During the survey, PLALC and BNAC Site Officers and Douglas Connors were also asked to consider whether there were any Aboriginal cultural values or issues that they wished to raise, identify or have recorded in the assessment report.

As a result of the field survey undertaken for the CWFII project, a total of 63 sites were recorded, with a total of 218 artefacts. Site location mapping is provided in **Figure 82, Figure 83** and **Figure 84.** The number of each particular site type is presented below in **Table 22.**

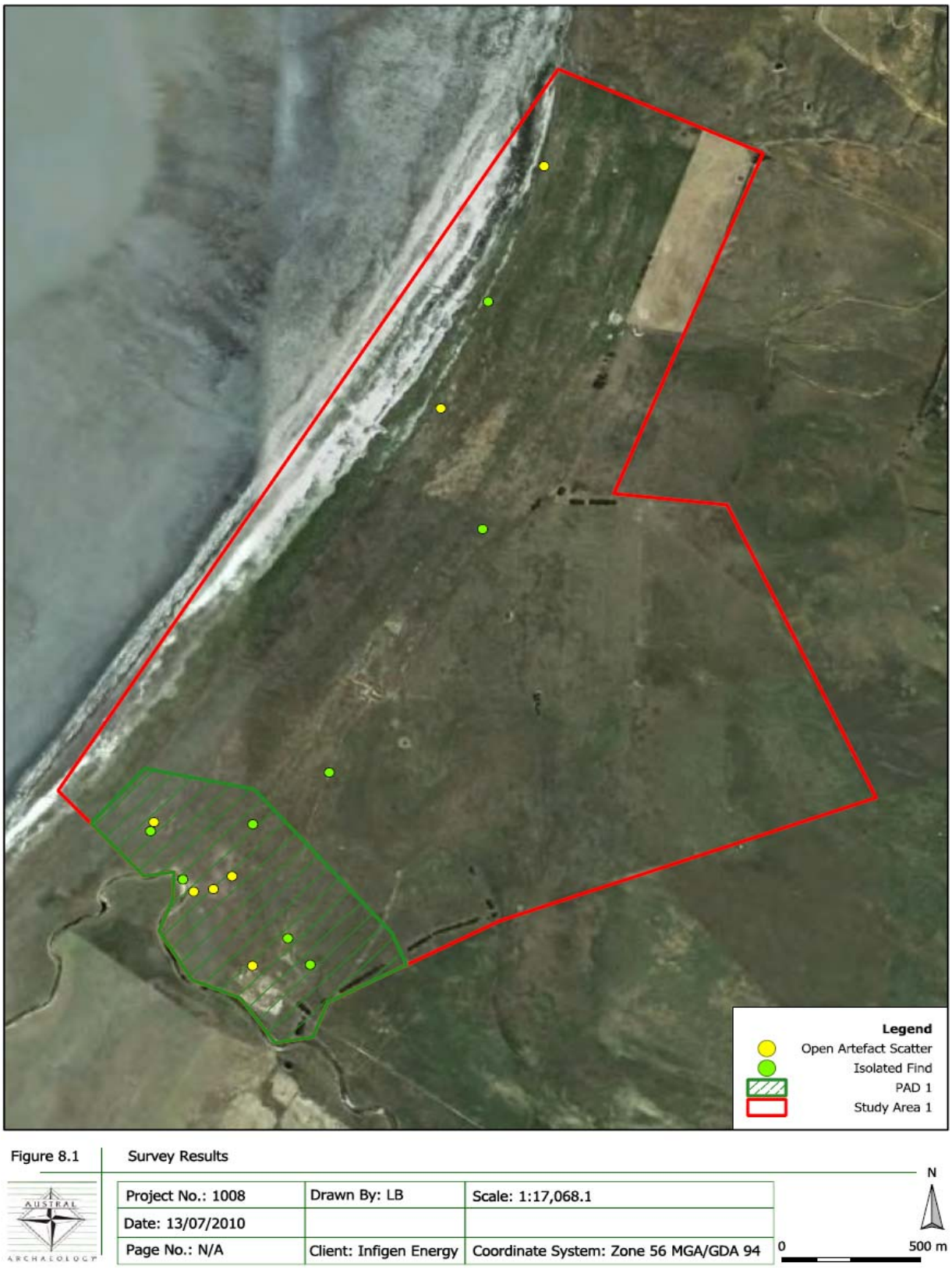

Figure 82: Survey Results - Study Area 1

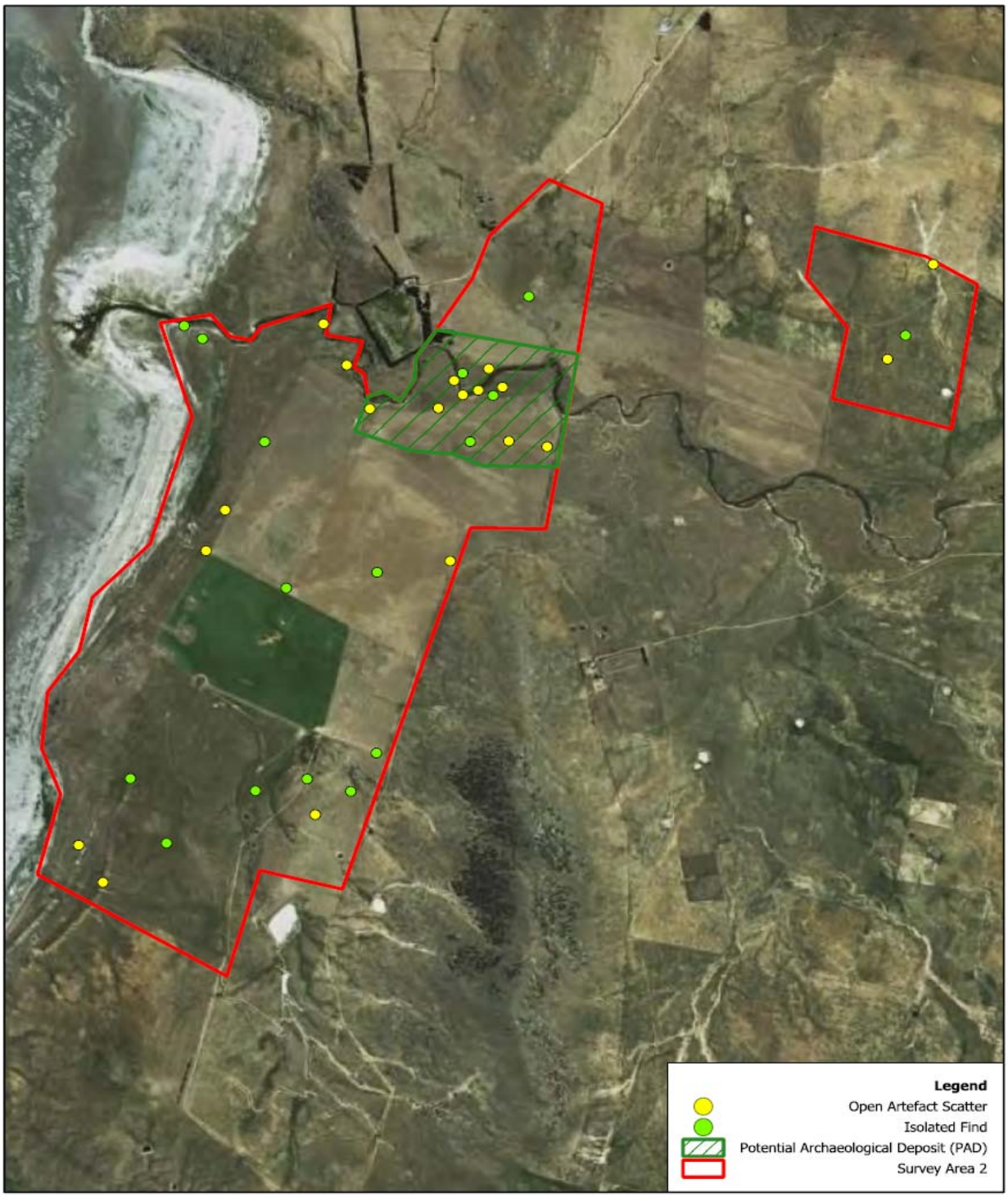

Figure 8.2 | Survey Reults

Project No.: 1008	Drawn By: LB	Scale: 1:20,452.6
Date: 13/07/2010		
Page No.: N/A	Client: Infigen Energy	Coordinate System: Zone 56 MGA/GDA 94

N

0 500 m

Figure 83: Survey Results - Study Area 2

Figure 84: Survey Results - Study Area 3

Table 22: Number of artefact types within the study area

ARTEFACT TYPE	NUMBER OF ARTEFACT TYPES	PERCENTAGE OF TYPES
Flakes	158	73%
Cores	39	18%
Tools	21	9%
Total	**218**	**100%**

10.8 ASSESSMENT OF POTENTIAL IMPACTS

Aboriginal archaeological and cultural heritage assessments in NSW are undertaken in accordance with the Director-Generals Requirements. A range of State and Federal Acts and Guidelines allow for the management and protection of Aboriginal places and objects, and the Guidelines set out best practice for community consultation in accordance with the requirements of the Acts.

Aboriginal site significance assessments need to consider both the scientific and social or cultural values of a site. Research potential or scientific significance of an Indigenous archaeological site can be assessed by utilising the criteria set out in the Aboriginal Cultural Heritage, Standards and Guidelines Kit. Social or cultural values of a site can only be established through Aboriginal consultation.

The significance of a site does not relate only to its scientific or research value. Aboriginal peoples' views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although most Aboriginal people also value any scientific information a site may be able to provide.

10.8.1 POTENTIAL ARCHAEOLOGICAL IMPACTS

Historic land use and natural taphonomic processes have impacted on the surface and sub-surface archaeological potential of the study area. In general, lower levels of ground surface disturbance correlate to higher potential for the survival of the Aboriginal archaeological resource, once patterns of past Aboriginal landscape use have been taken into consideration.

The main processes leading to ground surface disturbance in the study area are the historic land-use effects of vegetation clearance:-

- Ploughing and agriculture;
- Grazing of hoofed animals;

- Construction of sealed roads and unsealed access tracks;
- Construction of farm infrastructure such as fences, dams and earthworks;
- The natural taphonomic processes of hill slope and ridge erosion from rain;
- Creek bank erosion from river flows; and
- The deposition and removal of sediment as a result of flooding.

It must also be noted that past land use practices such as extensive vegetation clearance have intensified the effects of natural processes such as erosion.

10.8.2 POTENTIAL CULTURAL IMPACTS

The Aboriginal cultural heritage component of the CWFII archaeological and cultural heritage assessment was undertaken simultaneously with the archaeological field assessment component.

