ATTACHMENT C

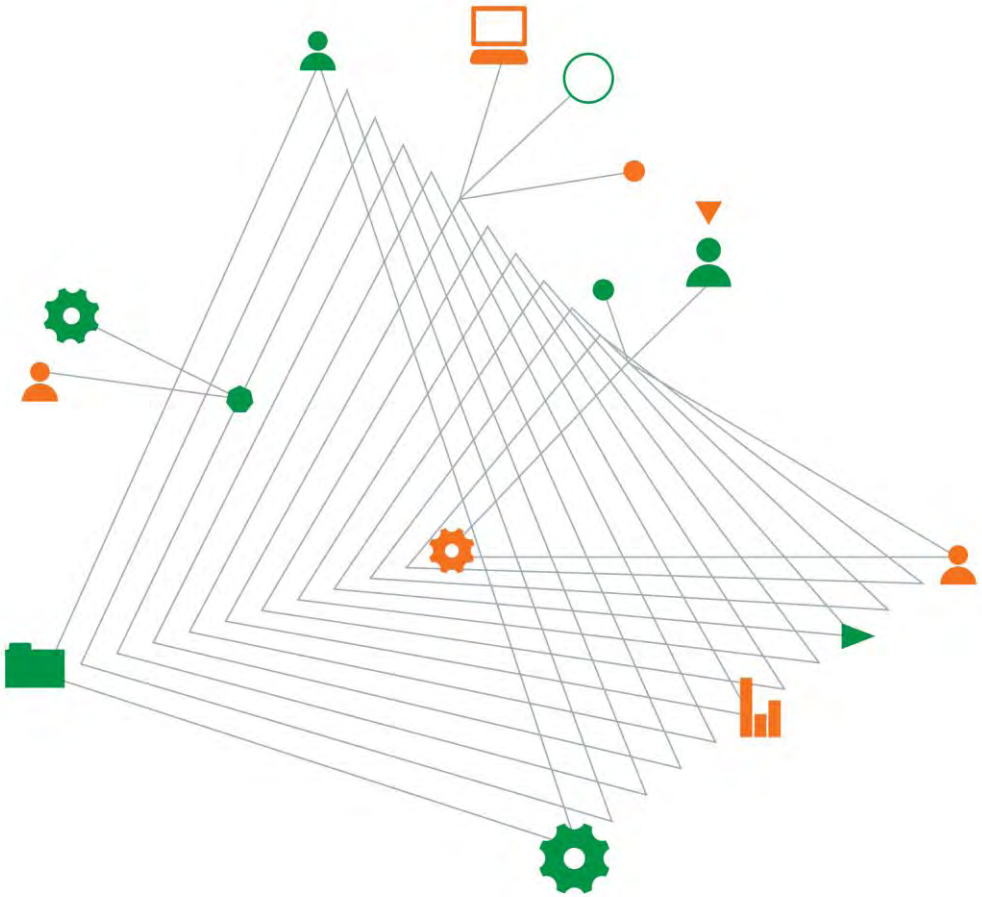
PRELIMINARY GEOTECHNICAL ASSESSMENT

Bulgana Wind Farm Pty Ltd

Bulgana Wind Farm

Preliminary Geotechnical Assessment
GEOTABTF09541AA-AD

1 September 2014



Experience
comes to life
when it is
powered by
expertise

Bulgana Wind Farm

Prepared for
Bulgana Wind Farm Pty Ltd

Prepared by
Coffey Geotechnics Pty Ltd
126 Trenerry Crescent
Abbotsford VIC 3067 Australia
t: +61 3 9473 1300 f: +61 3 9473 1350
ABN: 93 056 929 483

1 September 2014

Document authorisation

Our ref: GEOTABTF09541AA-AD

We have pleasure in submitting our preliminary geotechnical assessment report for the above project. One electronic copy of the report is provided for your information. Following receipt of any comments you may have we would issue our final report.

We trust this report meets your current requirements for the design of the above project. If you have any queries related to this report, or require further assistance, please do not hesitate to contact the undersigned

For and on behalf of Coffey

David Annan
Associate Geotechnical Engineer

Quality information

Revision history

Revision	Description	Date	Author	Reviewer	Signatory
V1	Rev0	1/09/2014	DBA	HM	DBA

Distribution

Report Status	No. of copies	Format	Distributed to	Date
V1	1	PDF	Bulgana Wind Farm Pty Ltd	1/09/2014

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1. Executive Summary

The proposed Bulgana Wind Farm site is located approximately 2km north east of the township of Great Western, and approximately 225km west of Melbourne. We understand that the proposed development will comprise up to 67 wind turbine generators (WTGs), new access tracks, underground cabling substations and hardstand areas.

This assessment involved a site visit by an associate geotechnical engineer which included:

- Photographs of the site.
- Making notes regarding the nature of rock outcrop including information such as, rock type, degree of weathering, assessed rock strength, type and likely thickness of soil cover.
- Observations regarding evidence of existing instability, erosion and general geomorphology of the site.

The proposed wind farm site is located in an area identified by a series of ridges on which a large percentage of the proposed WTG's are to be located. Ground slopes vary greatly from flat generally up to about 30^{o} to the horizontal but locally much steeper in areas of significant erosion. Erosion gullies and washouts are present along drainage paths throughout the site.

In areas of high relief, rock outcrop was typically evident. The rock was predominately high strength sedimentary rocks including siltstones and sandstones. In these areas soil cover is expected to be relatively thin and comprise clayey and sandy soils.

