

Glen Innes

Executive Summary



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ES1 Introduction

ES1.1 Purpose of this document

This Environmental Assessment supports the Major Project Application lodged under Part 3A of the NSW Environmental Planning and Assessment Act 1979 for the construction and operation of the Glen Innes Wind Farm to be located in the New England Tablelands near Glen Innes, NSW. This Environmental Assessment has been prepared for Glen Innes Wind Power by Connell Wagner. It addresses the Director-General's requirements (NSW Department of Planning (DoP)) and matters raised by relevant stakeholder agencies including Glen Innes Severn Council and issues raised during community consultation.

ES1.2 Proponent

The proponent for the project is Glen Innes Wind Power (GIWP) a company formed specifically for the Glen Innes Wind Farm Project. Its parent companies are NP Power Pty Ltd and Babcock & Brown Windpower Pty Ltd. These companies have developed and now operate renewable energy assets including the 89.1 megawatt (MW) Alinta Wind Farm in Western Australia and the 240 MW Lake Bonney Wind Farm in South Australia. They are currently involved in the construction of the 140 megawatt Capital Wind Farm in NSW and are seeking to develop further renewable energy projects.

ES1.3 Location

The proposed wind farm site is located on Waterloo Range about 12 kilometres west of Glen Innes. The project spans five rural properties and extends about 8.5 kilometres along the Waterloo Range to the south of the Gwydir Highway. The properties have been substantially cleared and are predominantly used for grazing. The site is entirely within the Glen Innes Severn Shire Local Government Area.

ES1.3 Project Overview

The project involves the construction and operation of up to 27 wind turbines each with a capacity of between 2 and 3 megawatts. The installed capacity may vary from about 54 to 81 MW depending on the turbine model selected and number of turbines installed.

Each wind turbine structure will comprise a three bladed rotor, potentially up to 100 metres diameter. The turbines will be mounted on a steel tower of about 80 metres in height and the top of the blade sweep may be up to 130 metres above ground level. The turbines will be linked by underground cables to a new substation where the wind farm voltage will be raised from 33,000 volts to 132,000 (or 66,000) volts for connection to the electricity grid. It is likely that the existing 66,000 volt transmission line between Inverell and Glen Innes will be upgraded to 132,000 volts by TransGrid in a similar time frame to the development of the wind farm and that the connection will therefore be at 132,000 volts.

The proposed wind farm layout, including the locations of the 27 turbines, the substation and access tracks together with temporary construction facilities, is shown in Figures ES1 and ES2.

Construction works will include:

- the forming of about 14 kilometres of access tracks
- a substation and associated buildings
- trenching for installation of about 20 kilometres of underground cables
- construction of footings for the wind turbines and erection of the wind turbines
- installation of about four temporary masts and an additional permanent wind monitoring mast

The construction phase will be followed by removal of temporary facilities and restoration of the site.

Subject to gaining the necessary approvals and award of contract(s) for the supply and construction of the wind farm, its installation could be completed in early 2010.

ES2 Project Objectives and Alternatives Considered

The proponent has identified wind energy as a technically and commercially viable renewable energy technology for a number of Australian sites. Australian Governments have also introduced measures to foster the development of renewable energy projects and reduce Australia's greenhouse gas emissions. The Federal Government's Mandatory Renewable Energy Target (MRET) scheme, a more recent Victorian (VRET) scheme and the former NSW scheme (NRET) are testimony to the government support for renewable energy. The Federal Government has indicated its intention for a single extended national MRET scheme that provides further encouragement for development of Australian renewable energy projects and State governments are indicated to be working with the Federal government to assist this outcome.

The Glen Innes Wind Farm has been chosen by NP Power Pty Ltd and Babcock and Brown Windpower Pty Ltd as a suitable wind energy site for development after consideration of a range of potential Australian sites. Each site was reviewed in terms of the technical, environmental, social and commercial factors relating to its development.

A range of design variables has been considered during the planning of the Glen Innes Wind Farm with initial planning considering a variety of layouts, number of turbines, models and connection options. While 27 turbine sites have been assessed in this document not all of these may be developed and the actual turbine model and the final design is still to be confirmed. Nevertheless, the layout presented here has been refined to address the results of the comprehensive analysis of wind monitoring data and wind energy modelling together with commercial and environmental considerations and community consultation.

The final wind farm design will be confirmed after approval has been gained and following a tender process for equipment supply and construction of a project that addresses approval conditions. This Environmental Assessment includes discussion of the potential for variation in specific design parameters and associated impacts. It is anticipated that the impacts will be in accordance with this Environmental Assessment or in some cases may be less due to the assessment addressing the worst case situation for the potential design and impact scenarios.

The proposed grid connection arrangement to the existing 66,000 volt or upgraded 132,000 volt transmission line has been confirmed as the only feasible arrangement for a wind farm of this scale. The connection will require the construction of a new 33,000/132,000 (or 66,000) volt substation close to the location of the existing line.

ES3 Project Description

The project involves a total of up to 27 wind turbine generators each capable of generating between 2 and 3 megawatts of electricity. The wind turbines will be located over a length of about 8.5 kilometres

along the Waterloo Range. Its northern extent is located about 12 kilometres west of Glen Innes and just south of the Gwydir Highway.

