



5 October 2016

Mr Mike Young,
Department of Planning & Environment,
23-33 Bridge Street,
Sydney, NSW 2000

Section 75W Modification Application 2 - Bodangora Wind Farm

Dear Mr Young,

1. Project Background

Bodangora Wind Farm ("**Project**") is a proposed wind farm development located approximately 4 km north-east of Bodangora and 15 kilometres north-east of Wellington, in the recently formed Dubbo Regional Council.

The Project is a critical infrastructure project approved under Part 3A of the *Environmental Planning and Assessment Act 1979 (NSW)*.

Project approval was granted for the Project to Bodangora Wind Farm Pty Ltd ("the **Proponent**") by the NSW Planning and Assessment Commission on 30 August 2013 ("**Project Approval**"). The Project Approval authorised the construction and operation of up to 33 wind turbine generators ("**WTGs**") and associated infrastructure including:

- A 33 / 132 kV substation plus switchyards, transformers and microwave towers to provide a connection to the existing 132 kV Wellington-Beryl transmission line;
- 39 kilometres of new and upgraded access tracks; and
- Underground and overhead cabling.

Modification 1 to the Project Approval was approved on 29 October 2015 and authorised an increase the WTG blade diameter from 'up to 114 metres' to 'up to 130 metres', whilst remaining within the approved maximum WTG tip height of 150 metres.

2. Proposed Modification 2

Overview

The Proponent seeks to further modify the Project Approval so as to make the changes to the electrical infrastructure and access tracks as outlined below.

No changes are proposed to be made to the WTG locations or size as part of this modification application. Similarly, the Proponent is not seeking to change the existing 100m micro-siting allowance for both WTG and other infrastructure authorised by the Project Approval. All changes proposed remain located on associated land.

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Substation Relocation

Transgrid has approved a 'T' style connection concept which will enable the Project to connect near to pole 88 on the existing Wellington to Beryl 132kV line (94b) at a location adjacent to Gunnegalderie Road. This means that it has become necessary to update the location of the substation to the central part of the project area. In addition, the Proponent seeks approval for any subdivision required to enable land access over the substation site to be delivered to Transgrid (including either by the subdivision of the land into a new lot or a deemed subdivision arising from the grant of a long term lease for the substation).

The proposed relocation of the substation will also deliver the following key environmental benefits:

- It will enable the substation and switching station will be combined, rather than separate, reducing the overall footprint of the Project.
- It will avoid the use of Gunnegalderie and 12 Mile Roads for any large substation components during construction, minimising traffic impacts for the local community.
- Having the collection substation closer to the wind turbines will also deliver greater energy efficiency by minimising the reticulation losses and thus allowing the project to export more renewable energy into the grid.
- Reduce the number of circuits between the wind farm and point of connection from four to one.

Attachment A contains figures which show:

- I. the current location of the substation;
- II. the proposed revised location of the substation;
- III. the indicative footprint of the substation at the revised location; and

A letter from TransGrid is included in **Attachment A2**.

Connection Feeder Realignment

In order to connect the relocated substation to the existing Wellington to Beryl 132kV line, the Proponent is seeking to realign the connection feeder from the connection point at the Wellington to Beryl 132kV line to the relocated substation.

The updated feeder route has been designed following further site review and landowner consultation to better avoid areas of native vegetation and to minimise the visual impacts of the above ground portions.

The voltage of the proposed feeder will remain up to 132kV, as per the existing Project Approval and will be approximately 7.5km in length. The feeder will initially run either underground or undercrosss the existing 330kV line that runs parallel to the 132kV to avoid interference and minimise vegetation impacts and will thereafter run above ground in most instances.

The modification application seeks approval to locate and access the proposed connection feeder line anywhere within the 100m corridor shown in **Attachment B**. This will allow flexibility to further microsite the connection feeder line so as to further minimise impacts, including on

native vegetation, during construction. To minimise vegetation impact the access for the feeder will follow the existing roads and feeder alignment.

Figures showing the proposed corridor for the re-aligned connection feeder are included in **Attachment B** and **Aii**.

Access Track and Underground Cabling Realignment

Following further detailed design work, a number of minor changes are proposed to the indicative access track layout shown in the Appendix A of the Preferred Project Report. The updated indicative access track layout proposed is shown on the map in **Attachment C**. The revised indicative access track and underground cable layout has been designed to:

- allow for fewer tracks and cables, further reducing the overall footprint and the amount of ground disturbance; and
- address constructability issues by realigning some of routes around more suitable terrain, resulting in less cut and fill for access tracks and minimising the potential for erosion.

The key proposed modifications to the indicative access track layout include:

- Removal of the optional access track between wind turbines 30 and 34;
- Consolidation and realignment of tracks between wind turbines 23, 24 and 30;
- Realignment of the track between wind turbine 18 and 12 and 13;
- Realignment of tracks between wind turbine 36, 39 and 41; and
- Realignment of the track between wind turbine 15 and 26.

The key changes proposed to the indicative underground cabling alignment include:

- Removal of the cable between wind turbine 30 and 34;
- Consolidation and realignment of cable between wind turbine 23, 24 and 30;
- Realignment of cable between wind turbine 17 and 13;
- Realignment of cable between wind turbine 26 and 15; and
- Realignment of cable between wind turbine 23 and 16.