The soil cover was observed to be greater in areas of low relief. Rock outcrop in these areas was granitic in nature and comprises a series of granodiorite boulders protruding the surface. The soil comprised predominately sandy and clayey soils and was in the range of 1 to 3m thick as observed in some of the drainage paths and washouts.

Due to the generally hilly topography of the site, drainage during rain events is expected to occur relatively quickly and the local creeks would be expected to rise rapidly. As a result, erosion of non-vegetated surfaces is likely to occur. The natural creeks and drainage paths show signs of severe erosion and washout.

No evidence indicative of deep seated slope instability was observed within the site at the time of our field assessment.

Based on the results of this assessment, the site is expected to be suitable for the proposed wind farm development provided good design and good construction practices are adopted with consideration to the site conditions including erodible soils, hilly topography, and shallow rock.

2. Introduction

Coffey Geotechnics Pty Ltd (Coffey) has undertaken a preliminary geotechnical assessment for the proposed Bulgana Wind Farm in Victoria.

The proposed Bulgana Wind Farm site is located approximately 2km north east of the township of Great Western, and approximately 225km west of Melbourne. We understand that the proposed development will comprise up to 67 wind turbine generators (WTGs), new access tracks, underground cabling substations and hardstand areas. Figure 1 shows the wind farm layout and Figure 2 shows the 38 site locations visited during this assessment on a areal imagery of the site. We further understand that this report forms part of the submission made for the Planning Application for this site.

The aims of this preliminary geotechnical assessment were to:

- Provide an understanding of the geological setting and its potential impact on footing types and sizes for WTGs, monitoring towers, substations and transmission towers, including preliminary assessments as to likely foundation design parameters;
- Consider groundwater and slope stability issues and their implications for footing location, footing types, trenching and access tracks, and other construction issues;
- Make a preliminary assessment of geotechnical constraints that could affect the construction of access roads, hardstand and lay down areas including the use of locally sourced materials. These constraints could include seismicity, erosion, slope stability, soft soils and rock excavation. It is noted that parts of the site are subject to an Environmental Significant Overlay (ESO1). We also provide comments regarding the erodability and slope stability of the site soils with regard to the ESO1.
- Recommend further geotechnical investigations and laboratory testing to aid detailed design and construction.

This study was commissioned by Rhiannon Ollie of Wind Prospect Pty Ltd on behalf of Bulgana Wind Farm Pty Ltd via email dated 27 February 2014. The scope and extent of the assessment were based on a proposal prepared by Coffey (reference GEOTABTF09541AA-AArev1, dated 25 February 2014).

This report describes the preliminary geotechnical assessment undertaken and summarises the subsurface conditions encountered. Preliminary recommendations relating to the key geotechnical issues affecting the development of the sites are presented in Sections 5, 6 and 7.

3. Fieldwork

On 17 March 2014, an associate geotechnical engineer conducted a walk/drive over which included:

- Photographs of the site.
- Making notes regarding the nature of rock outcrop including information such as, rock type, degree of weathering, assessed rock strength, type and likely thickness of soil cover.
- Observations regarding evidence of existing instability, erosion and general geomorphology of the site.

The results of the site walk / drive over are presented in Appendix A and B.

4. Topography and geological setting

The site of the proposed wind farm is located adjacent to the Western Highway, approximately 12.5km North of Ararat and is approximately 7,524Ha in area and of irregular shape. The site is occupied by approximately 11 landowners and is used primarily for grazing.

The proposed wind farm site is located in an area identified by a series of ridges on which a large percentage of the proposed WTG's are to be located. Figure 3 shows the wind farm layout and the site contours. The high point of the site is at about RL 470m at the south east corner of the site at the location of the proposed WTG (BU-67). The low point of RL 213m is in the north east corner of the site where an unnamed creek runs north out of the project site near the proposed substation site. Ground slopes vary greatly from flat generally up to about 30^{o} to the horizontal but locally much steeper in areas of significant erosion. Erosion gullies and washouts are present along drainage paths throughout the site.

At the time of the assessment the site was trafficable by a 4WD vehicle.

Figure 4 shows the wind farm layout overlayed on the 1:50,000 geological map. The Geological Survey of Victoria 1:50,000 scale "Stawell" map sheet indicates that the general geology of the site comprises:

- Cambrian Age St Arnaud Group (Warrak Formation) comprising Turbiditic siltstone, sandstone and mudstone, and minor schist with associated residual soils;
- Devonian Age Two Eyed Creek Granodiorite comprising Hornblende-biotite granodiorite , medium to coarse grained, numerous quartz diorite, biotite granodiorite and country rock xenoliths; strongly foliated in part with associated residual soils;
- Tertiary and Quaternary sedimentary deposits comprising clay, silt, sand, and gravel.

5. Expected subsurface conditions

Our findings from the walkover assessment were broadly consistent with the mapped geology. It should be noted that no subsurface investigations were undertaken as part of this assessment and the following comments on the expected subsurface conditions are based on the geological map indications and visual observations made during the site walk / drive over.

In areas of high relief, rock outcrop was typically evident. The rock was predominately high strength sedimentary rocks including siltstones and sandstones. In these areas soil cover is expected to be relatively thin and comprise clayey and sandy soils.

The soil cover was observed to be greater in areas of low relief. Rock outcrop in these areas was granitic in nature and comprises a series of granodiorite boulders protruding the surface. The soil comprised predominately sandy and clayey soils and was in the range of 1 to 3m thick as observed in some of the drainage paths and washouts.

