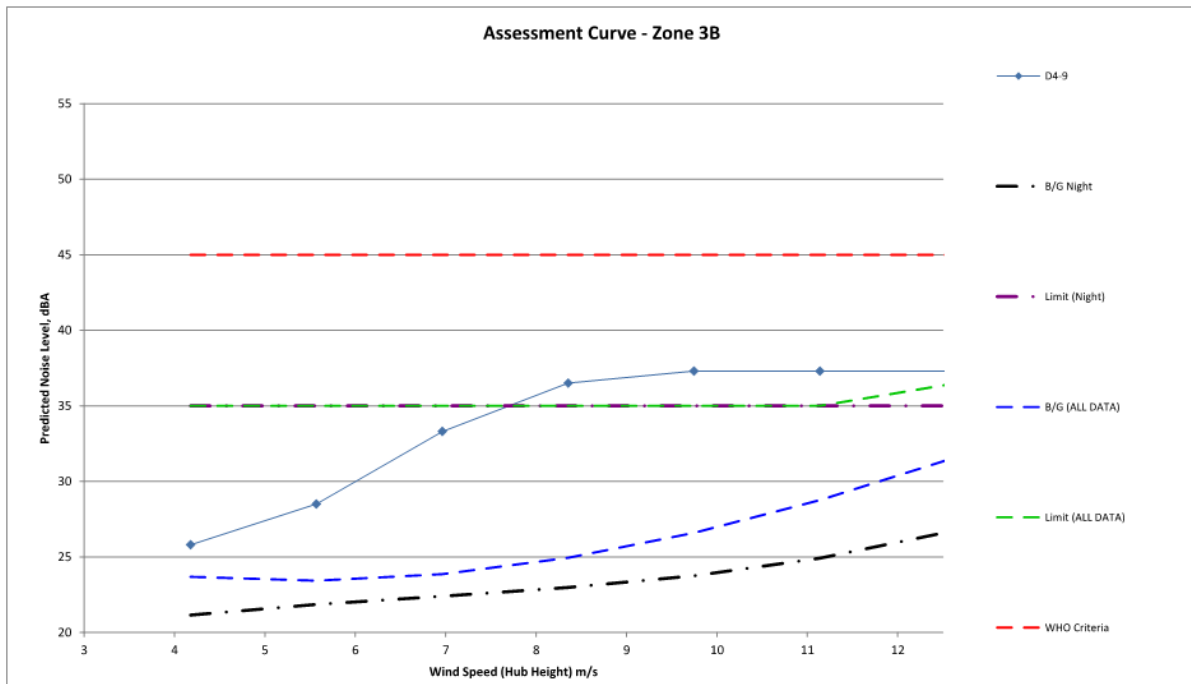


Figure 7 Assessment Graph for Receptor D4-9



4 DPE REQUESTS

In July 2016 the Department of Planning and Environment (DPE) provided a document of *Liverpool Range Wind Farm Issues to be considered as part of Response to Submissions*. The following sections respond to their comments in regards to the rock crushing and road traffic noise impact.

4.1 Rock crushing

The DPE comment in relation to Rock crushing is as follows.

Construction Noise

- No assessment was undertaken on construction noise impacts from rock crushing. Confirm location of proposed rock crushing activity and noise impacts associated with this operation.

The construction noise requirements for standard hours from the Interim Construction Noise Guideline (ISNG) are shown in **Table 2**.

Table 2 Noise at Residences Using Quantitative Assessment

Time of Day	Management Level LAeq(15minute) ¹	How to Apply
Recommended standard hours: Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 1.00 pm	Noise affected RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
No work on Sundays or public holidays	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

It is understood that rock crushing plant and equipment may be used on the site to produce suitable road base and hard stand material. It is anticipated that the rock crushing plant would be strategically positioned close to suitable rock resource and adequate stockpiling area. At this preliminary stage the locations for such sites are not known, however an indicative set of noise buffer distances has been calculated to assist in suitable site evaluation.