3. Environmental Assessment

Ecological Impacts

Kevin Mills & Associates Ecological and Environmental Consultants (“**KMA**”) was engaged to assess the flora and fauna impacts of the Project and prepared a detailed Flora and Fauna Assessment contained in Annexure G of the original Environmental Impact Statement (“**EIS**”). The Project Approval is subject to detailed conditions regulating flora and fauna impacts including requirements for a Construction Flora and Fauna Management Plan, overall clearing limits and biodiversity offset requirements.

KMA was asked to advise on the potential flora and fauna impact of making the proposed changes to the design of the Project. As indicated in the letter included in **Attachment D**, KMA concludes that the changes will not result in any significant impacts on flora and fauna, and in fact will result in fewer trees being removed.

Further, the proposed consolidation and realignment of access tracks and cabling will reduce the overall level of clearing required for the Project, further reducing the flora and fauna impacts from the Project.

Noise Impact

The revised substation location will be located substantially further away from any non-associated dwellings in comparison to the currently approved location. The Proponent is not seeking any change to the noise limits which apply to the substation (condition F9) as a part of this modification application. Sonus Engineering Pty Ltd have conducted acoustic modelling for the revised substation location and have confirmed that the change in substation location will remain fully compliant with the relevant noise limits in the Project Approval. Evidence of this is provided as **Attachment E**.

The realigned connection feeder, cables and access tracks are also not considered likely to not result any additional noise at dwellings. In particular, the realignments have been designed in consultation with relevant landholders and the main feeder will be located further away from dwellings.

Archaeological and Cultural & Heritage

The areas subject to the proposed modifications were included during the Aboriginal cultural heritage surveys conducted for the Project and will not result in any impact or interference to archaeological or cultural and heritage sites. As per the Project Approval, the Proponent will prepare a Construction Heritage Management Plan in consultation with Aboriginal stakeholders and the New South Wales Office of Environment and Heritage to detail how construction impacts on Aboriginal and historic heritage will be minimised and managed.

Visual Amenity

The Proponent has considered visual amenity when determining the proposed modifications. Overall, the Proponent believes there will be a lower visual amenity from the Project as a result of the changes. In particular:

- Substation Relocation - The substation will now be substantially further away from all non-associated residences. The revised location is located on the Northern side of Mt Bodangora, resulting in less visual impact from key view locations on Gunnegalderie and 12 Mile Roads. In addition, the revised location will be screened by existing vegetation on the north and western sides. Existing screening measures proposed in the original EIS will also be implemented at the revised location so as to further reduce any potential visual amenity concerns where required.
- Connection Feeder – The new location of the connection feeder, which is further away from public roads than the originally approved alignment, will reduce the overall visual impact from the feeder. The current approval allows for the feeder to cross Gunnegalderie Road twice, whereas it will now only cross this road once near the existing powerlines.

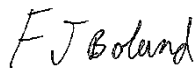
Consultation has occurred with the properties that are likely to have a view to influence the route selection of the revised feeder and to minimise any visual amenity impacts. The visual amenity impact of this feeder is accordingly, expected to lower than the current approval.

- Access Tracks and Cabling – Overall the length and number of required access tracks and cables will be shorter with the proposed modification. This will reduce the amount of ground disturbance and alteration to the existing landscape. In many instances the realigned tracks and cables will avoid the steeper terrain and require less cut and fill.

Conclusion

The overall impacts of the proposed modification for the Project are negligible. The attachments provide evidence that there are no additional impacts associated with noise or flora and fauna. The positive impacts of the proposed modification however, include increased renewable electricity production. The increased production of renewable electricity will help the NSW Government meet the objectives of the NSW Renewable Energy Action Plan, 2013 and the NSW 2021 plan of reaching a renewable energy target of 20% by 2020.