5.1. Rock strength and weathering

At this stage, there is limited information available regarding the condition of the rock below the surface. During the site walkover, highly or less weathered siltstone, sandstone and granodiorite was observed at a number of locations at the surface, particularly in areas of high relief.

Sandstone and siltstone was observed in outcrops at the surface. These materials were generally extremely to moderately weathered and of medium to high strength. The field assessment of rock mass strengths of the moderately to less weathered granodiorite typically ranged from medium to very high strength

5.2. Groundwater and drainage

Due to the generally hilly topography of the site, drainage during rain events is expected to occur relatively quickly and the local creeks would be expected to rise rapidly. As a result, erosion of non-vegetated surfaces is likely to occur. The natural creeks and drainage paths show signs of severe erosion and washout.

No groundwater or evidence of surface springs were noted at the time of the fieldwork. The site was generally well vegetated to sparsely vegetated which reflects the early autumn time of the site walkover and the typical surface materials. For most of the site the permanent groundwater is likely to be at least several metres below ground surface. Locally seasonal perched water tables can occur in the upper parts of the ground profile particularly in the alluvial soils surrounding creeks and drainage channels.

5.3. Observation of slope instability

The site, in general, is covered by a thin layer of residual soil with weathered rock expected to be encountered at shallow depths. The natural slopes are generally planar and range from moderate to steep.

No evidence indicative of deep seated slope instability was observed within the site at the time of our field assessment.

6. Footing systems

6.1. Wind turbine generators (WTG) footing systems

WTGs are generally supported on large reinforced gravity footings or on smaller pad footings restrained by subsurface ground anchors. It is understood that at this stage, the designers are considering both foundation options for the site.

6.1.1. Gravity footings

Based on our experience, WTGs supported on reinforced concrete gravity footings are generally expected to be founded between about 1.5m to 3m below the existing ground surface.

Based on the observations made during the site walk over, it is considered that excavations to a depth of about 2m to 3m are likely to encounter residual and alluvial soils as well as highly or less weathered siltstone, sandstone, schist and granodiorite. The thickness of the soil strength materials and the strength of the underlying rock materials at this stage is not known and will have to be assessed prior to final design. However, based on the observations made during the site walkover and considering that a high percentage of the proposed WTG sites are located in areas of high relief where rock outcrop was observed, it is considered that a large percentage of the WTG footings will be supported on the weathered siltstone and sandstone. An ultimate bearing capacity of greater than 1.5MPa would generally be expected in these materials.

6.1.2. Anchored footings

The main parameter governing anchor design will be the allowable bond stress at the rock to grout interface. It would be expected (based on previous experience) that anchors may be constructed to a depth of about 12 m.

On the basis of the limited available information, it is considered that anchors would extend into the siltstone, sandstone, schist and granodiorite rock such that the tensile strength of the strand becomes the controlling design parameter for rock anchors. It should be noted that the orientation and frequency of defects would impact on the grout bond stress available in these materials.

6.2. Monitoring towers, overhead power lines and substations

Monitoring towers, overhead power lines and associated substations would be required as part of the wind farm development.

It is expected that the monitoring towers, power lines, and substation infrastructure would generally be supported by near surface footings (pad or strip footings) founded in the alluvium, residual soil or weathered rock or bored piles founded in weathered rock.

At the time of preparing this report, one substation site and one collector substation site had been identified. Based on the observations made during the site walkover, for preliminary design purposes, it is considered that the proposed substation and collector substation structures may be supported on spread footings founded beneath the topsoil and within the underlying residual soils or highly or less weathered rock.

With regard to shallow footings supported on the natural soils, it should be noted that these clays are typically of medium to high plasticity and are generally considered to be moderately to highly reactive. Consideration would need to be given to the potential shrink swell movements when designing shallow footings supported on the natural medium to high plasticity silty clays.

7. Construction considerations

7.1. Excavation conditions

It is anticipated that excavations for access roads, construction platforms and foundations for the WTG are likely to encounter a variable thickness of clay and sand soils with some granodiorite boulders, and highly or less weathered siltstone, sandstone, schist and granodiorite rock.

Excavation of the soil and extremely weathered materials should be able to be carried out using tracked excavators or bulldozers. Some granodiorite boulders may be encountered when excavating soil strength materials. These may require larger plant and some over excavation to remove.

Bulk excavation in the highly or less weathered rock should generally be able to be carried out using large plant such as a heavy bulldozer or heavy excavator, assisted by hydraulic breakers and ripper attachments. Blasting may be required if strong intact rock such as moderately or less weathered granodiorite, siltstone and sandstone is encountered.

7.2. Excavation batter stability

The following general temporary batter slopes can be adopted for excavations which do not exceed 3m in depth and where no ground water is encountered.

- Sands, short term batters of 1.5H: 1 V.
- Clays, short term batters of 1H: 1 V.

The following general permanent batter slopes can be adopted for excavations which do not exceed 3m in depth and where no ground water is encountered.

- Sands, permanent batters of 3H: 1 V.
- Clays, permanent batters of 2.5H: 1 V.

Permanent batters should be protected from erosion by a vegetative cover or proprietary system. Further advice should be sought where higher batters are required in clay, sand or other soil strength materials.

The stability of batter slopes within the rock will depend on the orientation and spacing of joints and defects, which should be assessed once turbine locations are finalised. For preliminary design purposes only, batter slopes up to 3m high within the highly or less weathered rock should not be steeper than 1H:1V for the permanent case and 0.5H:1V for the temporary case.