Each turbine will comprise a footing, supporting tower, a wind turbine comprising three blades and a nacelle that houses the turbine shaft with gearbox, generator, hydraulics, motors, brakes, electronic control and communications equipment and lubrication systems. A generator transformer will be located near the base of each tower or within the nacelle to raise the generator output voltage from about 690 volts to 33,000 volts.

The turbine footings will comprise a reinforced concrete block about 16 metres by 16 metres and about 1.3 metres thick. The base of the footing will be about 2.5 metres deep and will be back-filled with soil.

The tower for each turbine will be constructed from three or four sections each of about 15 to 30 metres length. It will taper from about 4.5 metres at the base to about 2.5 metres at the top.

Each of the turbine blades will be between 44 and 49 metres long and weigh about 7 tonnes. The turbines will have a hub height of about 80 metres and a rotation speed of up to 18 revolutions per minute. The turbine operation will commence at a wind speed of 4 metres per second (14.4 kilometres per hour) and cut out at 25 metres per second (90 kilometres per hour). The turbines will be designed to operate automatically and will also be able to be monitored and controlled remotely. Nonetheless, a small on-site work force of about four to five staff will need to be maintained for inspection and maintenance purposes.

Associated works include a substation, facilities and auxiliary services buildings, temporary and permanent wind monitoring masts, underground cables and access works. The substation and associated facilities and auxiliary services buildings will be located at the northern end of the wind farm close to the existing 66,000 transmission line where the wind farm connection is proposed to be located.

Electrical works will involve about 20 kilometres of 33,000 volt underground power and control cables, a 33,000 to 132,000 (or 66,000) volt substation containing one or two transformers with a combined rating between 50 and 85 MVA as well as, switchgear and control and communications equipment.

Access to the site during the construction phase will be via Glen Innes, the Gwydir Highway and the former Gwydir Highway alignment on Waterloo Range. On-site access will be by unsealed tracks using upgraded existing tracks or new tracks predominantly located on the ridges.

The construction phase of the project will continue for at least 6 months and up to 12 months and will involve:

- the delivery of equipment and materials to the site
- provision of temporary office, workshop and storage facilities
- earthworks for turbine footings, the substation including facilities and auxiliary services buildings and earthworks for access tracks
- erection of up to 27 turbines and the substation structures and associated buildings
- trenching and installation of underground cables
- removal of any redundant or unsuitably located wind monitoring towers
- erection of additional permanent and temporary wind monitoring towers
- grid connection and commissioning of the wind farm

The potential for location on site of a concrete batching plant and quarry to obtain gravel has been considered but not allowed for by this assessment. If proposed by the contractor then such facilities

would need to be subject to a further approval process with the contractor to gain landowner agreements, undertake required environmental assessment and gain the necessary approvals.

The construction phase of the project shall be subject to a Construction Environmental Management Plan (CEMP) that will incorporate controls to address the identified potential environmental impacts of the construction activities.

Once the wind farm has been commissioned it will be able to operate whenever wind speeds allow generation. The operations phase will also be subject to an Operational Environmental Management Plan (OEMP) that will address activities of both operations and maintenance.

ES4 Planning Context, Approvals and Consultation

Project approval is being sought for both the construction and operation of the Glen Innes Wind Farm pursuant to Part 3A of the NSW Environmental Planning & Assessment (EP&A) Act. Assessment under Part 3A of the EP&A Act requires an Environmental Assessment to support the Major Projects Application. The Approval Authority for Part 3A projects is the NSW Minister for Planning. The Minister's delegate, the Director-General of the NSW Department of Planning (DoP) has specified the matters to be dealt with by the Environmental Assessment.

The Glen Innes Wind Farm will represent an electricity generation station that will be able to generate in excess of 30 megawatts of electrical power but as the electricity is generated from wind energy it will not constitute 'scheduled premises' under the NSW Protection of the Environment Operations Act and will not require an Environment Protection Licence.

The Major Project Application will be assessed by the NSW Department of Planning with referral of specific issues to relevant regulatory agencies undertaken as considered necessary by the Department of Planning to support appropriate assessment under the Part 3A project approval process. It is expected that DoP will refer specific matters in the Environmental Assessment to the Department of Environment and Climate Change (DECC) including noise, air, water, Aboriginal heritage, flora and fauna, soil conservation and native vegetation aspects..

The Department of Planning will assess the project in relation to planning matters and is likely to also seek advice from Glen Innes Council with regard to local planning issues. Chapter 4 includes a review of the project against the Severn Local Environmental Plan and relevant environmental legislation and associated policy and guidelines.

Chapter 4 also sets out the program of consultation implemented to date for the project. Consultation to date has included approaches to neighbours to the wind farm, two information days held in Glen Innes in December 2007 and various media articles. While there has been broad community support indicated for renewable energy developments a number of neighbours to the wind farm site have expressed concerns regarding the development. The exhibition of the Environmental Assessment will provide the community with a substantive set of information on the project details and the assessment of potential impacts as well as proposed controls to be incorporated by the proponent. During the exhibition period, the community is able to make submissions to the Department of Planning in respect of the proposal.

ES5 Existing Environment

The existing environment relevant to the project is described in Chapter 5 and in subsequent chapters that deal with specific environmental issues. Description of the management of specific environmental issues is provided in conjunction with details of the environmental issues and potential impacts.