During the field assessment the representatives of the Aboriginal stakeholder organisations BNAC, PLALC and Douglas Connors, were asked to identify issues, items or areas of cultural significance and offer comment on cultural rather than archaeological grounds.

No archaeological sites were identified in association with cultural areas or features. However, it is understood that all archaeological material is likely to be of cultural importance to the Aboriginal community as it is material produced by past Aboriginal people.

10.8.3 RESEARCH POTENTIAL

Research potential refers to the potential for information gained from further investigations of the evidence used in answering current or future research questions. The research and educational potential of the sites and areas of potential archaeological deposit identified in the field assessment is presented in Table 9: Assessment of Research potential in **Appendix E**.

The two areas where the research potential is of greater value are those associated with the two recorded PADs (CWFII-PAD-01 and CWFII-PAD-02). PAD 1 is considered to be of high potential. Although the area has been utilised in the past for sand mining activities and the ground in the area has been extremely disturbed there are still large areas where mining activity has not occurred.

Verbal accounts from the property owner also attest to the existence of camp fires and axe heads that were uncovered during sand mining activities in the area. This evidence increases the potential to yield intact deposits in areas of minimal disturbance, and makes this sites research potential high.

The second area of PAD (PAD 02) represents an area of high potential especially on the rises away from the creek on the southern bank.

The location of artefactual material inside the PAD, including several tools, means that there is a greater chance for further material to be present within 100 metres of the creek, which predictive modelling tells us is more likely to yield intact and more complex site types. Ground disturbance at PAD 02 was noted to include vegetation clearance and impacts associated with the land's use as a rural property.

The scatters recorded during the field assessment for the Project represented different levels of research potential. The majority were considered to be of low potential due to the small size, the lower potential of the area in which they were located based on past land use and condition as observed during the field assessment, and the number and variety of associated artefact types and raw material.

10.8.4 EDUCATIONAL POTENTIAL

The educational potential of a study area is best considered in light of its value to the general public, the Aboriginal stakeholders, and other researchers, those people whom the archaeologist has a duty to inform.

It is the heritage consultant's opinion that the data that could be retrieved from further investigation of the current study area, apart from PAD's 1 and 2, is unlikely to add any archaeological data that is likely to alter the story of Aboriginal people in the area prior to the arrival of Europeans. As such, the educational potential in terms of the public is considered to be low.

10.8.5 AESTHETIC SIGNIFICANCE

Aesthetic significance is generally taken to mean the visual beauty of the place. Archaeologists view aesthetic significance as an attribute that can only be culturally determined by Aboriginal stakeholders. Only members of the local Aboriginal community can advise of the cultural significance of an area or place.

To gain a determination of cultural significance, the heritage consultant approached and consulted with the identified Aboriginal stakeholders. Following consultation with the relevant stakeholders, the Aboriginal landscape and cultural values of the study area remain unchanged based on the results of the field assessment.

Accordingly, it is considered that the aesthetic significance of the study area will not be significantly affected as a result of the construction and operation of the Project.

10.9 MITIGATION MEASURES

On the basis of the field assessment findings, the following recommendations are proposed to address Aboriginal archaeological and cultural issues that represent known developmental constraints for the Capital II Wind Farm study area:-

1. If additional un-recorded Aboriginal archaeological material is encountered during development, works must cease immediately to allow an archaeologist to make an assessment of the finds, as all Aboriginal artefacts (known and unknown) are protected under Section 90 of the *NP&W Act*.

   The archaeologist may need to consult with NSW DECCW and registered stakeholder groups concerning the significance of any such material. DECCW must be notified of any such finds as per Section 91 of the *NP&W Act*.

2. As required by the *NSW Heritage Act 1977* (amended), in the event that historic relics are encountered, works must cease immediately to allow an archaeologist to make an assessment of the finds. The archaeologist may need to consult with the Heritage Branch Department of Planning concerning the significance of any historic cultural material encountered.

3. Restriction of access to Aboriginal archaeological information is recommended, in the event that this report is to go on public exhibition. Consultation with Austral Archaeology Pty Ltd will be necessary to determine the appropriate level of public release.

4. It is recommended that copies of the finalised report be provided to PLALC, BNAC, Douglass Connors and the NSW DECCW, and that the completed sites card be provided to the DECCW AHIMS Registrar

5. Adherence to Cultural Heritage Management Sub Plan. The protocols and procedures prepared by Austral Archaeology titled: *Capital Wind Farm, Tarago Region NSW: Aboriginal Cultural Heritage Management Sub-Plan (2007)* are to be adhered to by all parties during the course of the Capital II Wind Farm.

10.10 CONCLUSION

Although due to the impact of European colonisation there is uncertainty as to the precise details of the Aboriginal groups that occupied these lands, the Ngunnawal people and Ngunnawal/Gundungurra speaking groups are both indicated as being present within the study area at the time of the arrival of Europeans. Following from this it is possible to assert with some certainty that the people within the study region were the Ngunnawal or groups with very close ties to them. Aboriginal people in this region would have made use of the plant, animal and lithic resources of the area to furnish an adaptive material culture, with both the natural environment and human culture changing over the minimum 21,000 years that people have occupied this region. The resources within the region varied considerably in space and time requiring different approaches from the Aboriginal population. There may have been a tendency for people to pass through the area, using ridge lines as vantage points, either in response to seasonal resources such as aestivating Bogong moths, or *en route* to richer areas for exchange with other groups.

Some items of Indigenous heritage are located either on, or in close proximity to the site. The potential impacts of the Project on heritage have been considered at the early stages of the Project, including during development of the concept design for the Project. A number of changes were made to the site layout and design during the concept design phase to minimise the potential to impact of the Project on heritage items. These changes included realignment of the layout outside of the PAD areas and careful siting of the WTGs to avoid the identified surface scatters.

These design changes, coupled with the mitigation measures contained above, reduce the potential for the Project to impact on heritage. After implementation of the mitigation measures discussed above, it is concluded that the risk of residual impacts to Indigenous heritage from the Project would be very low.

11. TRAFFIC AND TRANSPORT

The Director-General's Requirements identified traffic and access as a key issue for the Environmental Assessment. This Chapter identifies the potential traffic and access impacts of the Project during construction and operation, as well as the mitigation measures to reduce these impacts. Any residual impacts are also discussed where applicable. The management measures are further detailed in the draft Statement of Commitments contained in Chapter 17. **Table 23** below outlines the Director-General's Requirements and where they have been addressed in this report.

Table 23: Director-General's Requirements for traffic and access

DIRECTOR-GENERAL'S REQUIREMENTS	CHAPTER ADDRESSED
Details of traffic volumes (both light and heavy vehicles) and transport routes (including site access) during construction and operation.	Chapter 11.1.2
Assess the potential traffic impacts of the project on the road network function (including intersection level of service) and safety.	Chapter 11.3
Assess the capacity of the existing road network to accommodate the type and volume of traffic generated by the project (including over-dimensional traffic) during construction and operation, including full details of any required upgrades to roads, bridges, site access provisions or other road features.	Chapter 11.3
Details of measures to mitigate and/or manage potential impacts, including construction traffic control, road dilapidation surveys and measures to control soil erosion and dust generated by traffic volumes.	Chapter 11.4
Details of the access roads within the site including how these would connect to the existing road network and ongoing operational maintenance.	Chapter 11.2

11.1 ASSESSMENT APPROACH

TPK and Associates prepared a Traffic Impact Assessment (TIA) for the Project assessing potential traffic implications that may result form the Project. The TIA was completed in accordance with the *Guide to Traffic Generating Developments* (RTA, 2002). The TIA reviewed the traffic, access and parking implications for the proposed development. A copy of the TIA is contained in **Appendix F**.

11.2 TRAFFIC AND TRANSPORT ISSUES

The Project will generate considerable additional traffic during the construction phase and a negligible increase during the operation of the wind farm. The main traffic impacts will occur on the local roads surrounding the site during the construction phase. This is mainly due to the additional volume of traffic on the normally lightly used local roads and the need to use over-size and over-mass vehicles.

The key traffic issues that were considered during the assessment of the Capital Wind Farm I (CWFI) are generally identical to those affecting the construction and operation of the Capital Wind Farm II (CWFII). These can be broadly divided into on-site and off-site issues.

On-site traffic issues mainly related to:-

- Location of new access tracks and environmental considerations;
- Standard of track work required, including upgrade and extension of existing access tracks;
- Erosion and sediment control measures; and
- Restoration of any temporary tracks on completion of the works.

Off-site traffic issues mainly relate to:-

- Choice of local roads to be used for access and the timing of travel;
- Ability of local roads to handle the volume of construction traffic particularly in regard to over-mass and over-size vehicles;
- Road safety; and
- Traffic management measures.

11.2.1 CAPITAL I WIND FARM

Following from the Traffic and Transport assessment for CWFI, a Traffic and Transport Management Plan was prepared for the construction of CWFI. This included the recommendations in the first traffic assessment.

Upon completion of CWFI, a Construction Compliance Report was prepared detailing the mitigation measures outlined in the Environmental Assessment (EA) and Project Approval. With regard to traffic and access, all the recommended mitigation measures were completed including the upgrading of several roads such as a portion of Taylor's Creek Road and Western Leg Road. Compliance with these measures appropriately addressed the potential impacts discussed in the EA and no further actions were deemed necessary for any future works.

Figure 85: Upgrade works underway on Taylors Creek Road (May 2010)

The Complaints Register for CWFI documented several issues raised by members of the community. Of relevance to traffic and transport include the following however measures to mitigate and control these issues are included in the Construction Environmental Management Plan (CEMP) for CWFI. Accordingly, non-compliance with these measures resulted in concern from the community.

- Vehicle's orange light flashing whilst off-site;
- Safety of vehicles travelling on Taylors Creek Road; and
- School bus delayed due to blade deliveries.

In response, the Site Manager immediately addressed these issues. Consideration of these issues has been included in the Traffic Assessment and particular attention has been provided in the draft Statement of Commitments (Chapter 17) and the CEMP that will be implemented for the construction of CWFII.

11.2.2 TRAFFIC FLOWS AND VOLUMES

The Project comprises the construction of up to 55 wind turbines with a maximum tower height of 100m. This particular turbine model has a blade length of up to 57 metres and represents the largest single component to be transported to the site. This assessment considers the transport of the largest components and the greatest traffic volumes. Depending on the final layout, the size of turbine components and the traffic volume may be reduced, therefore minimising the potential traffic impacts as assessed in the EA. Allowance has also been made for all concrete batching to be undertaken off-site. It is anticipated that two on-site temporary concrete batching plants will be installed; however the following table includes truck movements to import concrete into the site.