7.3. Re-use of site materials for engineered fill

The following comments are provided on the potential reuse of excavated materials for engineered fill:

- The performance of the natural clay soils is likely to be sensitive to changes in moisture content and they may heave or be difficult to compact under adverse moisture conditions. Careful moisture conditioning and compaction will be required to place these materials.
- The natural sandy soils may be able to be used as engineered fill.
- The highly and less weathered rock may be able to be used as engineered fill if, during excavation, handling and re-compaction, the rock breaks down to fragments in the order of 100mm or less. It is likely that there may be zones where the rock fragments are in general larger than 100mm. These materials may be used as engineered fill following a crushing process breaking the rock into a well graded aggregate with particle sizes of 100mm or less.

7.4. Re-use of site materials for construction of unbound pavements

Based on the supplied information and discussion with the client it is understood that unsealed access roads will be constructed to allow access to the proposed WTG sites. It is also understood that regular maintenance and repairs will be undertaken along unsealed access roads during the construction phase, when heavy construction traffic is likely to degrade the pavement surface. Following construction, the access roads will only be trafficked by relatively light 4WD service vehicles.

It is considered that locally derived moderately to less weathered rock of high or greater strength could be used as pavement materials for the proposed unsealed pavements provided some processing is undertaken on site to provide a reasonably well graded material with a maximum particle size of about 50mm. Excessive fines should be avoided to provide adequate strength when wet. Based on our experience with similar soils on other sites, it is recommended that for preliminary purposes a California Bearing Ratio (CBR) of 3% be adopted for pavements founded on a prepared subgrade of the natural soils and weathered rock. If extensive areas of rock are exposed at subgrade level, a higher CBR value of about 8% may be considered. It is recommended that pavement surfacing materials be targeted to have grading and plasticity requirements as recommended in the Austroads “Unsealed Roads Manual”.

7.5. Quarries

During the site visit it was noted that an existing quarry (Tuckers Hill Quarry) is located near the south east boundary of the site. Although no assessment of the material being quarried here has been made, it is understood that the aggregate produced at this quarry is used for the production of concrete and road making. This site could provide a convenient source of aggregate for use on the concrete and access tracks for the project.

7.6. Seismicity

Based on Figure 3.2(A) in section 3 of AS1170.4-2007 “Structural Design Actions Part:4 Earthquake actions in Australia”, the hazard factor (Z) for the site is 0.08 (0.08 in 500 years probability of exceedence).

Based on the subsurface conditions observed during the site visit, it is considered that a site subsoil classification of Class Be – Rock site, or Class Ce – Shallow soil site is expected for this site in accordance with Section 4 of AS1170.4.

8. Slope stability & erosion

The site is covered by an Environmental Significance overlay (ESO1). This overlay required that the proposed development consider the potential for erosion of the existing site soils including control of storm water runoff and quality of the natural waterways.

Evidence of severe erosion was observed along drainage channels indicating that the surface soils are susceptible to erosion. Due to the hilly topography it is expected that water flows along these drainage channels would be fast and erosion is likely to result. Measures to mitigate erosion during construction may include:

- Reduce, as much as practicable, the clearing of natural vegetation and surface water runoff in the construction areas;
- Re-vegetate stripped and filled areas as soon as practicable;
- Construction of silt traps and stilling basins to slow the flow of surface runoff and to reduce the sedimentation of the natural waterways (Photograph 9 and 10 illustrate two typical sediment traps);
- Drainage channels may require protection by rock beaching, silt dams or similar.

No evidence of natural slope instability was observed at the site during the site walkover. Given the topography of the site, it is considered that a number of cut and fill embankments will be required to construct access tracks and hardstand areas. Care should be taken that appropriate measures including drainage and appropriate batter slopes are adopted to ensure that cut and fill batters are constructed in a manner which will not impact the stability of the natural slopes or the constructed batters.

9. Geotechnical investigation

The findings in this report are based on the results of a site walkover. The contents of this report should be considered as a preliminary indication of the geological setting and its impact on the proposed wind farm. It is recommended that geotechnical investigations be conducted to provide information for the design of footings, access roads and other infrastructure. Geotechnical investigations should include the excavation of test pits at all WTG locations, substation locations and along access track alignments, together with deeper boreholes at a number of the WTG locations. The actual number of boreholes depends on the location of the WTG sites, the type of footing system preferred and the potential variation in ground conditions between the WTG sites.

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Important information about your **Coffey** Report