Yours Sincerely

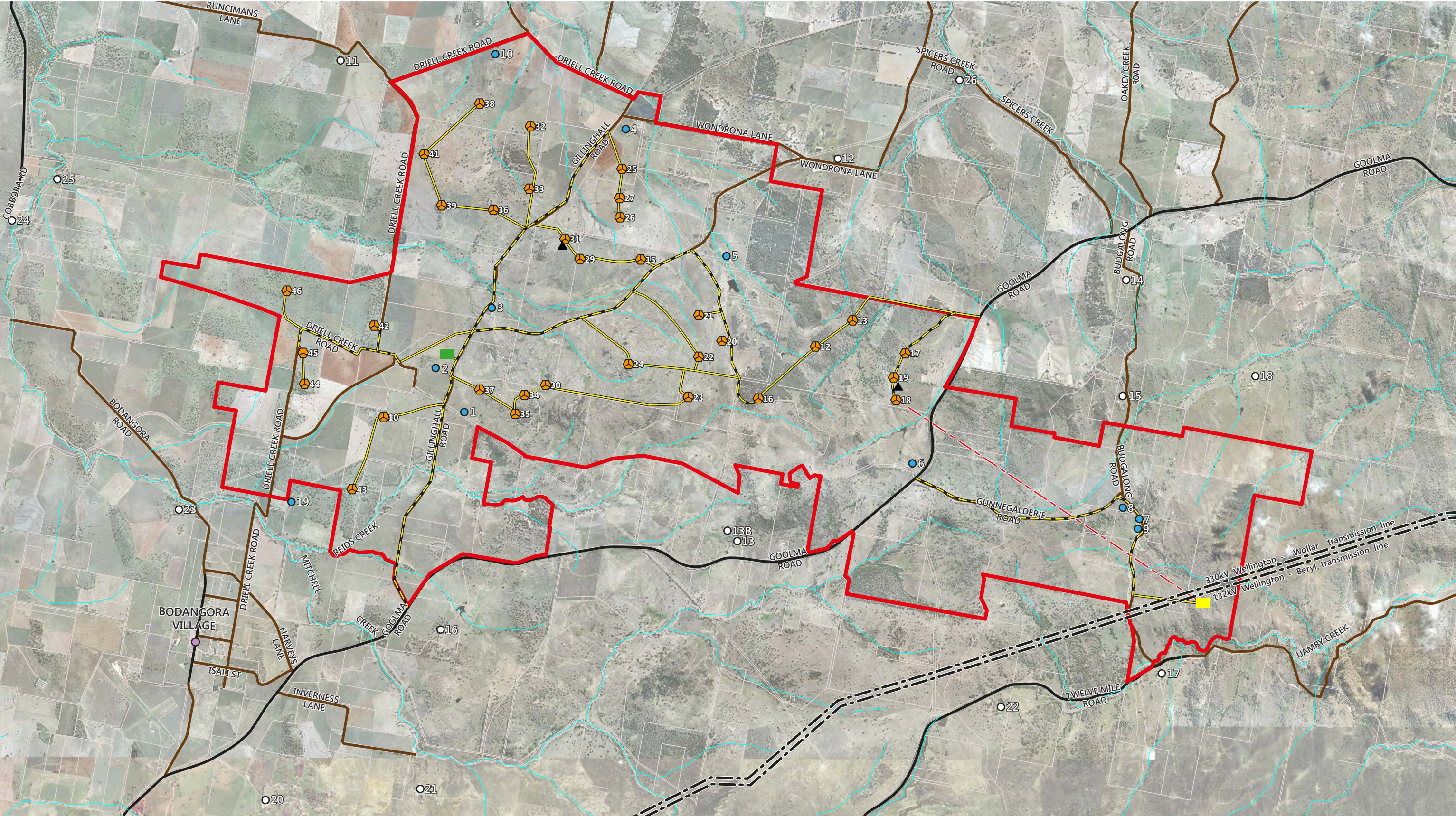


Frank Boland
Development Team Leader

Attachments

- A. Figure Showing Substation Relocation
 - A.i. Current location of the substation
 - A.ii. Proposed revised location of the substation
 - A.iii. Indicative footprint of the substation at the revised location
- A.2. Letter of Support from TransGrid
- B. Figure showing revised cable layout
- C. Figure showing revised cable layout
- D. Letter of Advice from Kevin Mills and Associates
- E. Updated Noise Assessment from Sonus Engineering Pty Ltd

Attachment A - Figures Showing Substation Relocation



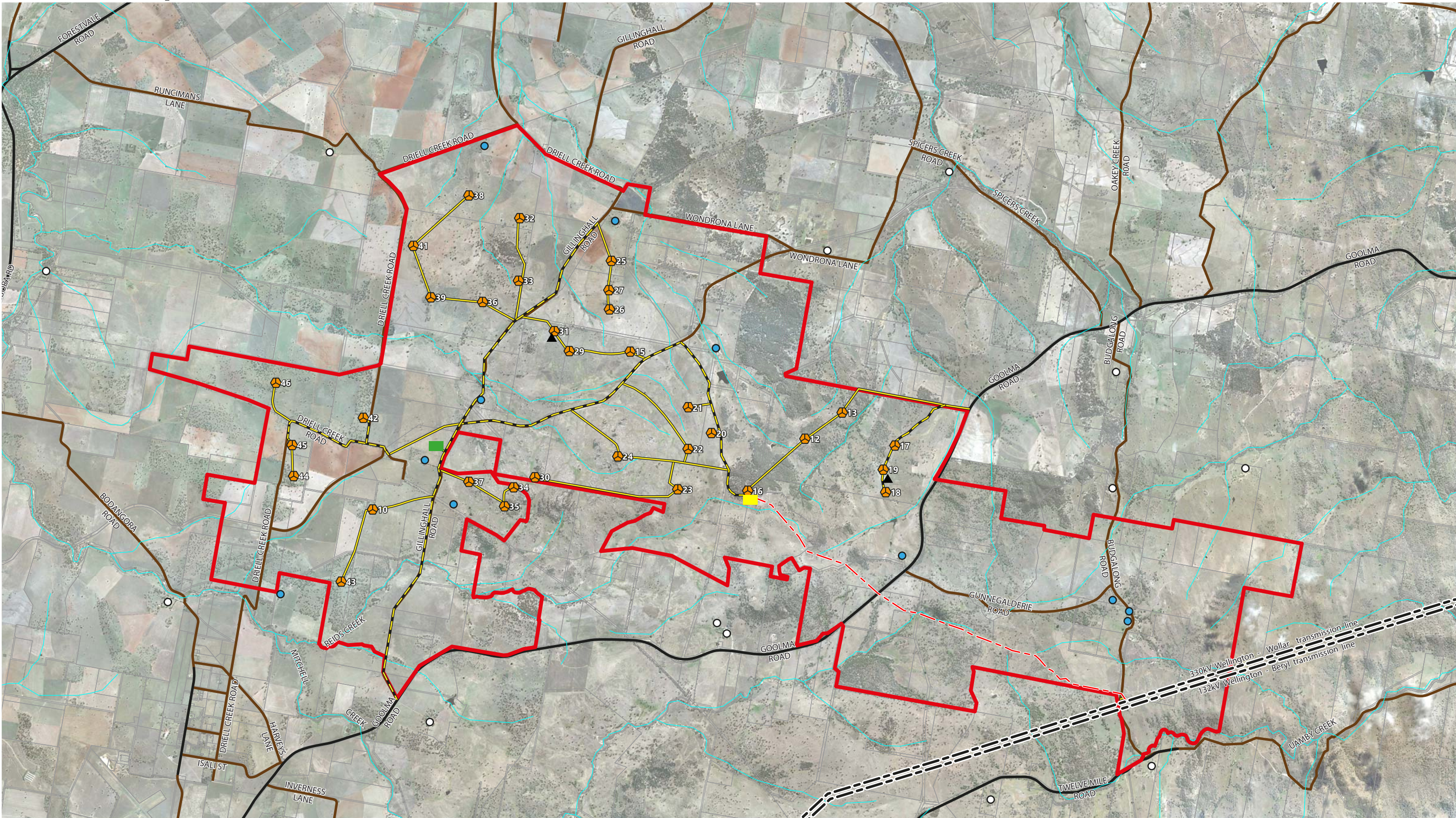
- Project Area
- Turbine locations
- Dwelling (Land Owner Agreement)
- Dwelling (Neighbour)
- Substation
- Construction site office and laydown area
- Existing wind monitoring mast
- Existing transmission lines
- Overhead/underground 33kV cabling
- Major road
- Minor or unsealed road
- Proposed new access tracks
- Existing access roads to be upgraded