For the purposes of estimation it has been assumed that:

- a mobile crushing plant consisting of primary and secondary crushers and conveyors (typical SWL of 115 dBA)
- a primary screen (typical SWL of 115 dBA)
- a secondary screen (typical SWL of 115 dBA)
- noise sources are approximately 3 metres above acoustically soft and flat ground
- propagation of noise in accordance with ISO9613
- a minimum accepted Rating Background Level (RBL) of 30 dBA

The following noise buffer distances should be considered when siting the rock crushing site:

- Distance of less than 1150 metres then noise potentially greater than 40 dBA = Noise affected.
- Distance of less than 50 metres then noise potentially greater than 75 dBA = Highly noise affected.

4.2 Road Traffic Noise

The DPE comment in relation to road traffic noise is as follows.

Road Traffic Noise

- There has been no quantitative assessment of noise impacts during construction due to increased traffic (up to 300 trips per day). It is stated that "the projected increase is expected to be greater than 2dB(A)" – however it is anticipated to meet the Road Noise Policy. Further justification is required demonstrating compliance with the RNP. Any uninvolved receptors closer than 50m from the public road on traffic key routes into the site should be identified – rather than state "most" receptors are at greater setback distances. Note that this will also be an issue for dust generation on unsealed access routes with residences at closer proximity to the road potentially impacted by dust generated from unsealed roads due to significant increase in traffic during construction. Mitigation measures to minimise dust will also need to be considered.

The original assessment concluded that the *Road Noise Policy (RNP)* target for a local road of daytime $L_{Aeq}(1 \text{ hour}) = 55 \text{ dBA}$ would likely be achieved at a typical setback distance of 50 m. Furthermore, for night-time deliveries preliminary calculations indicated that maximum noise levels at a residence approximately 50 metres from the road as a result of a heavy vehicle pass-by would be up to 55 dBA, which is at least 5 dBA below recognised sleep disturbance criteria.

An analysis of receptors that are located within the 50 metre buffer has been completed by Epuron and are shown in **Table 3** and **Figure 8**.