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

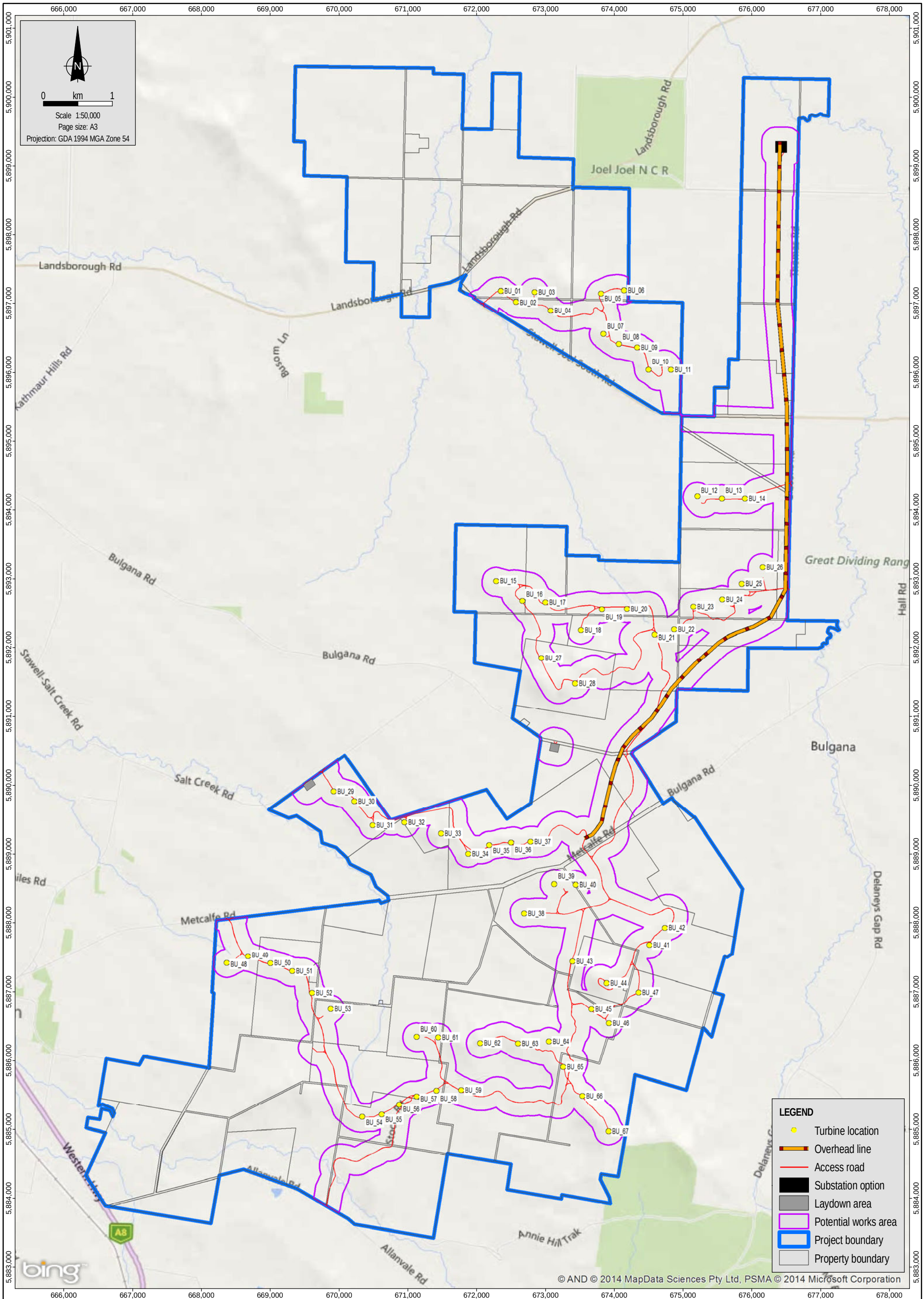
Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction,
speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.



Source:
Project boundary, works area, infrastructure and property boundaries from Wind Prospect.
Base map from Bing Maps.

coffey

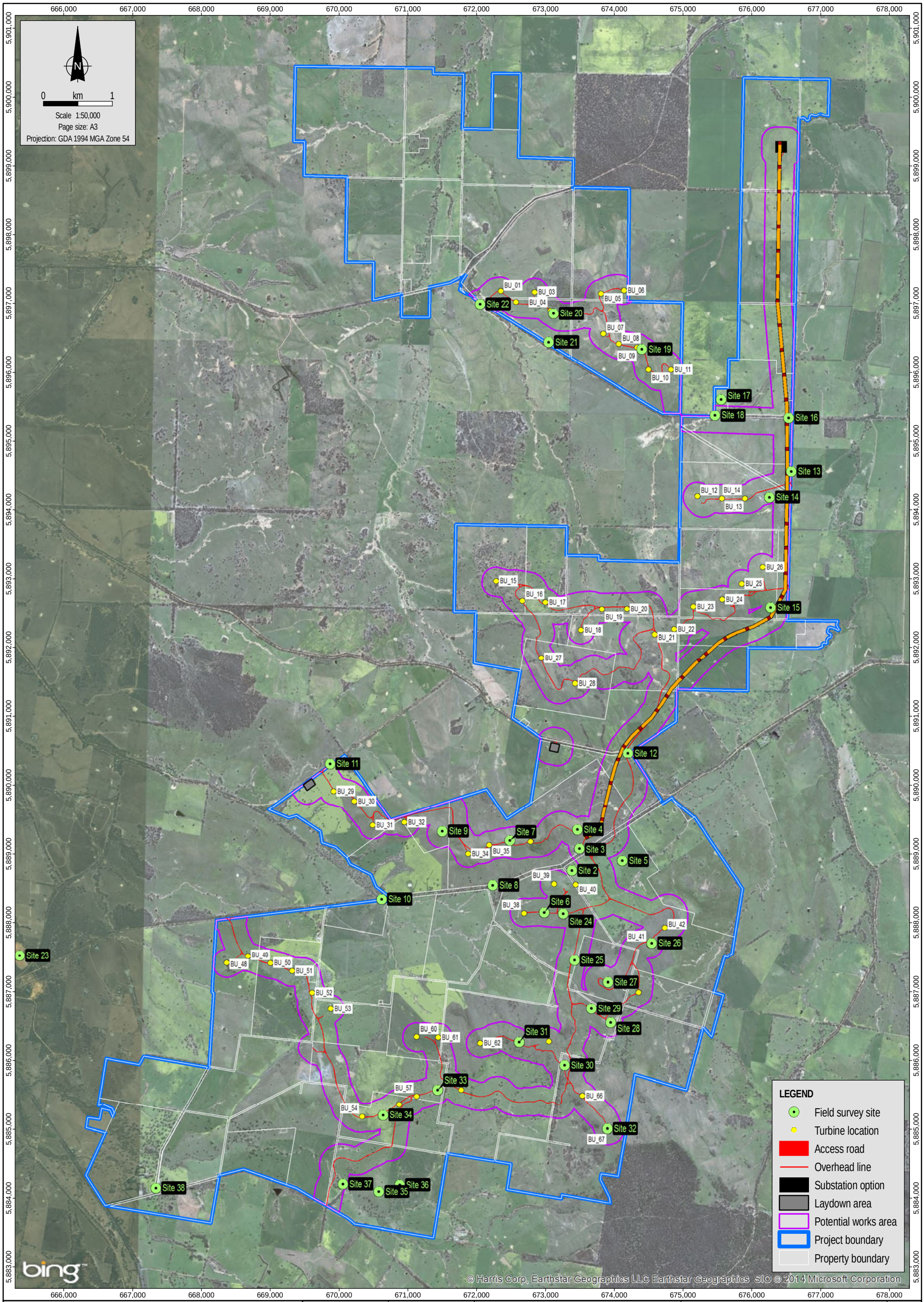
Date: 02.09.2014
MXD: 9541_01_GIS001_v0_5
File Name: 9541_01_F001_GIS