NOTES

- 33kV cabling to run adjacent tracks / roads
- Option to remove tracks and cables between WTG 30 & 34

Revised Wind Farm Layout

BODANGORA WIND FARM



- Project Area
 - Turbine locations
 - Dwelling (Land Owner Agreement)
 - Dwelling (Neighbour)
 - Substation
 - Construction site office and laydown area
 - Existing wind monitoring mast
 - Existing transmission lines
 - OHV Cabling Corridor
 - Major road
 - Minor or unsealed road
 - Proposed new access tracks
 - Existing access roads to be upgraded
- Note: 33kV cabling to run adjacent tracks / roads

Figure 1.3
Project Overview

BODANGORA WIND FARM

Attachment Aiii – Indicative Footprint of Substation at Revised Location





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23 September 2016

Mr Mike Young
Department of Planning and Environment
23-33 Bridge Street
Sydney NSW 2000

Dear Mr Young,

TransGrid Support for Project Modification – Bodangora Wind Farm

The Bodangora Wind Farm project ("the Project") will be connecting to TransGrid's 132kV transmission network at a location approximately 20km from Wellington 330/132kV substation. TransGrid confirms that the Proponent is working closely with TransGrid to facilitate the connection, under the provisions of the National Electricity Rules.

The proposed Project modification aligns with the connection arrangements discussed with TransGrid and it offers a better connection solution for both the Proponent and the network. Additional benefits include less visual impact with the substation located within the wind farm, a shorter connection feeder route, reduced vegetation clearing, a reduction in the quantity of cabling and trenching, and a more efficient design resulting in lower project costs.

This connection will meet the requirements of the National Electricity Rules and Electricity Supply Act 1995 (NSW) relating to reliability and safety of the electricity network during construction and operation of the Project.

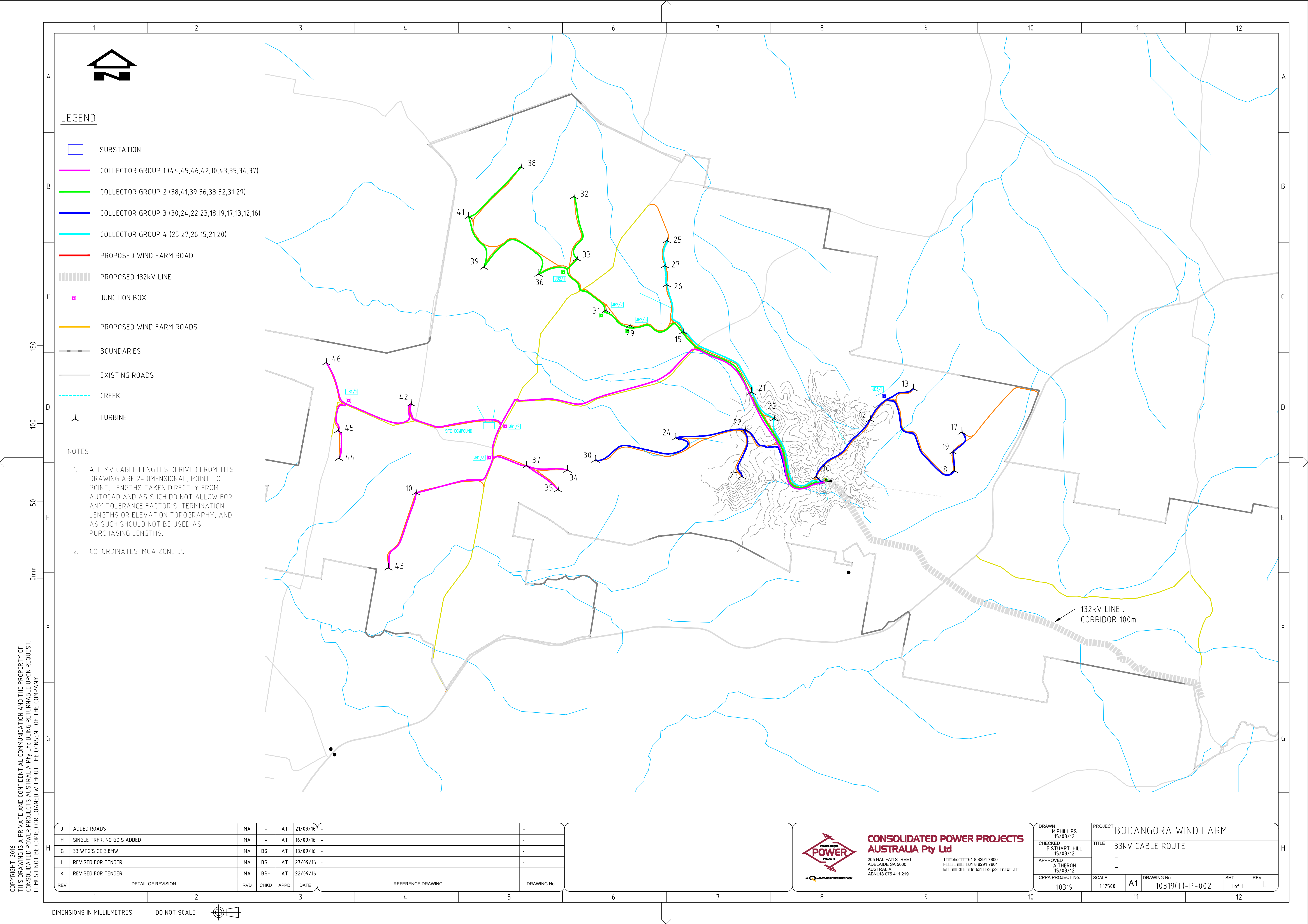
TransGrid supports Bondagora Wind Farm Pty Ltd proposed Project modification application for Bodangora Wind Farm.