General Setting

The proposed development is located in an inland rural location that has been substantially cleared and has a predominantly pastoral land use. The development does not preclude the existing land use and it is anticipated that the landowners of the properties where the wind farm is located will continue to graze stock on their properties.

Physically the wind farm is sited in the Waterloo Range on a number of ridges and knolls at a height of 1160 to 1275 metres. It is about 150 to 300 metres above the surrounding valleys with the topographic relief being greater on the western side of the range.

Climate

The climate of the Glen Innes Wind Farm site is a function of its inland elevated location. Rainfall is about 850 mm per year and averaged over the long term, mean monthly summer rainfall is about twice the rainfall during winter. However lower solar incidence and evaporation in winter means that soil moisture can be similar to summer months or greater in winter months. Mean daily temperatures for Glen Innes vary from a maximum of 26.5 °C for January to a minimum of 0.5 °C for July. Snow is also possible during winter months. The site has high average wind speeds with the most prominent direction from the east followed by the west. The site has sufficient wind energy resource to support the development.

Air Quality

The air quality of the wind farm locality is not significantly affected by industrial or vehicle emissions. The main impacts on air quality arise from dust storms or bush fires. The construction phase will involve a range of earthworks that have the potential for dust generation. Accordingly, the Construction Environmental Management Plan (CEMP) for the project will incorporate controls to minimise dust emissions. Once operational, the generation of electricity using wind energy is a low emissions form of generation.

Site Geology

The geology of the wind farm site comprises predominantly basaltic (igneous) rocks for much of the site. The geology does not present any impediments to the construction works but variations in the strength of the basalt are apparent and may require variation in methods of footing construction. A preliminary review of the geotechnical characteristics of the site has been undertaken and the project contractor will undertake a detailed assessment once turbine sites and cable and access routes are confirmed.

The development of the wind farm does not conflict with any existing plans to develop mineral resources. The New England area has a low frequency of earthquakes and a lesser intensity than other parts of eastern Australia. Nevertheless, the turbine towers and footings will be designed to withstand the appropriate seismic loading as well as addressing the structures and strength of the basalt rocks where they are located.

Soils

The soil types of the site relate to the extensive basalt geology of the elevated parts of the local area and factors such as slope, aspect and drainage. Some of the soils that may be encountered by the project will present an erosion hazard particularly on steep slopes. However, the area generally has good vegetation cover that limits erosion. Many of the flat ridge top areas have thin soils with shallow depth to rock and will have limited potential for severe erosion. Construction of tracks on slopes and crossing valleys where less resistant strata are often exposed are likely to present greater potential for erosion. Accordingly, the Construction EMP will include a Soil and Water Management Plan that has

appropriate erosion and sediment controls. With the proposed management measures it is anticipated that the project can be implemented without exacerbating existing areas of erosion and in some cases the repair of the limited areas of existing erosion using excess spoil excavated from turbine footings and revegetation may be achieved.

Water Resources and Site Drainage

The water related issues for the project include water usage requirements and potential impacts on waterways and any aquatic ecosystems.

The project will require water during the construction phase for activities such as dust control and plant and equipment wash down. Depending on weather conditions during construction it may be necessary to import water for the purpose of controlling dust on access tracks or at sites where earthworks are being undertaken, fire fighting reserves and for re-establishing vegetation at disturbed areas. This will involve the supply of about two to five megalitres of water over the construction period. If the contractor proposed an on-site concrete batching plant then the assessment and approval process for that plant would need to address the issue of additional water supply to the site.

Several options are possible for sourcing the water required during construction including use of Glen Innes town water or use of local surface or groundwater supplies. It is more likely that water would be obtained from the Glen Innes supply, subject to Council approval, as no additional on-site infrastructure is required for this temporary use. Once operational, the project will require only a small amount of water and it may be able to obtain much of the requirement from roof drainage at the facilities and auxiliary services buildings.

The project area is located wholly within the Border Rivers catchment area and the Severn River sub-catchment. The location of the wind farm site is a moderate rainfall area however being on ridges and hilltops means that it is distant from permanent watercourses. Some of the access tracks will have minor crossings of ephemeral creeks. These crossings will be designed to minimise impacts on the banks of the watercourses. Sediment controls will prevent construction earthworks affecting the watercourses on the site and downstream areas.

The substation will be located on Waterloo Range at the northern end of the wind farm. One or two large transformers that together will contain about 25,000 litres of oil will be installed in the substation and the substation design will include suitable measures to contain a potential spill or loss of oil from the transformers should that occur. The smaller generator transformers located at each turbine site will either be oil filled or a dry type. If oil filled each transformer will contain about 1,000 litres of oil and incorporate containment measures.

Land Uses

Existing land uses on the wind farm properties include mostly grazing, limited residential, two telecommunications facilities located in the vicinity of Ross Hill and surveying activities that intermittently use the Ross Trig Station located on Ross Hill. Neighbouring properties are primarily used for pastoral activities and rural residential. Due to the small area required for the wind farm facilities the current land uses will continue and can coexist with the wind farm. It is likely that some temporary disruption to grazing activities on the wind farm properties may occur during the construction phase of the project and management measures will need to be incorporated in the construction EMP.

No turbines will be constructed on Crown Land which is primarily represented by the Wattle Vale Travelling Stock Route to the north of the wind farm. Approval has been granted by the Rural Lands

Protection Board for temporary site access via the Wattle Vale Travelling Stock Route during the construction phase of the project.