Table 24: Maximum predicted external traffic movements based on 55x100m WTGs

ASPECT	TRIPS			ASSUMPTIONS
	Cars	Trucks	RAV	
1. **Workers**				
Wind Farm Workers	5600			Workers located in Goulburn, Queanbeyan, Tarago and Bungendore all go to Site Office off Collector Road to commence work.
Substation Workers	2400			Workers located in Goulburn, Queanbeyan, Tarago and Bungendore, all go to Substation off Bungendore road to commence work.
Trips between Substation and Wind	1000			Travelling Collector Road and Bungendore Road throughout the day.

ASPECT	TRIPS			ASSUMPTIONS
	Cars	Trucks	RAV	
Farm				
2. **Site Establishment/Dis-establishment**	20	20		
3. **Civil Works Deliveries**				
WTG Foundation Concrete Materials		2475		Assume gravity foundations, off-site batching.
WTG Foundation Reinforcing		50		Assume gravity foundations.
Road Material Import		30		Assume generally materials won on-site only capping stone imported.
Drainage Structures		4		
Water Trucks		4		Assume water trucks remain on-site for entire project with water sourced from on-site.
Revegetation	10	6		Including grass seeding materials, top soil, trees.
4. **Turbine Component Deliveries** [2]				Deliveries to site are RAV, return trips are standard truck configurations.
Tower Sections		220	220	Note: RAV trips will be accompanied by escorts as per permit.
Blades		330	330	Assume 1 blade per vehicle. Note: RAV trips will be accompanied by escorts as per permit.
Hubs		110	110	Note: RAV trips will be accompanied by escorts as per permit.
Nacelles		110	110	Note: RAV trips will be accompanied by escorts as per permit.

[2] It is anticipated that over-size and over-mass vehicles will only travel one way; from Port Kembla to the Project site. All return journeys will not require traffic permits or escort vehicles.

ASPECT	TRIPS			ASSUMPTIONS
	Cars	Trucks	RAV	
Miscellaneous	50	400		Includes ducting, entry stairs, bottom cabinet mounts, tower bolts, tower cables, tower platforms, lifts, met masts, cranes.
5. **Substation**				
Miscellaneous	6	10		Including earthing, capacitor banks etc.
Foundations		5		Concrete sourced from external supply as batch plant.
6. **Operations and Maintenance Building**				
Slab		15		Concrete sourced from external supply.
Building		10		
7. **Electrical Works**				
Overhead Lines		14		Including insulators etc. and machinery 10km overhead lines.
Transmission Poles			6	400m pole spacing, 10km.
Underground Cable		80		Including trenching machinery, 20km of underground.
Optic Fibre		10		20km of optic fibre.
Bedding Sand and Backfill Material		20		20km of trenching.
TOTAL MOVEMENTS	**9,000**	**3,923**	**776**	

In comparison to the traffic movements generated from the construction of CWFI, there is substantially fewer traffic movements due to the Project utilising a substantial amount of the existing infrastructure such as the access roads.

11.2.3 TRANSPORT ROUTES

It is anticipated that the same transport routes utilised during the construction of CWFI will be used during the construction of CWFII. These routes were selected following consultation with Palerang Council and the RTA as they had the least impact on existing local and regional traffic and were able to accommodate the movement of the over-size and over-mass vehicles.

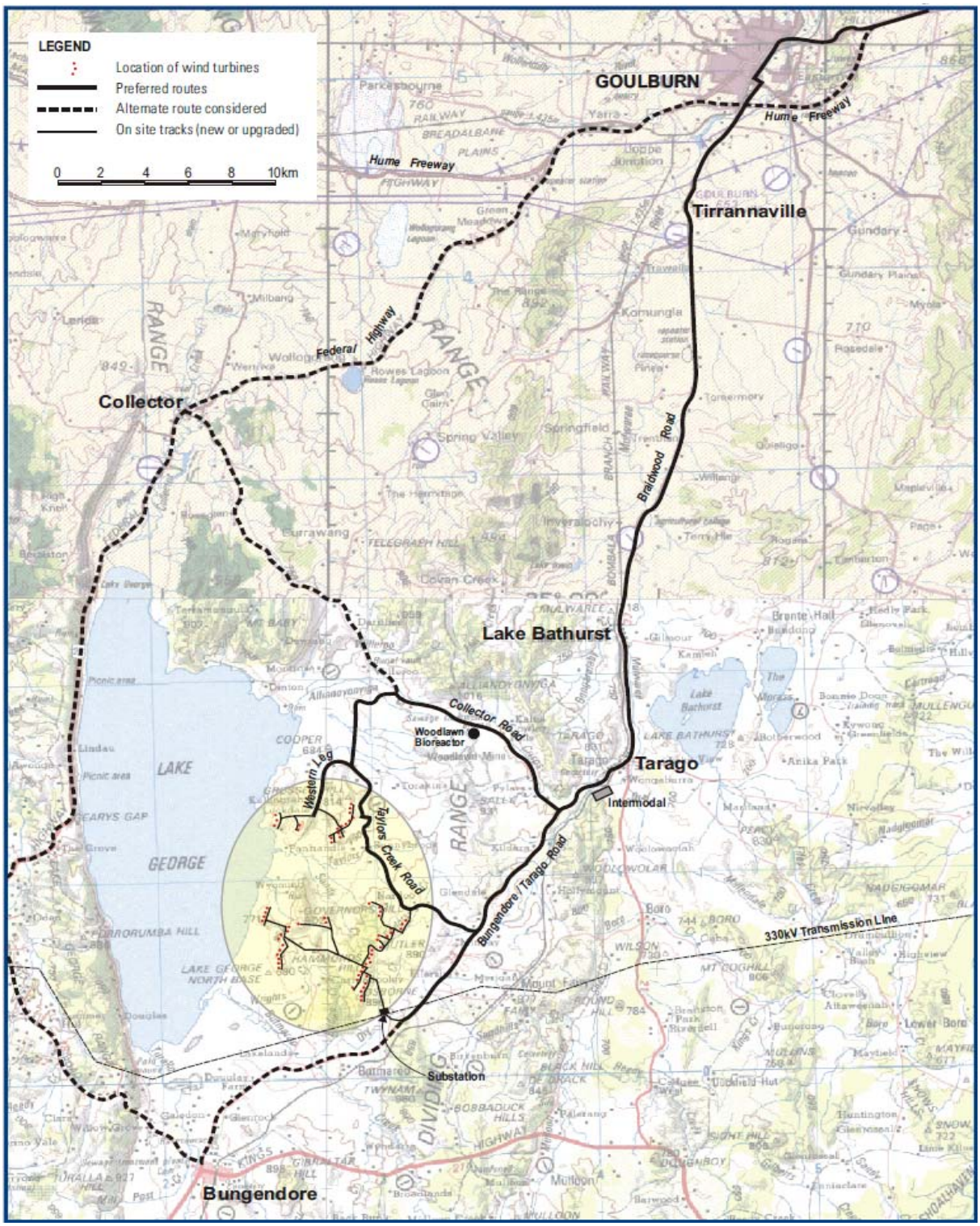

Figure 86: Traffic access to the Project site (Connell Wagner, CWFI EA 2005)

11.2.4 SITE ACCESS

Access to the site from public roads will be provided from an existing access point to CWFI, i.e the southern end of Western Leg Road. Direct access to the existing substation is also off Bungendore Road.

All internal access roads will be extensions to the existing service tracks constructed for access to the CWFI. No new connections to public roads will be constructed.

11.3 ASSESSMENT OF POTENTIAL IMPACTS

The following provides an assessment of potential traffic and access impacts associated with the Project including:-

- Suitability of existing road layout for the types of vehicles that will need to access the site. Aspects affecting suitability include width of roads, radii of curvature for bends and nature of existing traffic use.

- Structural capacity of the existing roads and structures. This particularly applies to the increased volume of traffic during the construction stage which will include heavy vehicles.

- Disturbance to local community. The change in vehicles accessing the site has potential to affect existing users of local roads.

- Road safety. Any change to traffic conditions can impact road safety and project planning has considered where safety risks may potentially be increased and proposed measures to mitigate these.

- On-site access management. On-site management issues relating mainly to minimising the disturbance to environmentally sensitive areas, minimising erosion and sedimentation and limiting the visual impact of the trackworks.

11.3.1 SITE ACCESS

The proposed development will generate additional traffic during the construction phase and a neglible increase for the operational phase of the works.

There would be no changes to existing access arrangements to and from the site as a result of the Project. All vehicle access to the Project would be via the existing site access off Western Leg Road. Several access roads would be extended within the site to service the WTGs within the Project.

11.3.2 CONSTRUCTION TRAFFIC

Construction traffic will be generated by the delivery of materials and equipment as well as by the construction workforce of up 90 persons going to and from the site on a daily basis.

The type of vehicle accessing the site will be dependant upon the equipment or personnel being transported. Due to the size of the WTG equipment, it is expected that many of the delivery vehicles that will transport the individual components will be over-size, or over-mass or both. These vehicles are generally regarded as Restricted Access Vehicles (RAVs) and will require operating permits to allow them to travel on public roads.

Over-Size and Over-Mass Vehicles

For the WTG equipment it is expected that road and track widths of 5 metres on straight sections will be required. Given that the vehicles delivering the blades will be at least 57 metres in length, special attention will be required to turning circles and road widths at bends and intersections. The over-mass and over-size vehicles are likely to occupy most of the width of the roadway at many locations thereby requiring permits outlining traffic control procedures to ensure safe passage for local road users. This may include the provision of traffic control personnel where large vehicles are required to execute difficult manoeuvres.

11.3.3 OPERATIONAL TRAFFIC GENERATION AND DISTRIBUTION

The wind farm will be designed to operate automatically but will have a small on-site staff (up to ten persons) during its operational life for the purpose of inspecting and maintaining the wind farm. It is expected that the on-site staff for CWFI will also maintain CWFII. Operational staff will be based at the new Operations and Maintenance building and will regularly visit all parts of the wind farm.

During the initial commissioning and “run-in” phase of its operation the wind farm will require attendance by an additional small number of technical and maintenance staff. Any unscheduled maintenance or repairs may also require attendance at site by additional specialist personnel and equipment.

The number of vehicles accessing the site during the commissioning and operation and maintenance periods is considered minimal relative to the volumes of local traffic.

11.3.4 CAR PARKING

The Project would provide on-site car parking for employees and contractors.

11.4 MITIGATION MEASURES

A Traffic Management Plan (TMP) will be prepared to manage construction traffic for the Project. The TMP will be adapted from the Traffic and Access Management Plan prepared for CWFI. The CWFI TMP included such measures as:-

- Alter the hours of work on site so that staff movements in and out of the site would be completed outside of peak hours and to avoid school bus movements. This would mean work commencing on site at 7:00am and finishing after 6:00pm;

- Where possible, limit material delivery vehicles to be outside of peak hours;

Whilst a large portion of materials could be delivered outside of the peak hours:

- any oversize/over mass transport vehicles will be controlled in terms of travel times and transport routes will be outlined in the conditions of the necessary permits;

- Prepare a road dilapidation survey prior to construction commencing;

- Establishment of an inspection and maintenance program for the local road access network to ensure condition of roads are maintained in safe state; and

- Implementation of an erosion and sediment control plan for internal access roads and laydown areas.