Yours faithfully

A handwritten signature in black ink, appearing to read "Jennifer Sai", with a stylized flourish at the end.

Jennifer Sai
Customer Manager

Attachment B – Figure showing revised cable layout



LEGEND

- SUBSTATION
- COLLECTOR GROUP 1 (44,45,46,42,10,43,35,34,37)
- COLLECTOR GROUP 2 (38,41,39,36,33,32,31,29)
- COLLECTOR GROUP 3 (30,24,22,23,18,19,17,13,12,16)
- COLLECTOR GROUP 4 (25,27,26,15,21,20)
- PROPOSED WIND FARM ROAD
- PROPOSED 132kV LINE
- JUNCTION BOX
- PROPOSED WIND FARM ROADS
- BOUNDARIES
- EXISTING ROADS
- CREEK
- TURBINE

- NOTES:
- ALL MV CABLE LENGTHS DERIVED FROM THIS DRAWING ARE 2-DIMENSIONAL, POINT TO POINT, LENGTHS TAKEN DIRECTLY FROM AUTOCAD AND AS SUCH DO NOT ALLOW FOR ANY TOLERANCE FACTOR'S, TERMINATION LENGTHS OR ELEVATION TOPOGRAPHY, AND AS SUCH SHOULD NOT BE USED AS PURCHASING LENGTHS.
 - CO-ORDINATES-MGA ZONE 55

J	ADDED ROADS	MA	-	AT	21/09/16	-	-
H	SINGLE TRFR, NO GO'S ADDED	MA	-	AT	16/09/16	-	-
G	33 WTG'S GE 3.8MW	MA	BSH	AT	13/09/16	-	-
L	REVISED FOR TENDER	MA	BSH	AT	27/09/16	-	-
K	REVISED FOR TENDER	MA	BSH	AT	22/09/16	-	-
REV	DETAIL OF REVISION	RVD	CHKD	APPD	DATE	REFERENCE DRAWING	DRAWING No.