The Ross Trig Station is close to the proposed construction works for Turbine 7 and will be fenced off to prevent disturbance during construction. Consultation has been initiated with NPWS in respect of its Ross Hill radio facility. The proximity of Turbine 7 to the radio station will be a factor in micro-siting of Turbine 7. The Telstra Ross Hill Repeater Station will not be impacted by the project.

Utility Services

The wind farm development requires construction of a new 33,000 volt to 132,000 or 66,000 volt substation to connect the wind farm to the existing 66,000 volt transmission line or an upgraded 132,000 volt line located to the north of the wind farm site. The wind farm will draw a small amount of power from the grid when not operating. Other than electricity, the main utility service required by the wind farm will be a number of telephone lines to enable the wind farm to be remotely monitored and controlled as necessary.

Social Impact

The Waterloo Range locality has a rural population of low density with Glen Innes being the nearest township at about 12 kilometres. Pockets of small acreage rural residential areas are present within a few kilometres west of Glen Innes but for the areas surrounding the wind farm rural residential settlement is at a low density.

The immediate main social impacts of the wind farm development relate to potential employment opportunities for the local population and to any potential changes to the local community that may arise from the project. It is anticipated that the project will generate either directly or indirectly a number of employment opportunities for people from the local area during the construction stage.

In terms of impacts a number of neighbours to the wind farm have also expressed concerns in relation to noise, visual impacts and impacts on property values and the Environmental Assessment provides a detailed review of these aspects. Where possible, the project design has been modified to minimise impacts on neighbours while still ensuring that it remains viable. The bulk of the community that is further distant from the site will be essentially unaffected by the development. The project is unlikely to result in an excessive demand on local resources.

A program of community consultation has been initiated with consultation with neighbours, information days held in Glen Innes and media articles. Issues raised during that consultation have been considered during the project planning and where warranted and practicable, the project has been amended to address the issue. Consultation will be continued through the remaining planning and subsequent construction and operational stages.

Economic Impact

The proponent has assessed the project as being commercially viable and income will be produced from the electricity generated. It will also provide direct income to landowners where the wind farm is located and to companies involved in the project development. Additionally, the project is likely to provide a small but significant boost to the local economy related to employment and increased demand for various local services.

The project also assists the Australian economy to achieve its various renewable energy and emission targets. During 2008, the Federal government has advanced planning for an expansion to the national renewable energy target scheme from 9,500 GWh/year in 2010 to 45,000 GWh/year in 2020 and also proposed a Carbon Pollution Reduction Scheme to be implemented from 2010.

ES6 Visual Issues

Wind turbines are large structures that are generally located in exposed and elevated positions. This project's location on the Waterloo Range means that it will be visible over a large area extending to the township of Glen Innes and the area to the west of the facility. Visual impact is a key element of the wind farm assessment.

A comprehensive visual impact assessment has been undertaken (Appendix C) that incorporates elements of landscape analysis, identification of the visual catchment and preparation of visual simulations of the wind farm (photomontages). The results of the assessment are summarised in Chapter 6 together with the measures to mitigate the project's visual impact.

The computer generated visual catchment indicates that as expected, the wind farm will be visible over a wide area. Its visual impact will reduce with distance despite it being visible at distances of 10 to 20 kilometres where the topography allows this.

The ability of the Glen Innes landscape to visually absorb the proposed wind farm project has been examined in Appendix C. Due to topographic variations at the wind farm locality and the available landscape views, the 'visual absorption capability' of the individual landscapes appears to vary from place to place. Many locations in the Glen Innes area will have only partial views of the wind farm.

While the turbines of the Glen Innes Wind Farm will be prominent features in otherwise pastoral landscapes and a new element in the landscape they will not significantly obscure existing landscape elements. The Glen Innes wind farm landscapes have low viewer exposure and have not been recognised under any planning scheme or heritage register as a zone of special visual significance.

Ten representative viewpoints were selected for the area surrounding the wind farm and visual simulations (referred to as photomontages) of the installed wind farm were prepared to indicate the visibility of the wind farm from various view points and the changes to the various scenes. The assessment of the wind farm visibility and impact used criteria based on the distance from the wind farm and extent of the view field angle as described in Appendix C. The viewpoints covered locations in most of the main directions surrounding the wind farm excluding the north and south where Waterloo Range limits views of the wind farm and settlement density is low. The assessment included views from distances from about two kilometres to 11 kilometres. All of the viewpoints are from public roads surrounding the wind farm. Eight of the ten viewpoints are located close to individual residences and can be regarded as representative of views from a number of residences.

Based on the visibility criteria, two of the viewpoints (Viewpoints 2 and 8) were assessed as having high visibility of the wind farm. Also, two viewpoints with visibility assessed as low have significant numbers of turbines at distances of more than five kilometres. The remaining six viewpoints have intermediate visibility with moderate numbers of turbines at distances of three to five kilometres.

The perceived visual impact is likely to vary between individuals depending on a range of factors. For this reason the set of ten photomontages has been prepared showing how the wind farm will appear when viewed from the representative viewpoints located around the site. The photomontages are provided in Appendix C and enable the Approval Authority and interested stakeholders to make their own judgement of the visual impact of the development. In addition, Section 7.3 of Appendix C provides a review of indicative visual impact in terms of residence locations surrounding the wind farm and Table 7.3 summarises the findings.