In addition to the mitigation measures implemented for CWFI, the following measures will also be required:

- Improved signposting on several intersections including the junction of Taylors Creek Road and Collector Road;

- Correction of road hazards such as loose material; and

- Correction and maintenance of intersection sight distances.

Figure 87: Loose gravel visible at the intersection of Western Leg Road and Taylors Creek Road

It is considered that these options should be discussed with the RTA during preparation of the TMP. There may also be opportunity to manage the cumulative construction impacts through measures such as co-locating construction compounds on site.

11.5 CONCLUSION

The primary impact to surrounding transport infrastructure as a result of the Project would be during the construction phase as the employee numbers would be much higher than during operation.

The wind turbines, towers and other materials will be transported to the site by means of articulated heavy vehicles using the existing public roads. The heaviest vehicles using the roads will be for the once only delivery of construction materials and later removal of the crawler crane.

Other over-size loads will include tower sections, turbine blades and nacelles, which will be delivered by large or extended articulated trucks, while other construction materials will be delivered by smaller single-body/medium rigid vehicles.

Traffic management measures will be implemented throughout construction to ensure that the impact of this traffic on the public road network and other road users is minimised. A Traffic and Access Management Plan will be adapted from the CWFI CEMP to reflect the different volume in vehicle movements.

Once operational, the wind farm is designed to operate with minimal maintenance and therefore traffic to and from the wind farm will be minimal and limited to mainly employee private vehicles.

12. HAZARDS AND RISKS

This Chapter of the Environmental Assessment provides a description of potential impacts of the Project on human safety and the measures to mitigate those impacts.

12.1 AVIATION SAFETY

The Project involves the construction of up to 55 WTGs that each with a height of up to 157 metres to the top of the area swept by the turbine blades.

The risk of airborne collision presented by the additional WTGs is considered minimal since the majority of the existing WTGs in CWFI are located on the ridges and hills above the development site where the proposed WTGs will be located. Furthermore, during daylight operations pilots will be able to see and avoid the large, conspicuous structures. It is a requirement for the Proponent to notify the Civil Aviation Safety Authority (CASA) and the Royal Australian Air Force Aeronautical Information Service of the final location of the WTGs, therefore, pilots will be aware of the Project site and flights at night or under instrument navigation, the pilots will be able to make suitable adjustments to flight paths if necessary.

12.1.1 AIR TRAFFIC ROUTES

There are no classified aerodromes within 30 kilometres of the development site. The closest landing fields or aerodromes providing instrument landings are Goulburn, some 35 kilometres to the north of the site, and Canberra, approximately 35 kilometres to the south-west.

12.1.2 AIRCRAFT OPERATING HEIGHTS

Under Civil Aviation Safety Regulation (CASR) Manual of Standards Part 139 - Aerodromes, any object which extends to a height of 110m or more above local ground level must be notified to CASA. Furthermore, any object that extends to a height of 150m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

The proposed wind turbine structures are therefore considered new obstacles (each turbine is greater than 150m above ground level). Given the new structures are in the vicinity of existing obstacles (CWFI) which have previously been assessed as not being a hazard to aircraft; the new structures proposed as part of CWFII are deemed to be shielded by CASA (Part 139 Chapter 7.4.1.1):

> *"a new obstacle located in the vicinity of an existing obstacle and assessed as not being a hazard to aircraft is deemed to be shielded."*

It is acknowledged that the new structures may have a greater height above ground level in some areas than the existing adjacent wind farm (157m WTG compared to 124m WTG), however the new structures will be located on the lower slopes below the ridges where the majority of the wind turbines are located in the CWFI (**Figure 88**). Furthermore, the highest obstacle within the Project area will continue to be Governor's Hill. At a height of 902m AHD, Governor's Hill is 25m higher than the blade tip of the highest proposed WTG (A14 877m AHD and B8 874m AHD). Therefore the proposed wind farm will not introduce any additional obstacles higher than the existing topography.

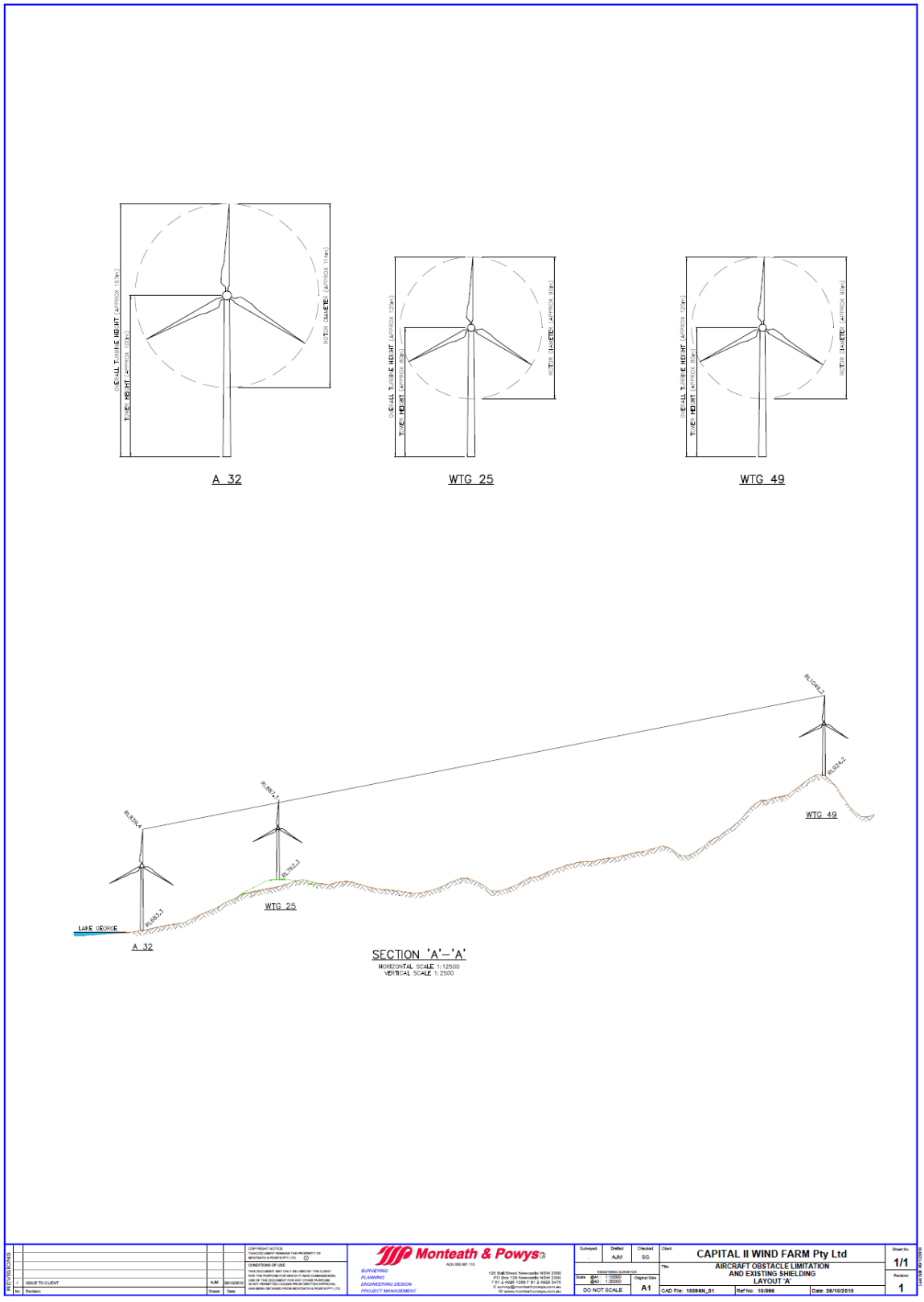

Figure 88: Cross Section identifying the vertical clearance between the existing CWFI and proposed CWFII providing shielding from

Therefore, the shielded obstacles do not require removal, lowering, marking or lighting and should not impose any additional restrictions to aircraft operations (Part 139 – Chapter 7.4.1.2).

Minor airfields are located on various properties throughout the region, many of which are marked on topographic mapping. As the small planes that could use the runways use visual rather than instrument based landings and the wind turbine structures are readily identified at close distance, there is not expected to be any safety risk for planes that may use local air strips.

12.1.3 AERIAL AGRICULTURAL ASSOCIATION OF AUSTRALIA

The Aerial Agricultural Association of Australia (AAAA) has been provided with details of the Project and invited to comment.

The existing wind turbine structures found within CWFI have previously been considered not to be a safety hazard to aerial agriculture operations as the structures are readily visible and the pilots can easily avoid them. Since the CWFI operation commenced, there has been no recorded incidents involving aerial agriculture operations being affected by the CWFI – including collision or obstructing the operations on the site or surrounding properties.

It is anticipated that the construction of additional WTGs adjacent to the CWFI will not have an additional impact or create a significant hazard to the safe operation of aerial agriculture as aerial agriculture operations generally occur during daylight hours when the wind farm structures are visible. Additionally, as there has been minimal to no aerial agriculture operations adjacent to the Project area in the past and due to the surrounding land uses, potential impacts to aerial agriculture operations are considered negligible.

12.1.4 CIVIL AVIATION SAFETY AUTHORITY AND AIRSERVICES AUSTRALIA

The Civil Aviation Safety Authority (CASA) and Airservices Australia both maintain databases and charts of any obstacles that may be relevant to the safety of flying operations.

At the time of construction, the Proponent will provide a plan with the exact co-ordinates of the wind turbine structures and details of the height of each turbine above ground level to CASA, Airservices Australia and also the Royal Australian Air Force (RAAF) and the AAAA so that these organisations can record the details in their databases and on the relevant charts. Airservices Australia regularly maintains and upgrades its charts on a six month basis.

CWFI is shown on the Canberra/Albury Visual Terminal Chart to identify the location of the wind farm for pilots relying on visual navigation. Instrument rated pilots do not generally fly below a certain height, commonly no less than 5,000 feet (1,500 metres).

12.1.5 NAVIGATION AND COMMUNICATION SYSTEMS INTERFERENCE

Airservices Australia operates a facility at Mt Majura which is about 40km to the south-west. The facility includes aircraft radar and navigation aids servicing the nearby Canberra Airport. On the basis that the operating CWFI is acceptable to Airservices Australia, it is unlikely that there would be any objection to the CWFII wind turbines at similar distances to Mt Majura. Other Airservices radio systems on Mt Majura and on other sites around the Canberra Airport are also unlikely to be impacted by the Project due to the separation distance and the nature of the services which are ground to aircraft communications or localised navigational aids where the wind turbines 40km away will not obstruct the radio signal path to aircraft at operational heights above ground level.