CONSOLIDATED POWER PROJECTS AUSTRALIA Pty Ltd
205 HALIFAX STREET
ADELAIDE SA 5000
AUSTRALIA
ABN:18 075 411 219

Tel: 08 8291 7800
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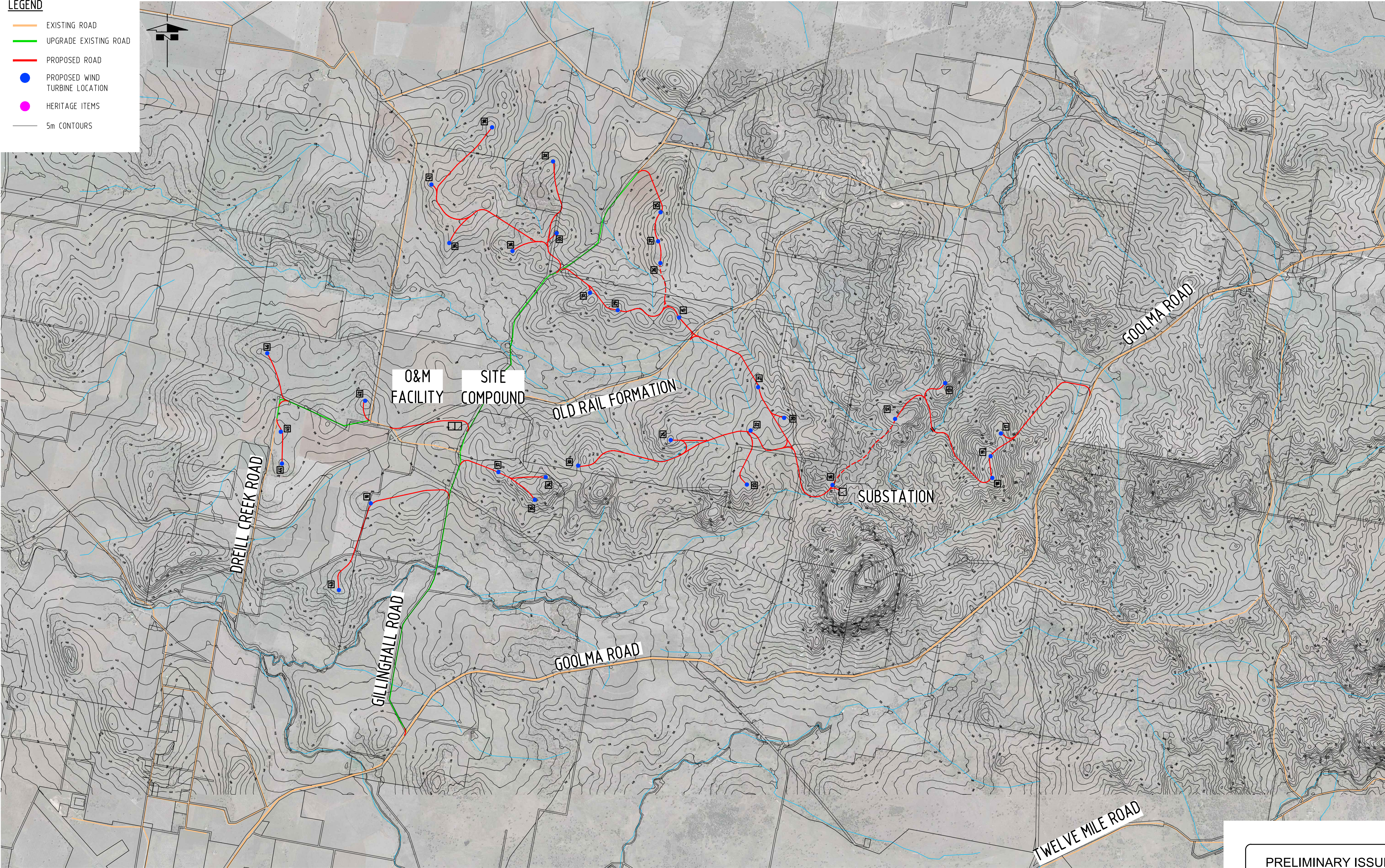
DRAWN M.PHILLIPS 15/03/12		PROJECT BODANGORA WIND FARM	
CHECKED B.STUART-HILL 15/03/12		TITLE 33kV CABLE ROUTE	
APPROVED A.THERON 15/03/12			
CPPA PROJECT No. 10319	SCALE 1:12500	DRAWING No. 10319(T)-P-002	SHT 1 of 1
			REV L

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Attachment C – Figure showing revised track layout

LEGEND

- EXISTING ROAD
- UPGRADE EXISTING ROAD
- PROPOSED ROAD
- PROPOSED WIND TURBINE LOCATION
- HERITAGE ITEMS
- 5m CONTOURS



PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

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D	ISSUED FOR REVIEW	JJF				21.09.16	
C	ISSUED FOR REVIEW	EM				29.04.16	
B	ISSUED FOR REVIEW	BJH				07.10.15	
A	ISSUED FOR REVIEW	TSM	RB			17.09.15	
REV	DETAIL OF REVISION	RVD	CHKD	APPD	CLIENT	DATE	

	REFERENCE DRAWING			DRAWING No.	

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catcon
civil & allied technical construction

DRAWN JF	DATE 19.03.12	PROJECT BODANGORA WIND FARM
CHECKED -	DATE -	TITLE GE LAYOUT PLAN
APPROVED -	DATE -	
CONTRACTOR PROJ. No. WAD120189	SCALE AS SHOWN	A1 DRAWING No. WAD120189
		SHT C00
		REV D

DO NOT SCALE DRAWINGS FOR WORKING DIMENSIONS



Attachment D – Letter of Advice from Kevin Mills & Associates

Tel: (02) 4236 0620

Mobile: 0429 848 094

email: k.mills@bigpond.net.au

12 Hyam Place
Jamberoo NSW 2533

Mr Frank Boland
Infigen Energy Pty Limited
By email

14 September 2016

Dear Sir

Bodangora Wind Farm
Proposal to modify substation location and hence connection line to TransGrid

Further to your request for a review of a proposed modification to the approved Bodangora Wind Farm project, we are pleased to provide the following assessment.

We note the aerial image supplied to us showing the locations of the approved and the new line route and substation. The approved line is a straight line between the approved substation site and the TransGrid line. The new line responds to topography and tree cover and is longer and contains several angles.

The aerial plan indicates that the approved line traverses some heavily treed areas, while the new line avoids these stands of trees and we have been informed that the route was selected to minimise tree loss. In addition to this approach to re-routing the new line, a corridor is being sought such that further micro-sighting of the line could be used to avoid tree removal.

The substation site at the approved and the new locations is on cleared grazing land with no requirement for tree removal or modification of important habitat.

Our assessment concludes that there will be no significant impact upon the flora and fauna of the area as a result of the proposed modification. In fact, it appears that tree removal would be less in the case of the new proposal.

Please do not hesitate to contact me should you require further information.

Yours sincerely
KEVIN MILLS & ASSOCIATES
Dr Kevin Mills
Managing Director





Attachment E – Updated Noise Assessment from Sonus

Bodangora Wind Farm Substation

Environmental Noise Assessment

September 2016

sonus.