Table 6.2 in Chapter 6 of Volume 1 also provides the summary of the visual impact assessment for residences within three kilometres of the wind farm. It shows four residences as having a high visual impact. While a high visual impact is identified for the four residence locations it is noted that none of

the residences is surrounded by turbines and that the turbines only occupy part of the viewfield for the respective residences as indicated in the visual impact assessment.

Due to the scale of the wind turbines and need to maintain a clear area around the turbine, it is not practical to provide visual screening at the wind farm site. However, tree screening at residences can provide effective visual screening. Accordingly, Glen Innes Wind Power will offer financial support for screening of the wind farm by trees situated at suitable locations near residences within three kilometres of the wind farm site.

Consultation with the Civil Aviation Safety Authority (CASA) is underway to determine if the proposed wind farm will require lighting for aviation safety purposes. While it is believed that the wind farm without lighting will have a reduced visual impact at night time, if lighting is required by CASA, Glen Innes Wind Power will install the required lighting. Mitigation measures to partly reduce the impact of lighting are provided in Chapter 6 and Appendix C.

The visual impact of the ancillary works is minor when compared to that of the wind turbines. Nevertheless a range of mitigation measures have been incorporated for the ancillary works to mitigate their impact and the overall visual impact of the project. These measures include location of ancillary works to reduce their visibility, minimising woodland clearing, use of underground cables between turbines and procedures for earthworks that reduce their visibility from surrounding land.

ES7 Flora and Fauna Issues

The wind farm site is predominantly within cleared grazing land and has been sited to avoid the remnant woodland. The main impacts of the wind farm development relate to site disturbance during construction and, once operational, to the potential for blade strike to effect birds or bats.

Assessments of flora and fauna values of the wind farm site by relevant specialists and the project's impact on those values are provided in Appendices F and G and key findings are summarised in Chapter 7.

Site surveys have identified species of flora and fauna present at the site particularly in relation to the site works, identified habitat that could be disturbed and established the potential for the development to impact on significant flora and fauna values. Based on these assessments measures will be incorporated in the project to mitigate the potential impacts.

Due to the cleared nature of the properties in relation to the siting of the project facilities it is possible to implement the project with minimal clearing of woodland. While much of the grassland has been affected by incursions of exotic pasture species, areas of native grassland are present in places within the site. An assessment has been made of the proposed areas of disturbance and most involve grazing lands that have a significant proportion of exotic grasses. Limited clearing of trees will be required at a few locations to enable turbine construction and access. In some places the working area for turbine construction will be reduced to an area less than optimal for construction to minimise clearing. Due to the overall relatively small amount of clearing there will be a low impact on fauna habitat and on native flora.

Consideration has also been given to whether an area of native vegetation, possibly part of an endangered ecological community, can be fenced off from stock for the duration of the project. If maintained beyond the project time frame this would provide some compensation for any native vegetation clearing required for the project. Also a few areas of rock outcrop will be disturbed and it is proposed that the rocks be carefully relocated to a nearby location where they can continue to provide similar habitat.

An initial desktop assessment of bat fauna was undertaken during mid 2007 and a survey of species present at the wind farm locality was undertaken in December 2007 when conditions were suitable for bats to be active at the site. The survey found a low occurrence of threatened species at the site predominantly associated with the areas of remnant woodland and absent from open pasture sites where the turbines will be located.

The assessments by the ecologists indicated that the development will not significantly impact any Threatened Species and a Species Impact Statement will not be required. In addition, the assessments have indicated that the project does not need to be referred to the Federal Minister for the Environment under the Environment Protection and Biodiversity Conservation Act. Nevertheless the proponent may arrange for the submission of a referral in relation to the project to ensure adequate assessment under the requirements of the Environmental Protection and Biodiversity Conservation Act.

ES8 Heritage Issues

The Aboriginal and non-Aboriginal heritage issues have been assessed for the wind farm site and findings of the Aboriginal heritage assessment are presented in Appendix E and heritage issues findings are summarised in Chapter 8.

The site survey identified a single Aboriginal site comprising an isolated artefact (GIWF 1). No areas were assessed as Potential Archaeological Deposits (PADs) and no subsurface investigation was recommended by the archaeologist. In the event of the project proceeding and site GIWF1 being within the area of disturbance, salvage work at Site GIWF 1 would precede the construction and be undertaken in consultation with DECC and the Aboriginal stakeholders, the Glen Innes Local Aboriginal Land Council.

ES9 Traffic and Transport Issues

The traffic and transport issues relating to the construction and operation of the Glen Innes Wind Farm have been assessed and documented in Appendix I and key findings are summarised in Chapter 9.

The construction stage of the project involves the transport of a considerable quantity of components and materials to site. Construction activities will include use of oversize and overmass vehicles that will require special consideration and approval for use of public roads. Up to 4,300 one-way truck movements and some 4,000 one-way car movements will be involved for the construction period of the Glen Innes Wind Farm. In addition, 80 trucks will involve loads with lengths of 50 metres or more.