12.2 TELECOMMUNICATION INTERFERENCE

Wind farms can degrade the performance of fixed radio links through three principal mechanisms for introducing electromagnetic interference (EMI) – near field effects, diffraction and reflection/scattering. Wind farms can also cause interference to television reception at residences within 6kms through shadowing, scattering or reflection of the television signal. Other services that could theoretically be affected by wind turbines include aircraft navigation systems and microwave links.

The Project layout was modified following an assessment undertaken by Lawrence Derrick and Associates (**Appendix H**). The Investigation of Possible Impacts on Broadcasting and Radio communication Services identified an Optus microwave link passing through the site that could potentially be affected due to the location of a proposed WTG. Accordingly, the proposed wind farm layout was modified to ensure sufficient vertical and horizontal clearance was provided between the proposed WTGs and any radio communication and broadcasting services. The amended layout was designed to prevent any unacceptable interference to fixed radio links operating in the vicinity of the Project.

The assessment was based on relevant International Telecommunications Union (ITU) documents and on other professional reports on overseas and Australian experience of wind farm impacts on broadcasting services in the vicinity of any wind turbine structures. For radio communication service radio sites up to at least 50kms from the Project site need to be considered.

A list of the broadcasting services which provide cover of the area has been collected from the Australian Communication and Media Authorities RADCOM database.

The following is a list of the type of broadcast transmitters which provide cover of the area:-

- Analogue television;
- Digital television;
- FM sound broadcasting;
- MF sound broadcasting; and
- Satellite pay television.

The following is a list of radio communication services that have radio sites within at least 50kms of the Project site:-

- Point to Point – UHF radio;
- Point to Point Multipoint and MDS Stations (Telstra and Austar);
- Cellular Mobile Base Stations;
- Two-way Mobile;
- CB Radio; and
- Radar services – Canberra Airport has a radar located about 40kms away.

12.2.1 TELEVISION

Television interference from wind farms is characterised by video distortion that generally occurs in the form of a jittering of the picture that is synchronised with the blade passage frequency.

Analogue Television

Some analogue television picture degradation may affect surrounding properties for a percentage of time depending on the direction and speed of the wind. The audio component remains unaffected. The Federal Government systematic transition to digital television will be achieved by 30 June 2010 in regional NSW. It is therefore considered that any remedial action necessary for interference to analogue television reception should focus on a digital solution where possible.

Digital Television

Digital television is not subject to ghosting degradation as analogue signals are, however some reduction of service may result from reflection of signals at the limits of the service area. There may be some isolated areas which are shadowed by local hills resulting in reduced signal levels however it is difficult to predict whether digital reception will be impaired at specific locations.

12.2.2 RADIO COMMUNICATION

Point to point links and other frequency bands may be affected if the wind turbine to the line of site path to the other end of the link is with the second Fresnel zone[3] (**Figure 89**) subject to the operating frequency of the link, the distance of the turbine from the link antenna and the total link distance.

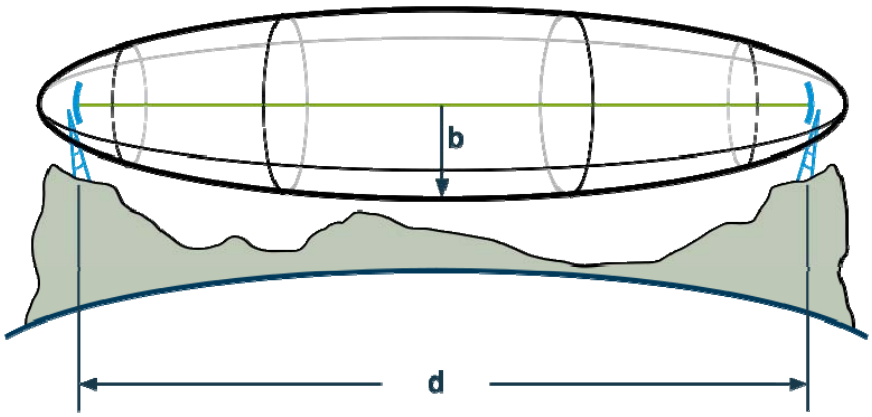

Figure 89: Depiction of a Fresnel zone between two radio links (Averse, 2007)

Of the broadcasting and radio communication services in the area, only four links pass through the Project site. **Figure** 90**91** and **Figure 91** depict the four links that may potentially be affected by the Project.

[3] The Fresnel zone is one of a (theoretically infinite) number of concentric ellipsoids of revolution which define volumes in the radiation pattern of a circular aperature.

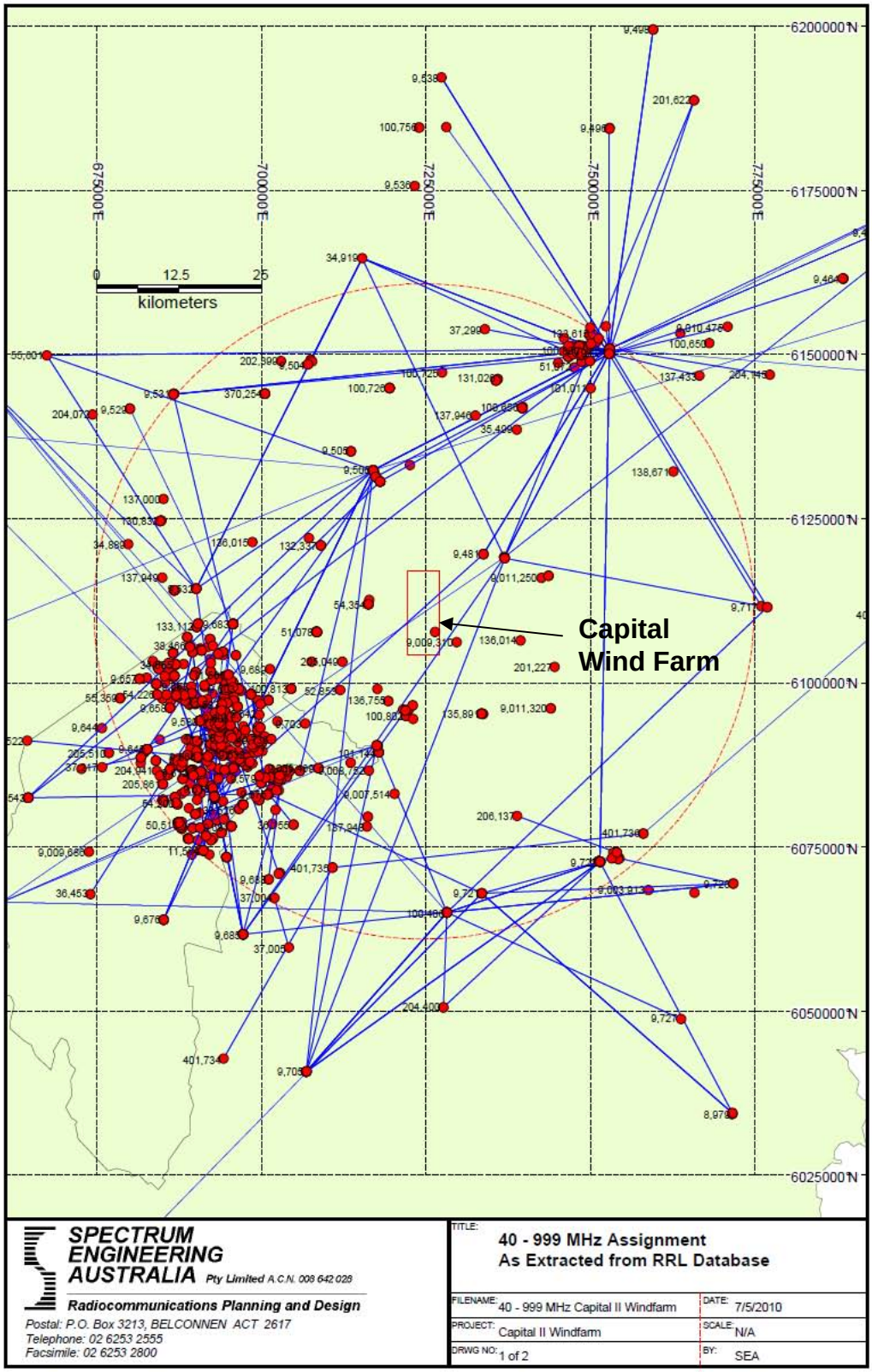

Figure 90: Radio Link Map 40-999 MHz frequencies (Lawrence Derrick and Associates, 2010)