Bulgana Wind Farm Pty Ltd

Bulgana Wind Farm

Base plan

Figure No: **1**



Source:
Project boundary, works area, infrastructure and property boundaries from Wind Prospect.
Field survey sites from Coffey.
Imagery from Bing Maps (capture date unknown).

coffey

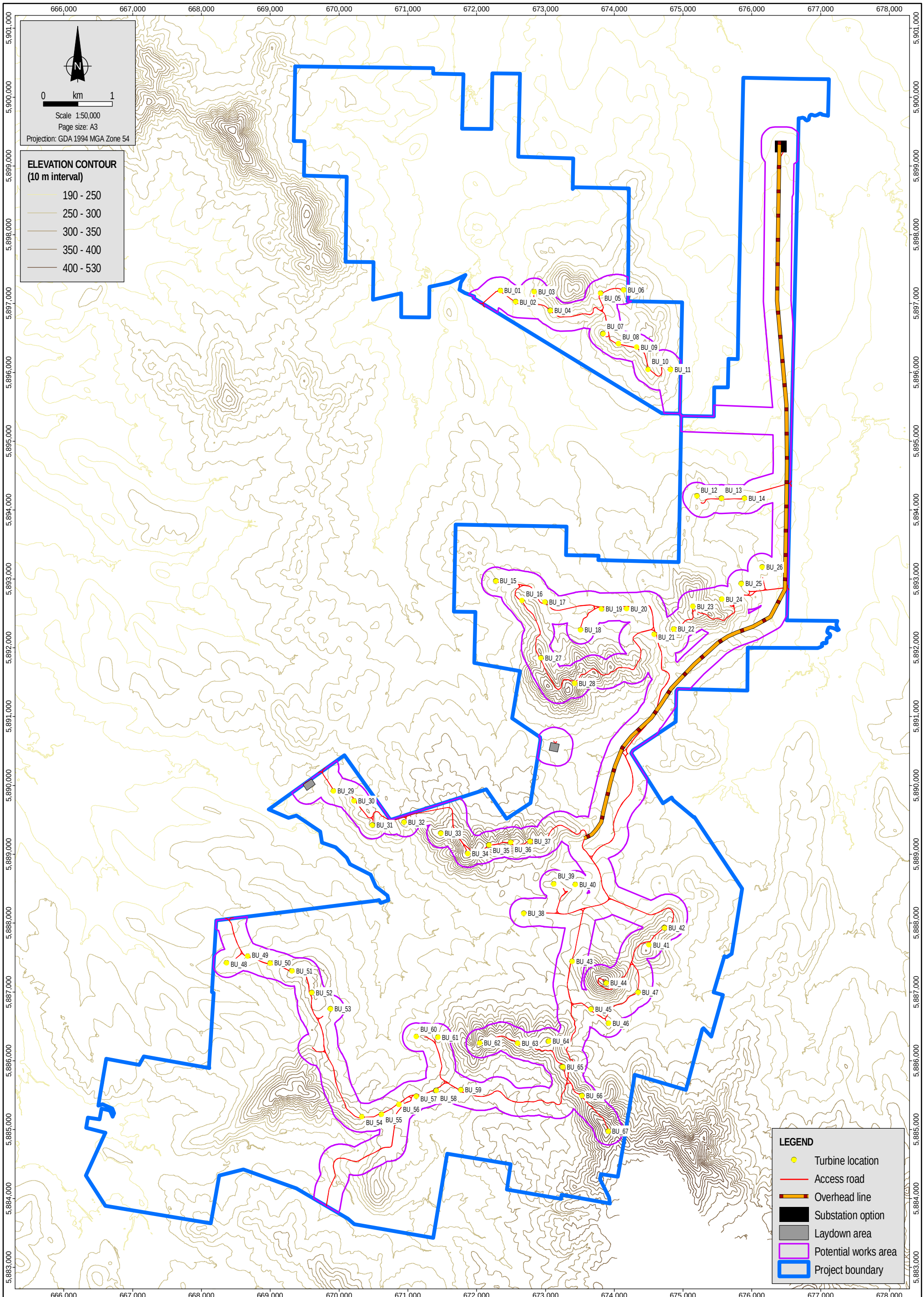
Date: 02.09.2014
MXD: 9541_01_GIS002_v0_6
File Name: 9541_01_F002_GIS