The construction phase vehicle movements will be spread over at least six months and up to twelve months and it is anticipated that some disruption to local traffic will occur at times. Delivery of turbine components to the site including towers, nacelles and blades will occur via the New England and Gwydir Highways. Passage through Glen Innes is likely to use the existing designated 'B-Double' transport routes. The preferred site access for all construction vehicles is via the former Gwydir Highway alignment to the north of the site. The Roads and Traffic Authority will need to be consulted in regard to the entry and exit of construction vehicles between the Gwydir Highway and the wind farm site.

Glen Innes Severn Shire Council will be consulted regarding the use of any local roads and their agreement will be sought for the traffic control measures proposed. To minimise disruption and ensure road safety a Traffic Management Plan will be developed in consultation with the local Traffic Management Committee and implemented during the construction phase of the project.

At the wind farm site the existing access tracks will be used wherever possible and these will require earthworks to upgrade them. New sections of access tracks will be required to access most of the individual turbine sites, the substation and its associated facilities and auxiliary service buildings. The tracks will be designed in accordance with the erosion and sedimentation requirements for the project and will, as far as possible, avoid the clearing of remnant woodland. Grades will be designed to suit the large vehicles accessing the site during the construction stage.

ES10 Noise Issues

The noise issues associated with the construction and operation of the Glen Innes Wind Farm have been assessed and reported in Appendix H and key findings are summarised in Chapter 10. Noise impacts arising from the construction phase will be limited to the construction period of 6 to 12 months and will vary in nature and geographic location over the course of the wind farm construction. Once operational, the potential wind farm noise impacts relate to the wind turbines when operating and substation noise sources.

The noise assessment for the operational wind farm has included characterisation of the existing acoustic environment, the turbine noise source and modelling of sound propagation to predict noise levels at sensitive receivers surrounding the wind farm. The assessment included background noise monitoring at four Noise Sensitive Locations (NSLs) (in this case residences), development of criterion for acceptable noise impacts based on the background monitoring and noise modelling using the noise specifications for the Vestas V90 3 MW wind turbine. The Vestas V90 3MW turbine was selected for the purpose of the noise assessment due to it producing sound levels at the upper end of those for the turbines under consideration and being indicative of the worst case situation.

The results of the background monitoring at the four residential receiver locations and resultant amenity noise criteria derived in accordance with the South Australian Environment Protection Authority (EPA) Noise Guidelines are supplied in this Environmental Assessment. The predicted noise levels arising from the indicative wind farm equipment have been used to assess the ability of the project to achieve compliance criterion once the wind farm is operational.

Modelling of the turbine sound power levels and their propagation at the locality has provided predicted wind farm noise levels that could be experienced at residences at various distances from the wind farm. This involved the use of typical noise level and noise spectra data for a representative wind turbine that could be used at the site. Selection of a turbine model with lower noise level specification than the Vestas V90 3MW turbine will result in lower values of predicted noise at selected receiver locations for various wind speeds.

The predicted noise levels derived from the computer modelling were compared with the noise criteria developed from the background monitoring according to the procedure outlined in the South Australian EPA Noise Assessment Guidelines as required by the Director-General's assessment requirements. The assessment also included consideration of noise propagation under various atmospheric stability conditions including consideration of the Van den Berg effect and noise propagation during stable conditions.

The assessment for the 27 turbine array comprising Vestas V90 3MW turbines has shown that predicted wind farm noise levels only infrequently exceed or equal noise criterion at the nearest residence locations. The closest neighbouring residence (relevant receiver) to the turbines is Highfields at about 0.96 kilometres and it is predicted that the criteria would be exceeded for short periods at this location if the Vestas V90 3MW turbine were used in an unconstrained operational mode. Exceedance of noise criteria of up to 1 dB(A) has been predicted for short periods at Highfields and may require a constrained operation of selected turbines to ensure compliance if the Vestas V90 3 MW turbine were selected for the project.

By varying the turbine operation at times when exceedance may occur it is possible to achieve noise levels that are within acceptable limits. Depending on the turbine selected and the final layout, post commissioning noise monitoring and consultation may be required to confirm any noise impacts and if necessary, to determine the extent of measures to control or mitigate any potential exceedance of criteria. Subject to suitable design and operational management the wind farm will be able to operate within the relevant noise amenity criteria.

ES11 Telecommunications Interference

The potential for telecommunications interference associated with the operation of the Glen Innes Wind Farm has been assessed and documented in Chapter 11.

The development is unlikely to affect aircraft navigation systems or radio reception due to the distance to commercial aerodromes.

In the case of local television reception, broadcast services to the east and west of Waterloo Range are received from different transmitters and the wind farm is unlikely to disrupt these services. For some residences where 'free to air' coverage is limited satellite services are used. Residences which currently have poor or nil reception of the local programs due to topographic screening or where satellite services are used will not be adversely affected by the development.

An assessment of the potential for interference to television signals has indicated that due to the positioning of the wind farm installation relative to the locations of the transmitters and receivers of television services that there is likely to be limited adverse impact. In effect Waterloo Range provides a barrier to transmission and the wind farm installation is therefore unlikely to degrade existing television reception services. Few residences are located in areas with potential to be adversely impacted and various options are available to address potential interference should it occur. Options include modifications to receiving equipment or installation of digital or satellite reception. It is proposed that Glen Innes Wind Power will assess any cases of television interference and rectify the problems shown to be associated with the wind farm development.