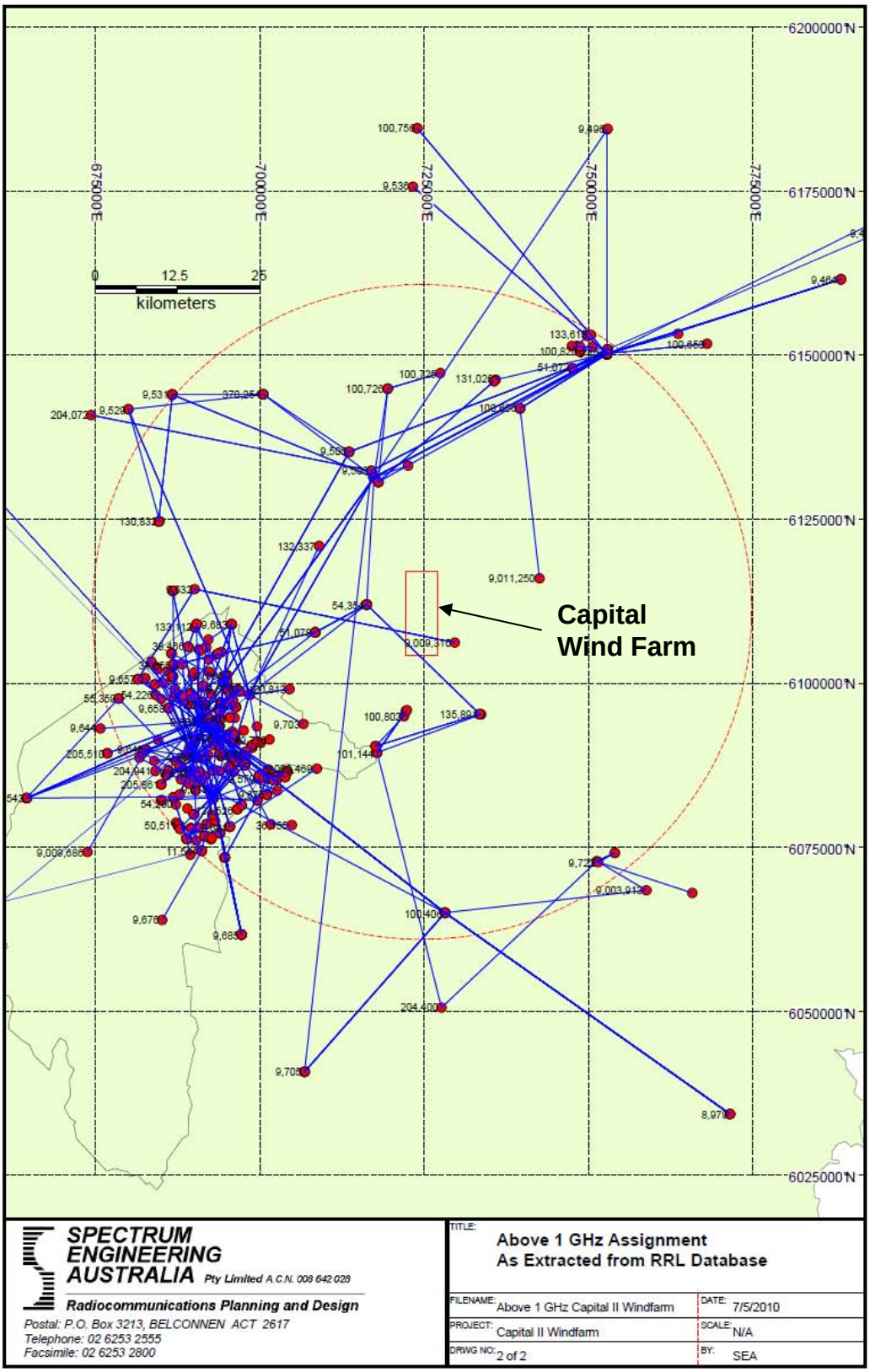

Figure 91: Radio Link Map above 1 GHz frequencies (Lawrence Derrick and Associates, 2010)

Clearance distances between any point to point microwave link paths and the wind turbines are required to avoid any degradation to the performance of the links.

12.2.3 MITIGATING MEASURES

Limited telecommunication impacts are anticipated during the construction and decommission phases of the Project. The investigation of possible impacts of the Project found that generally there will be minimal impact to telecommunication services. The investigation concluded that there will be no interference to MF and FM sound broadcasting service and the most vulnerable service for turbine interference is to analogue television.

Television

The mitigation measures recommended in **Appendix H** are similar to those implemented during the development of CWFI. The appropriate actions were taken prior to operation of CWFI commencing and those properties within the surrounding area that were likely to experience degradation in television signal quality were investigated to determine the severity of interference. Considering the vertical clearance of all components is greater than the components of CWFI, it is not anticipated that there will be any additional degradation to the television signal of surrounding properties. Notwithstanding, should it be found that the Project affects the quality of television signals in the surrounding area, it may be possible to further investigate the rectification measures listed in Chapter 10 of **Appendix H**.

Radio Communications

Mobile radio and other radio communication services in the area are not expected to be impacted by the Project or its operation following the redesign of the proposed wind farm layout.

Wind Farm Layout

The affect on the existing telecommunication services were investigated and considered as part of the site constraint analysis. The nominated horizontal clearance to the tip of any wind turbine blade is 15.2 metres. Of the four Point to Point links passing through the development site which require consideration in maintaining adequate clearance to the wind turbines and their towers, sufficient horizontal and vertical clearance has been provided for.

12.3 ELECTROMAGNETIC FIELDS

Electromagnetic Fields (EMF) emanate from any wire carrying electricity and the public are routinely exposed to these fields in their everyday lives. There are four potential sources of EMF associated with wind farms. These are:-

- The grid interconnection transmission line;
- The wind turbine generators;
- Electricity transformers and substations; and
- The underground transmission lines.

The connection of the wind farm to the existing grid (overhead) is no different from any other transmission line used within the State network.

The wind turbine generator itself is positioned in a protective housing (nacelle) and because the nacelle is up to 100 metres above the ground, the EMF at ground level can be considered negligible.

The substation transformer, which will carry the entire output of the wind farm, is generally located in a central part of the substation switchyard and the protective fencing means it is not possible for the property owners or members of the public to come close enough to be exposed to appreciable EMF.

The electricity reticulation network, which connects the WTGs, operates at typical distribution voltages and is buried at least 750mm below ground level and the cable will be shielded. Due to both the closeness of the phase conductors in cables and the screening of cables, the EMF are balanced out to be effectively zero.

In general, the easiest way to reduce exposure to magnetic fields is to increase the distance from the source. Given the source of the greatest EMF, being within the confines of the substation, is within a secure switchyard surrounded by a protective fence, the EMF associated with the generation and export of electricity from the Project does not pose a significant threat to public health. Consequently no serious or adverse EMF or interference issues are anticipated from the Project.

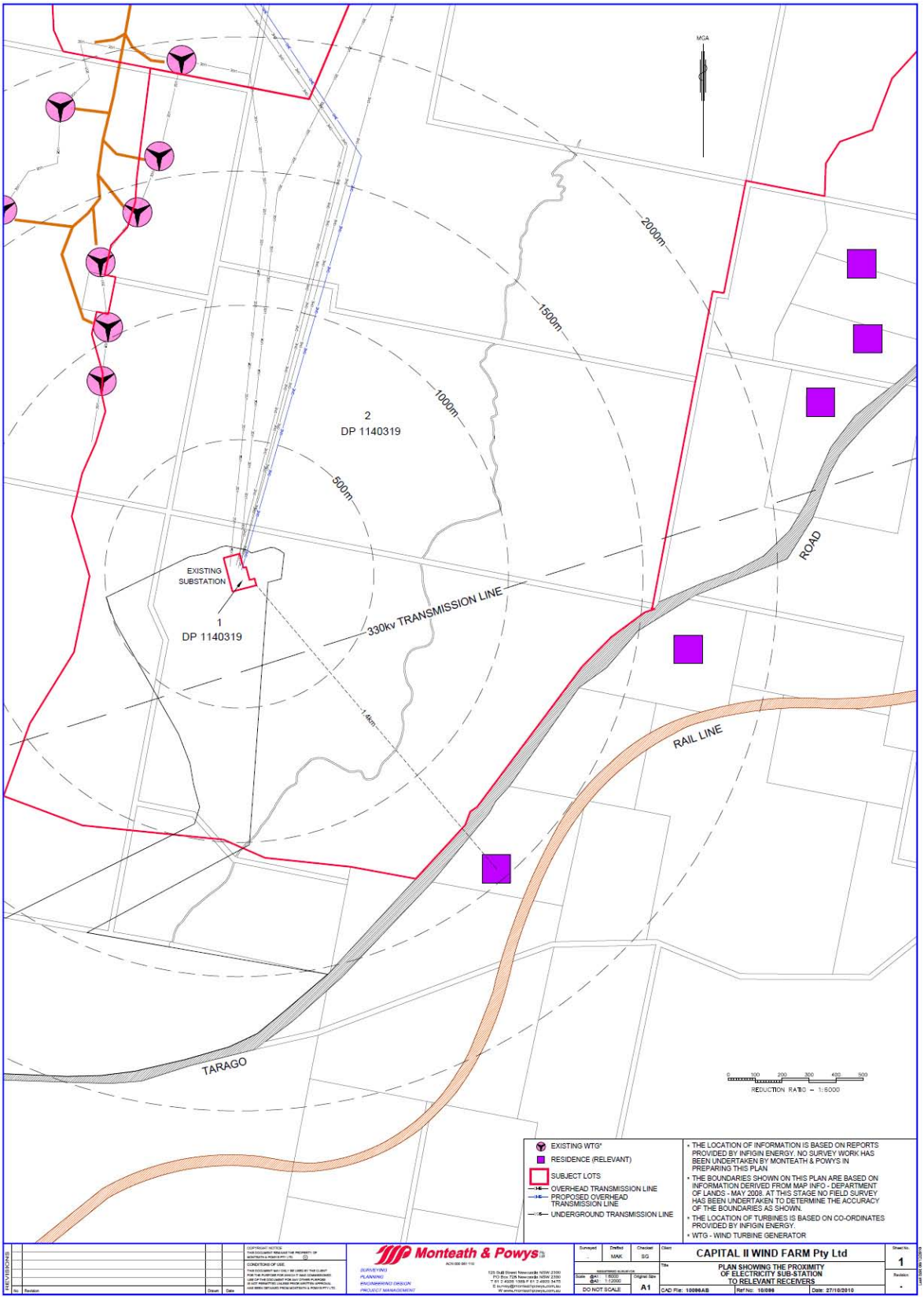

Figure 92: Distance from substation to nearest relevant receiver

12.4 BUSHFIRE HAZARDS

A Bushfire Risk Management Sub-Plan will be prepared for the Project in consultation with the local Rural Fire Service (RFS). The Sub-Plan will be incorporated in the Project Construction Environmental Management Plan.

Lightning strikes are common in the area and are the most likely cause of bushfires. Construction and maintenance activities are to employ best practice with regards to fire management, and will be in accordance with relevant regulations and industry guidelines. Actions that should be implemented during the construction phase include:-

- Use of diesel operated vehicles on un-constructed roads, and at all other times where possible;
- Provision of appropriate fire fighting equipment on construction vehicles and water reserves at construction sites;
- No outside hot work to be carried out on fire ban days (in accordance with RFS and other statutory requirements), hot work permits to be in operation at all other times;
- Notification of Taylors Creek RFS (TCRFS) when high fire risk construction work is being carried out;
- Dead end roads/access turn-around to be at least 25 metres diameter, OR, 'T' or 'Y' shape with leg lengths of 17 metres and agreed co-ordination of actions between the TCRFS and the Proponent; and
- Each turbine site to be identified for emergency response purposes.

The potential fire risk associated with electrical failure as a result of the operation of the Project will be managed by the following measures:-

- Use of fully enclosed electrical equipment on turbine structures and padmount transformers;
- Extensive use of underground cabling between turbines;
- Design of any overhead lines in accordance with industry standards;
- Use of circuit breakers and fuses to interrupt any electrical fault; and
- Adoption of lightning protection measures including:-

- Metallic conductors running throughout the turbine blades and electrically connected to the metalwork of the structure;

- Supporting structures sufficiently well earthed to limit the voltage rise during a lightning strike; and

- Internal electrical equipment protected against voltage rises due to lightning.

The risk of damage to the facilities in cleared grazing land is low. However, where WTGs are located adjacent to steep slopes that have considerable vegetation cover, there can be a significant risk. For the Project, all wind turbine locations are in cleared grazing land or in areas with sparse or scattered tree cover and are considered to have a low risk of bushfire damage.