Sonus Pty Ltd
17 Ruthven Avenue
Adelaide 5000 SA
www.sonus.com.au
+61(8) 8231 2100

Document Title : Bodangora Wind Farm Substation
Environmental Noise Assessment

Document Number : S3627C10

Date : September 2016

Prepared For : Infigen Energy
Level 22, 56 Pitt Street
Sydney NSW 2000

Author	Jason Turner (MAAS)	
Reviewer	Chris Turnbull (MAAS)	

TABLE OF CONTENTS

1 INTRODUCTION4

2 ASSESSMENT CRITERIA5

3 ASSESSMENT6

3.1 Noise Propagation Model 6

3.2 Noise Model Input..... 6

3.2.1 Meteorological Conditions..... 6

3.2.2 Noise Sources and Data 7

3.3 Predicted Noise Levels 7

4 CONCLUSION8

APPENDIX A: SUBSTATION AND RESIDENCES LOCATIONS.....9

APPENDIX B: PREDICTED NOISE LEVEL CONTOUR..... 11

1 INTRODUCTION

Infigen Energy has engaged Sonus to conduct an environmental noise assessment of the proposed modification to the substation associated with the Bodangora Wind Farm.

Sonus has previously conducted an environmental noise assessment of the Bodangora Wind Farm, including an assessment of the previous substation, summarised in Sonus report S3627C9, dated October 2012.

The proposed modification includes the relocation of the substation to a position which is more central to the wind farm, approximately 7.6km northwest of the previous location (as indicated on the Figure 1) and the incorporation of up to two 33kV/132kV transformers. The revised location will provide greater separation distance between the substation and the closest residence, with the separation distance now approximately 2.2km (refer Appendix A).

The assessment has predicted the noise levels at the closest residences from the substation and compared them against the relevant conditions of the current project approval (MP 10_0157 MOD 1), issued by the NSW Government Department of Planning and Infrastructure.

2 ASSESSMENT CRITERIA

The condition of the current project approval (MP 10_0157 MOD 1) that is relevant to the noise from the operation of the substation is provided below:

Operational Noise Criteria - Ancillary Infrastructure

- F9. *The Proponent shall ensure that the noise generated by the operation of ancillary infrastructure does not exceed 35 dB(A) $L_{Aeq(15\text{ minute})}$ at any non-associated residence.*

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy (as may be updated from time-to-time), as modified by the provision in Appendix 3.

However, these criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Based on Condition F9, the relevant noise criterion to assess predicted noise levels from the operation of the substation is 35 dB(A) at any non-associated residence when adjusted for modifying factors under the Industrial Noise Policy.

3 ASSESSMENT

3.1 Noise Propagation Model

The noise from the substation has been modelled using the CONCAWE¹ propagation model within the SoundPlan noise modelling software. The CONCAWE noise propagation model is an internationally accepted noise propagation model that takes into account:

- the sound power level and position of the noise sources;
- the separation between the noise sources and receivers;
- the topography between the noise sources and receivers;
- the hardness of the ground;
- atmospheric absorption at different frequencies; and,
- meteorological conditions.

3.2 Noise Model Input

3.2.1 Meteorological Conditions

The CONCAWE system categorises the possible meteorological conditions into six categories, from Category 1 to Category 6. Category 1 is considered the “best-case” meteorological conditions (i.e., lowest noise level) while Category 6 is considered the “worst-case” meteorological conditions (i.e., highest noise level).

For a conservative assessment, the noise model has considered meteorological conditions corresponding to Category 6.

¹ CONCAWE The oil companies’ international study group for conservation of clean air and water – Europe “The propagation of noise from petrochemical complexes to neighbouring communities”

3.2.2 Noise Sources and Data

At this stage of the development, the substation design and transformer selection have yet to be finalised. Therefore, the noise modelling has been based on the following:

- indicative substation layout as shown on the design drawing “10319(T)-P-005”, dated August 2016;
- two transformer units, each with a rating of up to 120MVA²;
- total sound power level for the transformers based on the *Australian/New Zealand Standard AS/NZS 60076.10:2009 Power transformers – Part 10: Determination of sound levels* (the Standard), which derives the maximum sound power level of a transformer unit based on its MVA rating; and,
- octave band spectra based on previously measured octave band noise levels of a similar transformer, conducted by Sonus.

Based on the Standard and the measured octave band levels, the derived maximum sound power levels for the 120MVA transformer used as input data in the noise model are provided below:

Sound Power Level (dB(A)) of a 120 MVA transformer

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Total
SWL (dB(A))	74	82	90	92	84	82	74	73	95

3.3 Predicted Noise Levels

The noise from the operation of the proposed substation has been predicted to all non-associated residences located in the vicinity of the wind farm. The prediction has been based on the modelling inputs listed above and the location of the residences and substation listed in Appendix A.

Based on the prediction, the noise level at each of the non-associated residences easily achieves the criterion of 35 dB(A), with the greatest predicted noise level being less than 10 dB(A) at R12 (although R12 is further from the substation than R13 and R13B, the topography reduces the noise levels in the direction of R13 and R13B).

A predicted noise level contour is provided in Appendix B.

² It is understood that two transformer configuration options are being considered. The first option comprises two transformer units, each rated up to 120MVA, whilst the second option comprises a single transformer rated up to 145MVA. Considering that the configuration with two transformer units each rated at 120MVA results the highest sound power level, this option has been modelled to provide a conservative assessment

4 CONCLUSION

An environmental noise assessment has been made of the proposed modification of the substation associated with the Bodangora Wind Farm.

The noise from the proposed substation was predicted to all non-associated residences in the vicinity of the substation using the CONCAWE noise propagation model. The noise model considers the influence of topography, ground hardness, temperature, wind speed, wind direction, humidity and meteorological conditions.