ES12 Safety Issues

A review of potential safety issues associated with the construction and operation of the Glen Innes Wind Farm is documented in Chapter 12. Issues include air safety, physical, electrical and bushfire risk. All of these matters are manageable and controls will be incorporated in the relevant project management plans to ensure safe conduct of the activities arising from the project. There are no health issues likely to arise from the project.

Air Safety

The wind farm is about 10 kilometres from the Glen Innes aerodrome. Consultation with the operator (Glen Innes Severn Shire Council) has indicated that the turbines will not infringe the Obstacle Limitation Surface (OLS) for the aerodrome. The height of wind turbine structures is greater than 110 metres and potentially up to 130 metres. Accordingly the Civil Aviation Safety Authority (CASA) has been advised of the proposed development and provided with details of the proposed structures. Details of wind turbine locations and their height will be provided to CASA, Airservices Australia and the Department of Defence for inclusion in their 'obstacle' databases. The information will be provided to these organisations prior to construction as well provision of the 'as constructed' details following installation.

Physical Safety

Wind turbines of the type to be used on the site have a very low incidence of blade failures and are unlikely to present a safety risk. A range of design and construction standards apply to the wind turbine structures to ensure that they are soundly constructed and safe. In addition, automated controls are designed to sense defective operation and shut the turbine down for inspection and maintenance. The moving turbine blades will be more than 30 metres above the ground, are on private land and clear of public areas where people or vehicles may pass under them.

Electrical Safety

There are some 15 standards applicable to electrical systems for the wind farm. All electrical equipment will be designed, installed and operated in accordance with relevant overseas or Australian standards. Stringent regulation and compliance requirements are designed to ensure the safety of site staff and the community.

Bushfire risk management

Parts of the locality may be bushfire prone, however instances of bushfire on Waterloo Range are indicated to be rare. Bushfire risk is of particular concern for rural residents and accordingly measures will be incorporated in the project to reduce the risk of initiating bushfires from the site operations. The appointed contractor will liaise with the local Rural Fire Service and the NSW Fire Brigade to ensure the adequacy of the project's bushfire controls during the construction and operations phases.

ES13 Greenhouse Issues

An assessment of the greenhouse gas emissions for the Glen Innes Wind Farm project is provided in Chapter 13. Generation of electricity from wind energy involves much lower greenhouse gas emissions than occurs for generation types using fossil fuels. Where the wind farm displaces fossil fuel generation the project will result in net greenhouse gas emission savings for electricity generation. The NSW Pool Coefficient defines the greenhouse gas emissions per unit of energy generated for the NSW 'pool' of generators. Based on the wind farm's projected average annual generation and assuming displacement of a similar amount of generation capacity with greenhouse gas emissions represented by the NSW Pool Coefficient, savings of about 130,000 to 195,000 tonnes of carbon dioxide equivalent per year could be obtained or 3.2 to 4.9 million tonnes over a 25 year period. The actual savings will depend on the turbine model selected, number of sites installed and the type of electricity generation that would have otherwise been used to serve the electricity demand.

ES14 Cumulative Impact

The visual impact of the Glen Innes Wind Farm is regarded as one of its most significant planning issues. Due to the wind farm being located on the elevated ridges of the Waterloo Range above the surrounding lowlands the turbine structures will be clearly visible over a wide area. However, some of the nearby ridges will limit the viewfield of the wind farm in some directions and will reduce the extent of the visual catchment. At a distance, the wind farm may be visible but will not dominate the broader landscape. While there is a likelihood of future wind farm developments in the wider community it is unlikely that many of the surrounding ridges will be subject to similar developments and accordingly wind turbines will only occupy a part of the landscape.

The proposed Ben Lomond wind farm would be located about 20 kilometres to the south of the Glen Innes Wind Farm. There will be sufficient separation between these wind farms such that most viewpoints will not include views of both wind farms.

Mitigation measures incorporated for the construction and operation will ensure that the wind farm will not cause significant further erosion or degradation of the ecology of the region. It will have limited or nil additional affect on water pollution. In terms of power generation technologies, wind farms are regarded as one of the most benign generation types.

ES15 Statement of Commitments

The mitigating measures that are proposed for the project have been identified in the relevant sections of the Environmental Assessment. A compilation of the proponent's proposed mitigation measures to be incorporated in the project is provided in Chapter 15 of this Environmental Assessment. The compilation represents the project's Statement of Commitments required as part of the assessment process under Part 3A of the EP&A Act. Environmental Management Plans will be prepared for the construction and the operating stages of the project incorporating the relevant commitments and as applicable the requirements of any relevant Project Approval conditions.