13. WATER QUALITY AND HYDROLOGY

13.1 DESCRIPTION OF SITE WATERWAYS

The Project is entirely within the Lake George catchment. The water level in Lake George fluctuates depending on rainfall and evaporation. For much of the time evaporation exceeds inflow and the lake can remain dry for extended periods due to drought conditions. The Project is within the headwaters of the drainage to the lake and adjacent to the lake's eastern shore.

The Project area has relatively low annual rainfall and extended dry periods are not uncommon. For much of the time there is little or no surface flow in the upper reaches of the drainage. Winter is generally associated with slightly lower rainfall but due to lower evaporation, soil moisture can be higher during that time. Storms are possible at any time during the year but are more common in summer periods.

13.2 EXISTING WATER SUPPLY

Due to the low annual rainfall, surface waters throughout the Project site are unreliable and therefore unable to supply potable water for humans, but can be used by stock. Residents rely on their own water supplies, primarily from rainwater tanks or on-site dams.

It is anticipated that any shortfall in the water demand will be sourced externally, similar to the methods employed during the construction of CWFI.

13.3 ASSESSMENT OF POTENTIAL IMPACTS

13.3.1 POTENTIAL IMPACTS OF THE CONSTRUCTION STAGE

The construction phase will require water to supply the temporary concrete batching plant, dust control, domestic use and for fire fighting reserves. The use of local water resources for the construction phase is favoured as it will not significantly affect the local resource - it involves less off-site impacts and does not compete with other users of surface water supplies.

It is anticipated the existing water resources available to the landowners of the properties associated with the Project will be sufficient to meet the temporary water demands during the construction stage. Should the water requirements exceed the available water supplies, water will be supplied from external sources.

All components of the Project including the WTGs, access roads and transmission line works will not disturb any intermittent or perennial water courses found on the Project site. Excavation activities, including access track construction and extensions, the excavation of footings for turbines, crane pads, the operations and maintenance facilities buildings, as well as soil stockpiling will be located away from the natural waterways.

Access to all parts of the site will for the most part be provided by existing access tracks. Any extensions or new access roads to the existing access track network will not be located near these water courses. Minor works to stormwater and erosion control measures may be required to ensure the quality of water discharged from the site will remain at pre-development levels.

13.3.2 POTENTIAL IMPACTS OF THE OPERATIONAL STAGE

Once operational, the Project will require a relatively small water supply and this will be supplied primarily from roof drainage at the operations and maintenance building, and if necessary by importing water. No additional water connections are anticipated.

13.4 WATER POLLUTION

Water bodies located within close proximity of the development site are likely to be sensitive to input from pollutants including sediment, hydrocarbons and nutrients. Excavation, soil stockpiling and haulage form the primary risks with regard to protecting the water quality.

A Soil and Water Management Plan (SWMP) will be prepared for the Project and will include the relevant water quality management measures to address the potential impacts.

13.5 FLOOD PRONE LAND

As part of the site constraint analysis, the Lake George water surface levels were mapped by the NSW Water Research Laboratory (NWRL) for the 1:10, 1:20, 1:50 and 1:100 exceedance probability levels (**Appendix I**). The water level in Lake George fluctuates depending on rainfall and evaporation.

For much of the time evaporation exceeds inflow and recently the lake has been dry for an extended period of time due to drought conditions. Notwithstanding, it was found that certain low-lying parts of the Project site may be affected by flooding (**Figure 93**).

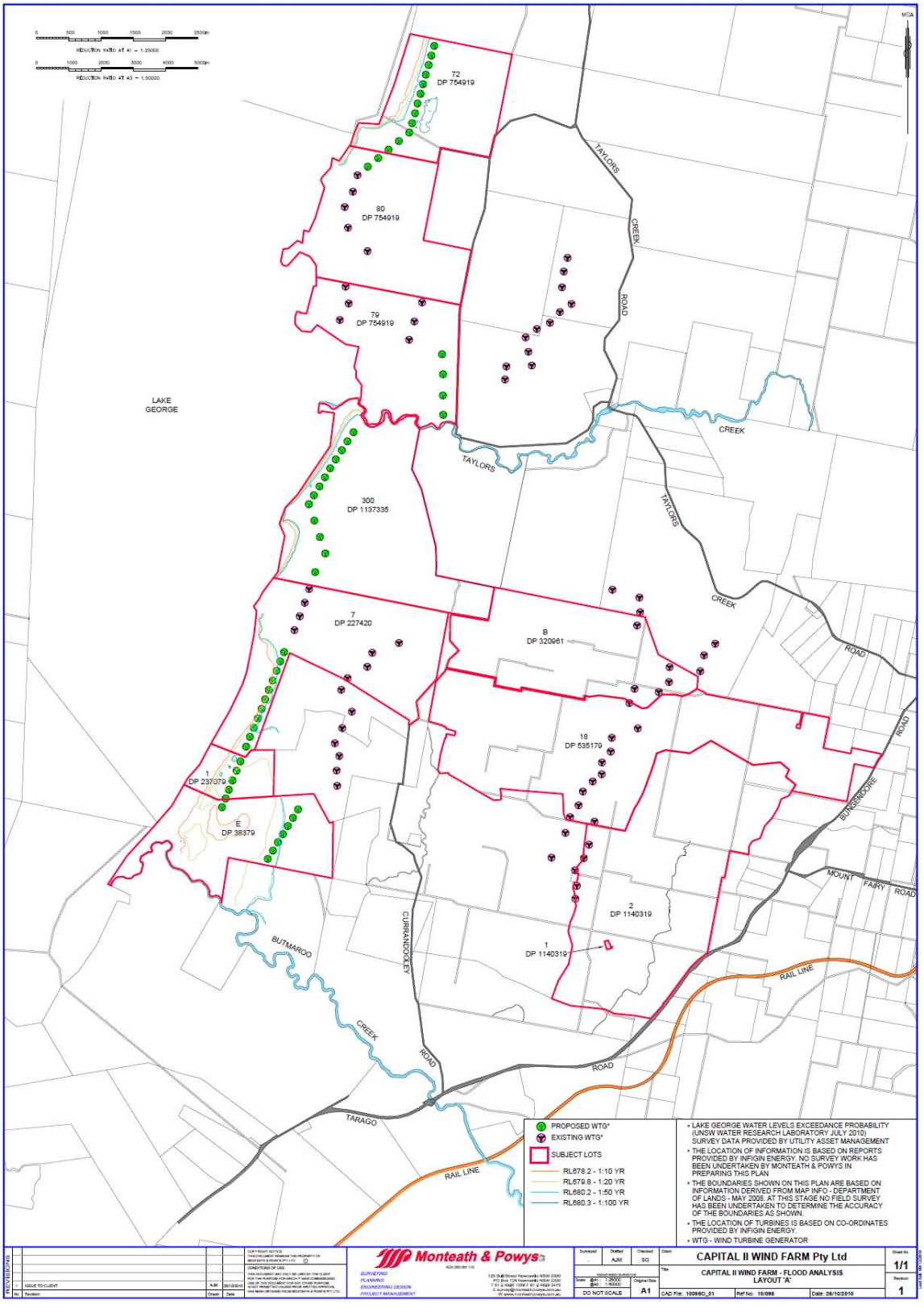

Figure 93: Lake George Flood Probability Exceedence Levels – Layout 'A' (NSW Water Research Laboratory)

Several proposed WTGs are located on land identified as below the 1:100 year exceedence probability level. A risk analysis was completed that considered the impact of flooding on the wind farm components including the WTGs, transmission lines and access roads. Also considered were external impacts such as water dispersion, floodways and access.

It was determined that the probability that a small part of the Project may be affected by rising flood waters was an acceptable risk given that the WTGs are remotely operated from a part of the site that is not subject to flooding. Furthermore, each WTG has an operational lifespan of 25 years, thereby reducing the risk of being affected by rising floodwaters; based on a 1 in 100 year flood event.

Should a flood event occur, the operation of the WTGs is not likely to be affected. As vehicle access to the WTGs may be restricted, in the event that a WTG requires maintenance or repair during a flood event, the Proponent may remotely control the WTG until such time vehicle access is reinstated.

An alternative risk management option is to elevate the base of the WTG tower and transformer above the identified 1:100 year flood probability level. This will require additional earthworks, and may potentially affect the dispersal of floodwaters however given the expansive area of Lake George it is unlikely that several raised mounds will have a noticeable impact over the entire Lake George flood plain.

The remainder of the site will not be affected by flooding, but at times of heavy rain, parts of the access tracks may be temporarily affected by ponded water.

The risk management assessment identified that the flood risk was acceptable and that the WTGs are capable of withstanding certain flood events. It is also unlikely that the construction of a portion of the Project on land that may be affected by flooding will create a cumulative impact on other properties on the edges of Lake George.

13.6 SOIL SALINITY

The existing salinity of the soils is not expected to be exacerbated as no deep-rooted native vegetation requires removal. Limited excavation is required and all earthworks will not create barriers to the movement of water.

13.7 MITIGATION MEASURES

A Soil and Water Management Plan (SWMP) including erosion and sediment controls will set out the measures to mitigate the potential impacts on soils at the Project site.

13.7.1 CONSTRUCTION PHASE

The construction of the Project is to involve earthworks to form the proposed hardstand areas and access tracks. As a result of the soil disturbances, there is potential for temporary increases in sediment loads to occur in run-off from the site.

During construction, sediment and erosion control measures would be designed and installed in accordance with the NSW Department of Housing "*Managing Urban Stormwater – Soils and Construction*" (*Blue Book*). A detailed soil and water management plan will be prepared at the detailed design stage of each construction stage.

Given the soils and low slopes of the Project site, drainage requirements for the wind farm will be minimal. Access roads will be graded so that rain water runs off to the side of the road. Where access tracks cross sloping ground, bunds and drainage swales will be installed as necessary to trap and infiltrate run-off. The majority of the access roads will be extensions to the existing access tracks, consequently, there are no new water crossings required.

Erosion and sediment control measures will be designed to:-

- Divert run-off away from areas of earthworks or soil stockpiles;
- Design of earthworks to minimise erosion and sedimentation;
- Reduce the energy of surface flows in areas of potential erosion;
- Prevent sediment laden or contaminated water leaving the construction site;
- Provide containment for sediment entrained in surface flows; and
- Reduce susceptibility of disturbed areas to erosion and include prompt revegetation of disturbed areas.

Construction Water Sources

It is anticipated that the majority of water will be supplied from existing extraction bores located throughout the Project site and operated by local landowners. Should additional water be required beyond the permitted volume, the Proponent will seek the necessary licenses and water permits prior to extracting the additional groundwater. The short term nature of the extraction is unlikely to significantly affect the large water resource contained in the sediments below Lake George.