Based on the prediction, the highest noise level at any non-associated residence from the substation will be less than 10 dB(A), at R12. The predicted noise level easily achieves the 35 dB(A) requirement of Condition F9 of the current project approval (MP 10_0157 MOD 1).

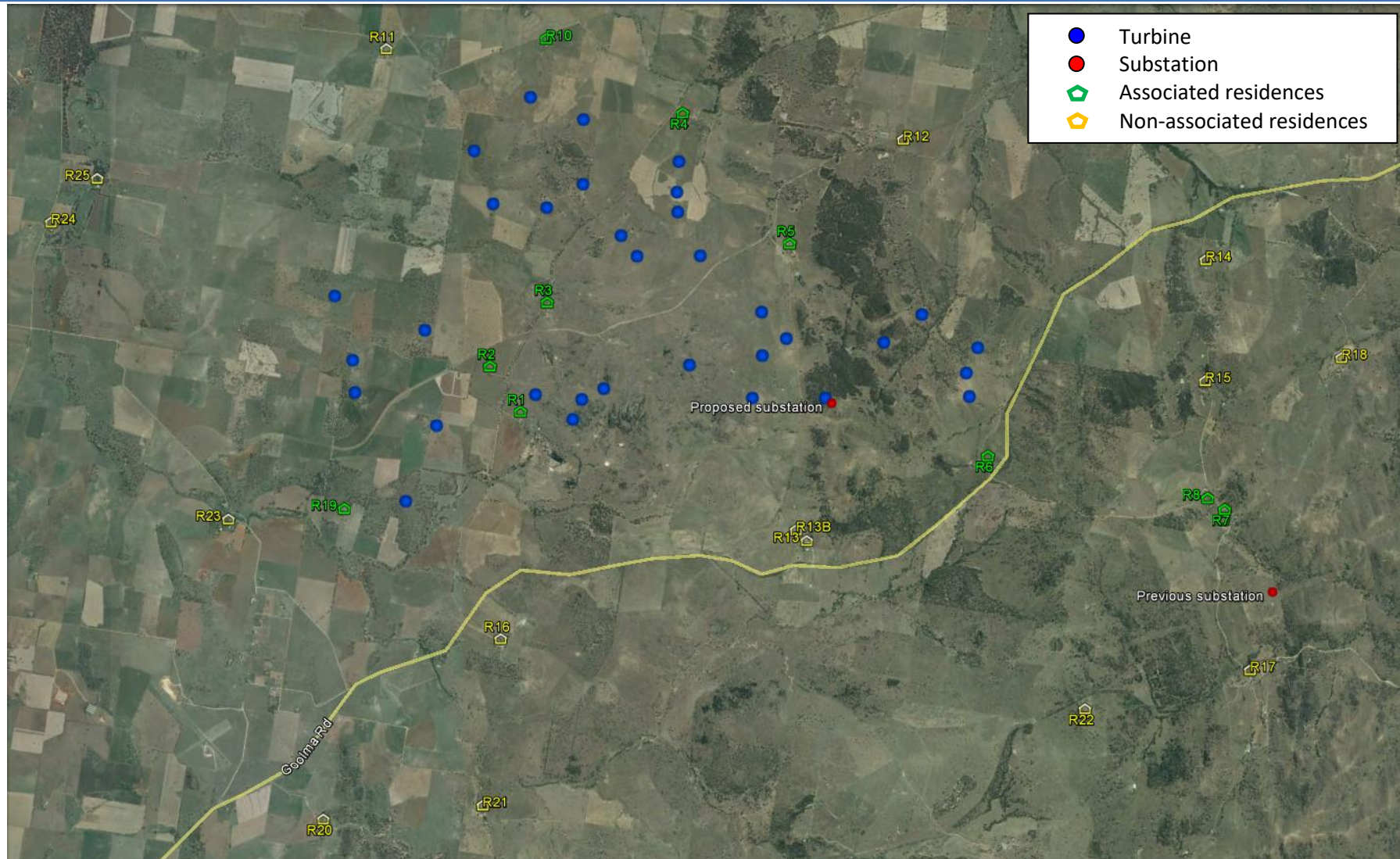
APPENDIX A: SUBSTATION AND RESIDENCES LOCATIONS

Coordinates of Substation

Coordinates (MGA94 Z55)	
Easting	Northing
697353	6411726

Coordinates of Residences

Residence ID	Coordinates (MGA94 Z55)		Approximate Distance to Substation (m)
	Easting	Northing	
Non-associated Residences			
R13B	696738	6409602	2245
R13	696905	6409427	2364
R12	698586	6415818	4244
R15	703349	6411856	5859
R14	703405	6413792	6267
R22	701314	6406657	6341
R16	691947	6407949	6704
R17	704000	6407217	7912
R18	705567	6412186	8089
R21	691607	6405283	8719
R11	690273	6417460	9225
R23	687573	6409950	10075
R20	689021	6405103	10747
R25	685541	6415477	12529
R24	684782	6414788	13076
Associated Residences			
R6	699834	6410724	2544
R5	696724	6414191	2590
R3	692800	6413328	4961
R1	692341	6411582	5153
R4	695042	6416317	5212
R2	691864	6412319	5660
R8	703348	6409983	6107
R7	703624	6409796	6426
R9	703601	6409630	6456
R10	692861	6417565	7460
R19	689454	6410083	8202



APPENDIX B: PREDICTED NOISE LEVEL CONTOUR