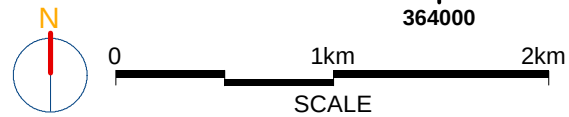
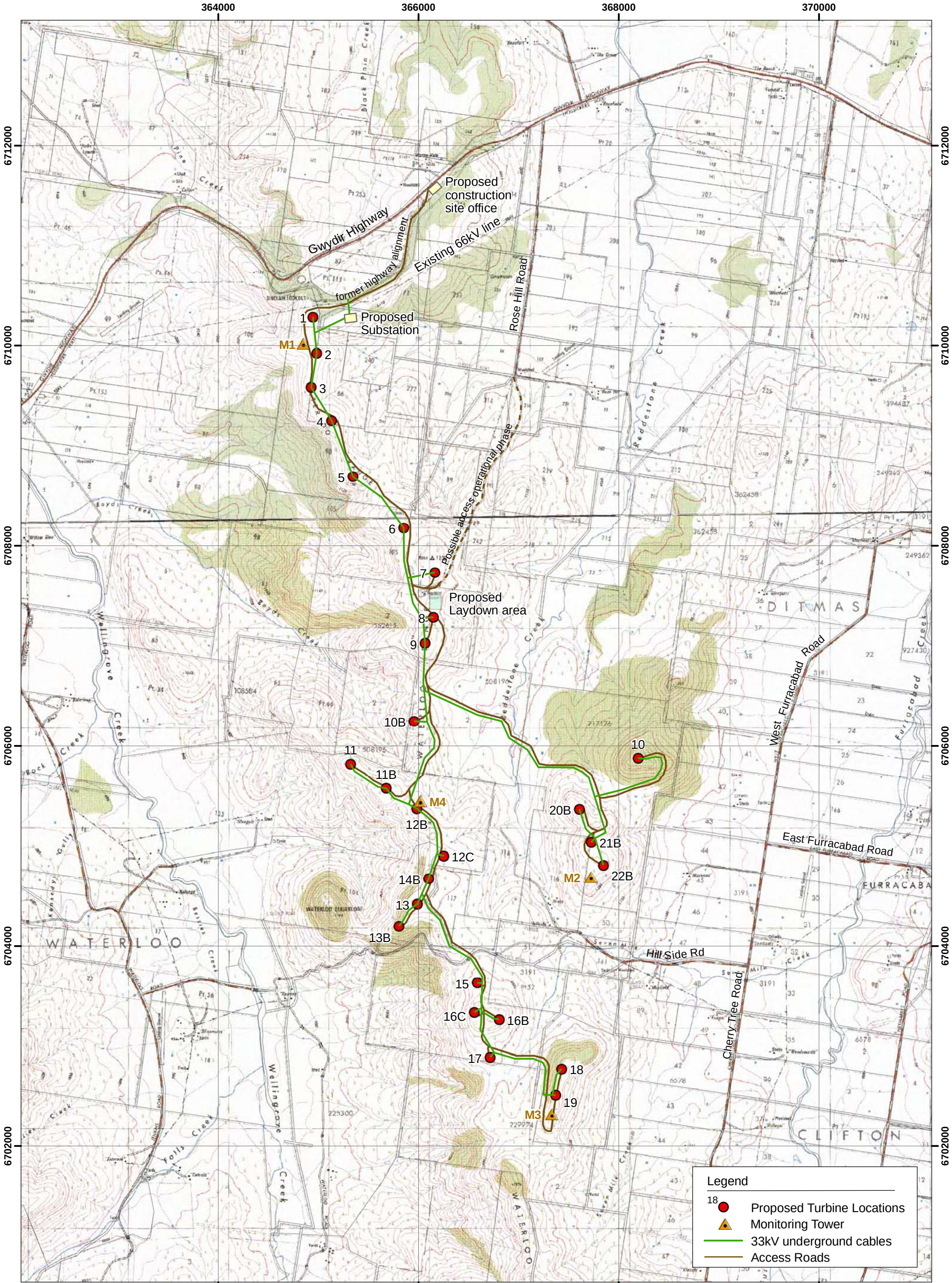
ES16 Project Justification

In summary, the development is justified for the following reasons:

- It utilises a renewable energy resource to produce between 54 and 81 megawatts of electrical power depending on the number of turbines and the model installed
- It provides additional generating capacity of between 137,000 to 206,000 MWh/yr to assist the National Electricity Market (NEM) to be able to meet forecast electricity demands
- By displacing generation from fossil fuels it can reduce greenhouse gas emissions from electricity generation of the order of 130,000 to 195,000 tonnes CO₂ per year and up to 3.2 to 4.9 million tonnes CO₂ over 25 years
- It contributes additional renewable energy generation that can serve to fulfil requirements associated with an expanded national Renewable Energy Target
- When implemented in accordance with the controls identified in this document, it does not compromise environmental values at the locality including ecological, heritage, soils and water quality. It also does not place undue stress on local community resources.
- The development is located on cleared grazing land and is able to operate compatibly with the existing grazing operations
- It provides additional income to the landowners of the properties on which the wind farm will be located
- The project is likely to provide a small but significant boost to the local economy, particularly during the construction phase of the project
- It is a commercially viable development that will assist Glen Innes Wind Power to meet its business objectives and provide employment beyond the project locality
- There appears to be positive support from the general community for wind energy projects and, in general, regulator support for appropriate development
- The project complies with the principles for inter-generational equity by avoiding the use of finite fossil fuel resources and by producing electricity using low emissions technology

Some impacts of the project could be considered as adverse by some stakeholders including changes to the landscape of the locality and increased traffic on local roads during the construction period. Some objections to the project have been received from residents of the Furracabad Valley and the matters raised during the project review process will need to be taken into account together with other matters for the Minister's determination of the project.

Overall, it is considered that once the mitigation measures have been applied any adverse impacts will be relatively minor and will be outweighed by the positive longer term environmental, social and commercial benefits of the project.



Source: Lands Department
Mapping Grid: Projection MGA56, GDA94 datum

Figure ES 1
Project Layout