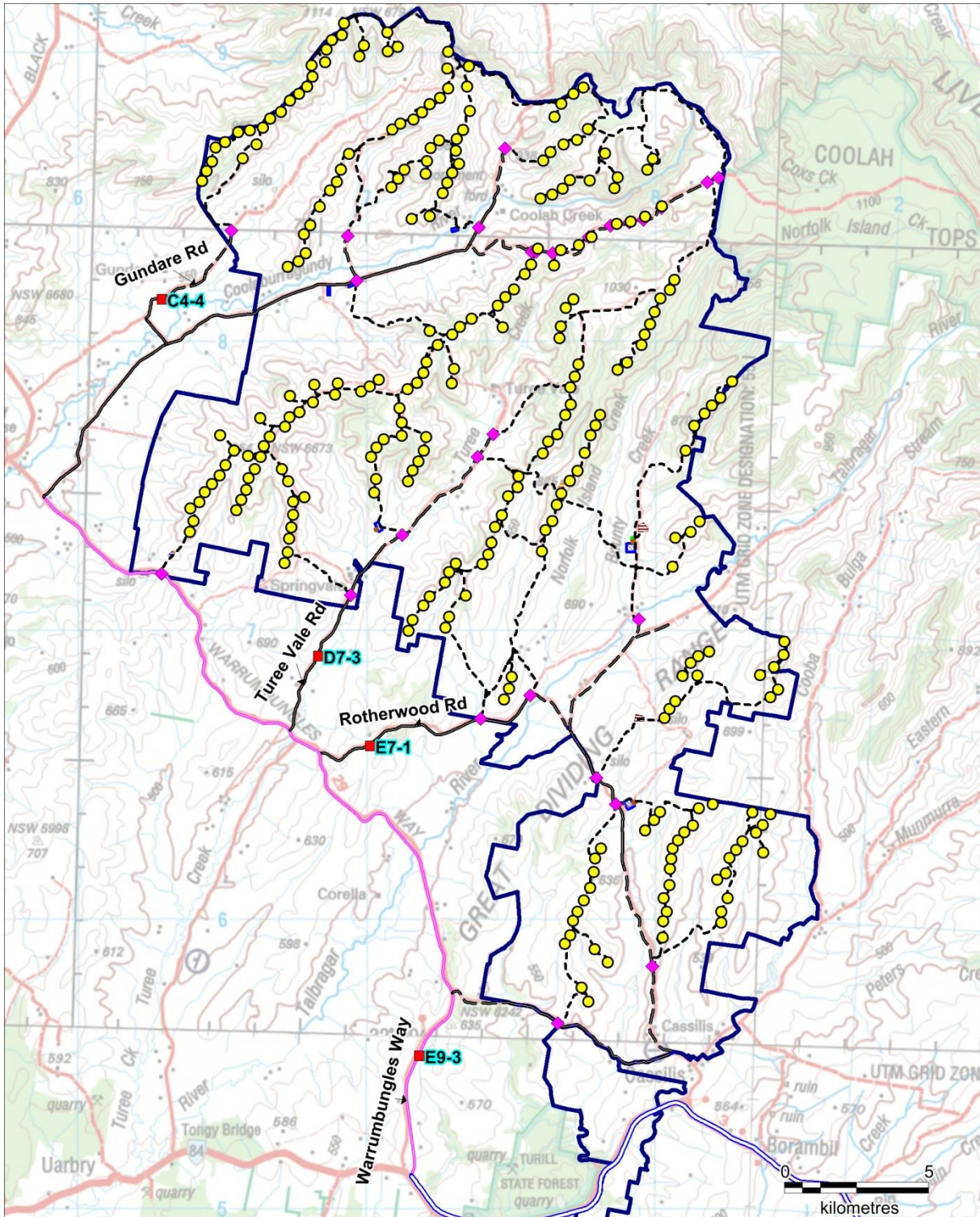
Table 3 Receptors inside buffer

House ID	Distance from road centerline
C4-4	40m
D7-3	24m
E7-1	38m
E9-3	30m

It is not anticipated that the above receptors are likely to be significantly impacted by road traffic noise as:

- The original assessment assumed worst case hour traffic volumes based on a conservative (high) estimate of the number of trips per day.
- The noise level at the closest receptor (D7-3) would only be approximately 3 dBA higher than that at the 50 metre setback.

Figure 8 Receptors within 50m of roads



5 SUMMARY CONCLUSIONS

The reduction in the total number of WTGs and the re-positioning of some WTGs will result in:

- A marginal reduction in noise levels for some receptors e.g. marginally lower from that predicted in the original assessment.
- A negligible change in noise level for the majority of receptors, e.g. no change from that predicted in the original assessment.

On this basis the noise predictions of the original noise assessment still stand.

With regard to potential sites for rock crushing plant the following noise buffer distances should be considered:

- At distances of less than 1150 metres then noise potentially greater than 40 dBA = Noise affected.
- At distances of less than 50 metres then noise potentially greater than 75 dBA = Highly noise affected.

With regard to road traffic noise impacts an analysis identified a total of 4 receptors within the 50 metre of the roads. It is not anticipated that these receptors are likely to be significantly impacted by road traffic noise as:

- The original assessment assumed worst case hour traffic volumes based on a conservative (high) estimate of the number of trips per day.
- The noise level at the closest receptor (D7-3) would only be approximately 3 dBA higher than that at the 50 metre setback.

Supplementary baseline noise monitoring in Zone 3 was undertaken by Epuron in June-July 2015 Location D4-6 and Location D4-9. The updated monitoring data has generally resulted in lower background noise regression curves.

It is understood that the land-owner of receptor D4-9 will now have 'project involved' status and a corresponding noise agreement. There are no exceedances of the SA EPA Criteria anticipated.

Notwithstanding the above, it is anticipated that once a finalised layout and WTG model has been determined a revised noise impact assessment will be prepared and submitted.