Bulgana Wind Farm Pty Ltd

Bulgana Wind Farm

Aerial imagery

Figure No: **2**



Source:
Project boundary, works area and infrastructure from Wind Prospect.
Contours from AAM (1 m interval data).

coffey

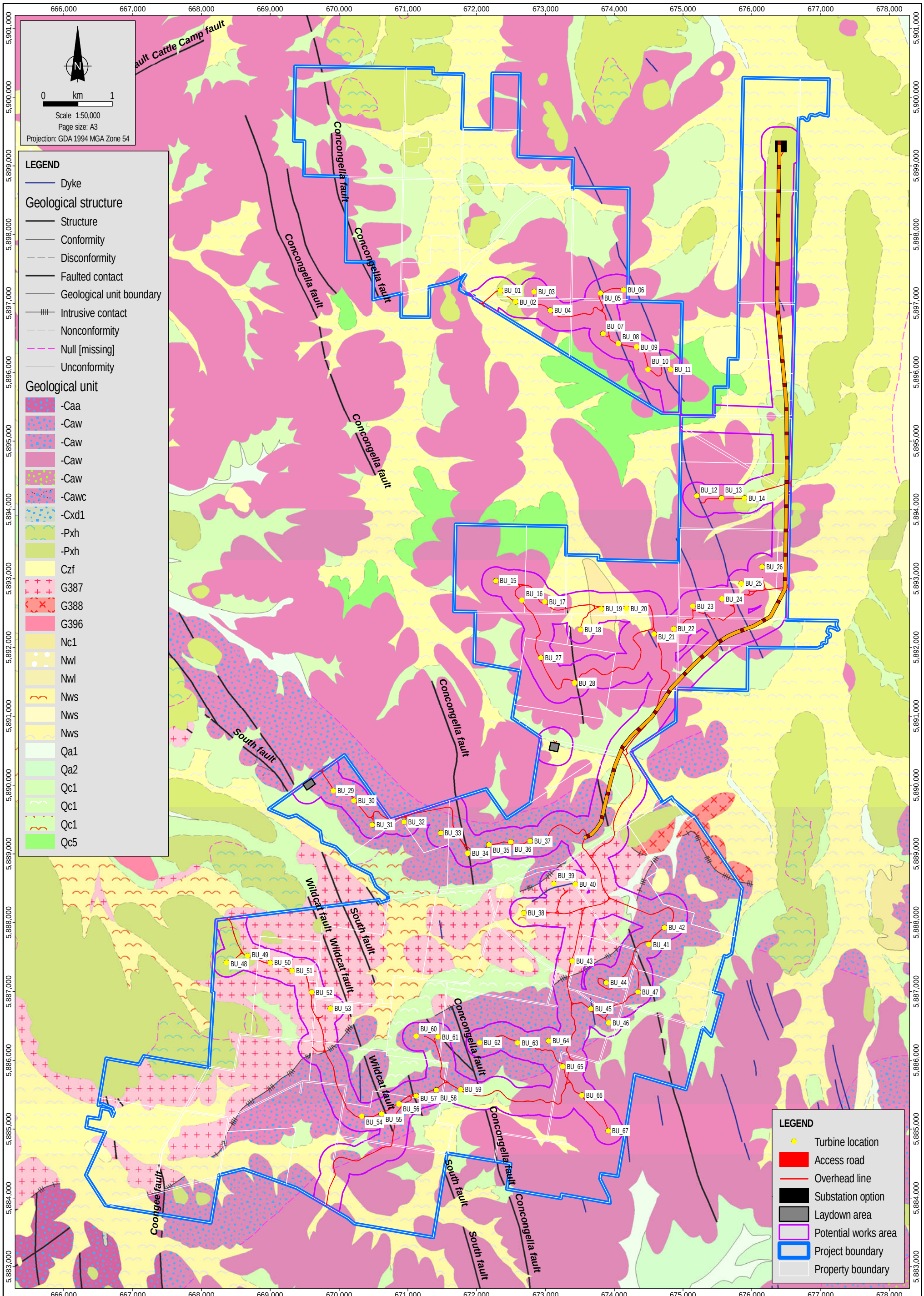
Date: 02.09.2014
MXD: 9541_01_GIS003_v0_5
File Name: 9541_01_F003_GIS

Bulgana Wind Farm Pty Ltd

Bulgana Wind Farm

Contour plan

Figure No: **3**



Source:
Project boundary, works area, infrastructure and property boundaries from Wind Prospect.
Geology from 'Victoria - Seamless Geology DVD October 2011', ISBN 978-1-74264-976-4, DEPI VIC (formerly DPI), 1:50,000 scale.
Imagery from Bing Maps (capture date unknown).

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Date:	02.09.2014
MXD:	9541_01_GIS004_v0_6
File Name:	9541_01_F004_GIS

Bulgana Wind Farm Pty Ltd

Bulgana Wind Farm

Geology plan

Figure No: **4**

Appendix A - Site photographs

PHOTOGRAPH 1 – Granodiorite outcrop

PHOTOGRAPH 2 – Proposed WTG location with sandstone outcrop

drawn	**DBA**		client: **BULGANA WIND FARM PTY LTD**	
approved			project: **PROPOSED BULGANA WIND FARM**	
date	**01/04/2014**			
scale	**Not to scale**		title: **SITE PHOTOGRAPHS**	
original size	**A4**		project no: **GEOTABTF09541AA-AD**	figure no: **APPENDIX A**

PHOTOGRAPH 3 – Ridgeline with multiple proposed WTG's

PHOTOGRAPH 4 – Ridgeline with proposed WTG's

drawn	DBA		client: BULGANA WIND FARM PTY LTD	
approved			project: PROPOSED BULGANA WIND FARM	
date	01/04/2014			
scale	Not to scale		title: SITE PHOTOGRAPHS	
original size	A4		project no: GEOTABTF09541AA-AD	figure no: APPENDIX A

PHOTOGRAPH 5 – Erosion Washout in Granitic soils

PHOTOGRAPH 6 – Soil profile in erosion washout

drawn	DBA		client:	BULGANA WIND FARM PTY LTD	
approved			project:	PROPOSED BULGANA WIND FARM	
date	01/04/2014				
scale	Not to scale		title:	SITE PHOTOGRAPHS	
original size	A4		project no:	GEOTABTF09541AA-AD	figure no: APPENDIX A

PHOTOGRAPH 7 – Erosion Washout in sedimentary units

PHOTOGRAPH 8 – Soil profile in erosion washout

drawn	**DBA**		client: **BULGANA WIND FARM PTY LTD**	
approved			project: **PROPOSED BULGANA WIND FARM**	
date	**01/04/2014**			
scale	**Not to scale**		title: **SITE PHOTOGRAPHS**	
original size	**A4**		project no: **GEOTABTF09541AA-AD**	figure no: **APPENDIX A**

PHOTOGRAPH 9 – Sediment trap using rock beaching and hay bails

PHOTOGRAPH 10 – Stilling basin with diversion mounds

drawn	**DBA**		client: **BULGANA WIND FARM PTY LTD**	
approved			project: **PROPOSED BULGANA WIND FARM**	
date	**01/04/2014**			
scale	**Not to scale**		title: **SITE PHOTOGRAPHS**	
original size	**A4**		project no: **GEOTABTF09541AA-AD**	figure no: **APPENDIX A**

Appendix B - Comments from the site visit

Title	Northing	Easting	Description
Site 01	5888055	668231	Proposed site access track
Site 02	5888760	673381	Field of moderately to slightly weathered granodiorite boulders
Site 03	5889085	673492	Erosion washout
Site 04	5889358	673461	Proposed site access track
Site 05	5888905	674116	Granodiorite outcrop in low lying areas.
Site 06	5888152	672982	Proposed site access track on low land north of ridge line.
Site 07	5889200	672482	Proposed WTG location along ridge line.
Site 08	5888550	672233	Erosion washout
Site 09	5889335	671501	Proposed WTG location. Current Met Mast location.
Site 10	5888348	670619	Creek / washout. Slightly weathered Granodiorite in base of washout, very high strength.
Site 11	5890312	669869	Proposed site entrance.
Site 12	5890471	674197	Proposed site entrance.
Site 13	5894560	676569	Possible borrow area showing signs of erosion
Site 14	5894189	676252	Proximate to the proposed WTG location. Note side erosion on hill. Possible old borrow area.
Site 15	5892586	676269	Proposed WTG location along ridge line. Rock outcrop on ridge.
Site 16	5895339	676532	Transmission line crossing.
Site 17	5895611	675550	Generally flat. Adjacent to erosion gully.
Site 18	5895377	675461	Drainage path. Erosion.
Site 19	5896341	674400	Proposed WTG location along ridge line. Some rock outcrop on ridge.
Site 20	5896858	673114	Proposed WTG location. On east slope of hill.
Site 21	5896442	673044	Erosion gully along road. Exposed siltstone in gully bedding - sub vertical striking north west.
Site 22	5896997	672049	Proposed site entrance.
Site 23	5887525	665360	Sand / gravel quarry. May be suitable for pavement materials.
Site 24	5888136	673254	Weathered granodiorite foundation materials. Some weathered granodiorite outcrop, very high strength.
Site 25	5887458	673419	Proposed WTG on granodiorite hill.
Site 26	5887709	674543	Proposed WTG location along ridge line. Foundation materials comprise moderately weathered sandstone, medium to high strength. Shallow surface soils.
Site 27	5887139	673908	Proposed WTG location.
Site 28	5886553	673946	Proposed WTG location.
Site 29	5886756	673666	Proposed WTG location.
Site 30	5885930	673276	Proposed WTG location.
Site 31	5886275	672616	Proposed WTG location. Along ridge line.
Site 32	5885011	673898	Proposed WTG location along ridge line.
Site 33	5885577	671432	Proposed WTG location.
Site 34	5885209	670639	Proposed WTG location along broad ridge line.
Site 35	5884097	670579	Rridge line.
Site 36	5884194	670881	Top of ridge line
Site 37	5884207	670055	Creek / erosion gully.
Site 38	5884150	667338	Entrance into Tuckers Hill Qurry. Possible pavement material and sub grade replacement source.