The operation of the temporary concrete batching plant will be in accordance with the Environment Protection Authority's guidelines for the Concrete Batching Industry.

13.8 CONCLUSION

While works adjacent to natural creeks and waterways would pose a serious risk without controls, potential impacts are manageable, through the design, implementation and monitoring of specific controls outlined in the Construction Environmental Management Plan. Notwithstanding, there are no proposed works within the immediate vicinity of any natural creeks or waterways on the site.

The Soil and Water Management Plan will identify and manage erosion, sedimentation and water quality issues potentially arising from the Project in order to minimise the adverse impacts of construction activities on the immediate site, local waterways and adjacent land. The SWMP has been prepared with consideration to best practice methods to mitigate potential on-site and off-site impacts relating to soil and water.

There will be minimal impacts to surrounding groundwater and surface waters due to limited activity within these areas and effective mitigation measures and management. Potential impacts are likely to occur mostly from construction activities. However, with the SWMP in place all potential impacts can be managed resulting in minimising the risk of remediation efforts being required.

14. CUMULATIVE IMPACTS

Due to the proximity of CWFII to CWFI and the approved WWF, a key component of the EA is to assess the cumulative impacts arising from the Project. Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region. They may also be caused by the synergistic and antagonistic effects of different individual impacts interacting with each other. They may be due to the temporal or spatial characteristics of the activities' impacts (NSW Wind Energy EIA Guidelines 2002).

In considering the potential cumulative impacts related to the Project, the following issues have been considered:-

- The potential for cumulative impacts from other existing or planned wind farms in the region;
- Any advantages or disadvantages from clustering wind farms in this location; and
- Any likely long-term and short-term cumulative impacts such as visual impacts, vegetation or fauna impacts:-
    - Considering the receiving environment's ability to achieve and maintain any environmental objectives established for that system; and
    - Outlining any actions that can be taken to minimise or compensate for cumulative impacts.

The main cumulative impact of the multiple wind farm developments in the area is likely to be related to the combined visual impact of the wind farms from vantage points where multiple wind farms are visible.

14.1 EXISTING AND PLANNED WIND FARMS

Investigations undertaken in the Southern Tablelands region by various organisations has proven the region benefits from a high quality wind resource and good access to electricity and transport corridors. In the region there are several wind farms currently in operation and several more with planning approval and it is anticipated that further wind farm developments are likely to be developed in the Southern Tablelands. However in all cases, it is anticipated that current rural activities will be continued at the wind farm development sites.

CWFII is essentially an extension of the adjacent CWFI. The layout of the Project has been sited to ensure it appears as a continuation of the existing wind farm as opposed to a separate entity. Being located on the foothills of the ridge line associated with the existing wind turbines, the most direct cumulative impact is likely to be the visual impact as seen from the west of the site, along the western shores of Lake George, primarily from the Federal Highway.

The Woodlawn Wind Farm (WWF) is currently under construction approximately 5km to the north of CWFI. It is possible that from some directions, CWFI and WWF will appear as one single wind farm. The largest combined visual impact would be likely to be felt from residents and public areas located between the CWFI and WWF, as they are likely to appear as two separate wind farms.

14.2 LONG-TERM CUMULATIVE IMPACTS

Significant environmental impact has occurred in the vicinity of the site over the last 180 years due to the clearing of native vegetation for grazing and subsequent settlement with its various cultural features. The development of CWFII adjacent to CWFI will result in some further change to the character of the landscape at the locality, but will otherwise have little further impact on the environment.

A wind farm development is potentially reversible. Equipment can be removed at the end of its useful life and the site restored. The potential for issues such as soil contamination is very low for this type of development and with the proposed controls implemented it should present a very low risk.

The environmental characteristics of the area and potential impact and cumulative impact as a result of the Project have generally been discussed in other parts of the Environmental Assessment by reference to the existing environment and assessment of potential issues relative to the existing situation, including the relationship with the CWFI.

The greater long-term environmental impacts will not be limited to the locality. The reduction in greenhouse gas emissions delivered by the operation of CWFII will support a national objective of mitigating greenhouse gas emissions and will be felt much further afield than the immediate surrounding area.

14.3 SHORT-TERM CUMULATIVE IMPACTS

The only short-term cumulative effects are mainly related to the transport of equipment and materials to the site. As discussed in Chapter 11, a Traffic and Transport Management Plan will be implemented to ensure the construction phase of the development will have a minimal impact on the local residents.

14.4 CONCLUSION

The Project will be located at a site that comprises cleared grazing land and which is regarded as suitable for wind farm development and continued grazing. The development of CWFI has proven that wind farms can co-exist with traditional farming activities with little effect. The development of CWFII adjacent to CWFI is anticipated to successfully assimilate into the landscape without impact to the established land use and surrounding environment.

When implemented with appropriate environmental management controls, the Project will be undertaken with very low impacts on the environment and the potential benefits through their delivery of a form of sustainable energy will far outweigh the localised impacts.

15. GENERAL ENVIRONMENTAL ASSESSMENT

In addition to the key issues identified in the DGRs prepared by the Department of Planning, several non-key issues have been identified during the environmental risk process and as a result of the preliminary investigations. They are not considered to be key issues to the Project, however, have been included to provide a comprehensive assessment of all potential impacts of the Project. This Chapter provides an assessment of:-

- Socio-economic;
- Air quality;
- Soils and landforms; and
- Waste management

15.1 SOCIO-ECONOMIC

Wind farm developments have been seen to polarise local communities with regard to differing personal opinions and who the wind farms directly benefit. Over time several wind farms have been constructed in the Southern Tablelands resulting in an increase in community acceptance of wind energy. Results from a survey completed for a proposed wind farm in the area found that almost 90% of respondents are in favour of wind farm projects (Report of Community Perceptions of Wind Farms in the Southern Tablelands, New South Wales, 2007).

The key socio-economic impacts for assessing the merits of the Project relate to:-

- Influx of skilled people into the region during construction;
- Increase in on-site workforce once operational;
- Increase in employment opportunities in the region;
- The Project's contribution to the local economy;
- The economic viability of the development; and
- Whether it has any adverse economic impacts.

CWFII is designed to have a peak generating capacity of approximately 100 MW of renewable energy that will contribute to the Federal and State governments targets to increase the proportion of electricity generated from renewable energy sources.

The Project will have an estimated capital investment of $100 million for which a significant portion will be directed to Australian based businesses.

Landowners on which the Project is located will benefit through income from leases of their land by the Proponent. Additionally, various businesses in the area surrounding the Project site will receive increased income from supplying services directly and indirectly to the Project, Project employees and contractors.

Employment opportunities may flow to residents of the local area through direct employment during the construction stage of the Project or as a result of increased commercial activity flowing to the local towns. This is a positive benefit and it is not expected to place undue pressure on local resources or alternate employment opportunities. Services such as accommodation, vehicle maintenance, refuelling and food outlets are likely to benefit from the influx of construction staff. Provision of these services may be spread between nearby Tarago and Bungendore and further afield to Goulburn and potentially Queanbeyan and the Australian Capital Territory.

CWFII, as part of the emerging Capital Renewable Energy Park may potentially attract an influx of tourists, albeit a relatively small number. However even a small number of tourists can have a significant positive impact on local small businesses.

The growth of renewable energy projects in the area is unlikely to affect the social structure of the locality and is not expected to place an excessive demand on local resources that would have an adverse impact to local residents.

Overall, the region has demonstrated its ability to cater for large renewable energy projects such as CWFI and the under construction Woodlawn Wind Farm. CWFII is expected to be similarly integrated into the social setting of the region and provide a welcome economic benefit to the local community in addition to contributing to the Federal Government's RET Scheme.

15.2 AIR QUALITY

An Air Quality Management Strategy was implemented for the CWFI Project. An updated version of this Plan will be prepared suitable for implementation for the CWFII Project.

The performance criteria identified in the CWFI Air Quality Management Strategy included:-

- Wetting of access tracks with water during dry and wind periods;

- Stabilisation of exposed soils and stockpiles;
- Placement of stockpiles in sheltered locations, where necessary;
- Restrict traffic to defined tracks and roads and implement speed limits; and
- Restoration of disturbed areas as soon as possible.

15.3 SOILS AND LANDFORMS

A Soil and Water Management Plan was implemented for the CWFI Project. An updated version of this Plan will be prepared suitable for implementation for the CWFII Project.

The performance criteria identified in the CWFI Operation Soil and Water management Plan included:-

- No erosion and sediment transport within or beyond turbine hardstands, access tracks, electrical cable routes, laydown areas, the substation site, or to the adjacent landscape as a result of these works;
- No transportation of hazardous substances beyond designated storage areas;
- Landscaping and revegetation works are to stabilise disturbed landscape and have a 90% success rate for ground coverage;
- All disturbed soil surfaces should be stabilised as soon as practicable; and
- All soil stockpiles should be covered to prevent loss of material during wind and rain events.

Given the soils and low slopes of the development envelope, drainage requirements for the wind farm will be minimal. Access roads will be graded so that rain water runs off to the side of the road. Where access tracks cross sloping ground, bunds and drainage swales will be installed as necessary to trap and infiltrate run-off. The majority of the access roads will be extensions to the existing access tracks, consequently, there are no new water crossings required.

15.4 WASTE MANAGEMENT

To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development, waste materials generated during construction and operation of the Project would be considered against a hierarchy of the following order: avoidance of unnecessary resource consumption, resource recovery (including re-use, reprocessing, recycling and energy recovery), and disposal. This is consistent with the principles of the waste management hierarchy referred to in the *Waste Avoidance and Resource Recovery Act 2001* and the NSW Government's *Waste Reduction and Purchasing Policy 1997*. The provisions of the waste management measures contained in the POEO Act would also be met on site, including classification and management.

Wherever possible the generation of waste is to be avoided or reduced. The Waste Minimisation Plan that was prepared as part of the Waste Management and Re-Use Sub-Plan for CWFI will be adapted for CWFII where applicable. The Plan addresses the management of wastes during the construction and operational stages of the Project in accordance with the NSW Government's Waste Reduction and Purchasing Policy.

The Plan identifies requirements for:-

- The application of the waste minimisation hierarchy principles of avoid/reduce/re-use/recycle/dispose.

- Minimising the volume of wastewater produced, and include as a minimum, a commitment to install AAA-rated water conservation devices in the control room/facilities building.

- Waste handling and storage. The human wastewater management system is to be designed according to the guidelines entitled On-site Sewage Management for Single Households and the AS/NZS 1547-2000 - On-site Domestic Wastewater Management.

- Disposal of wastes. Specific details must be provided for cleared vegetation, contaminated materials, glass, metals and plastics, hydrocarbons (lubricants and fuels) and sanitary wastes.

- Any waste material that is unable to be re-used, re-processed or recycled, which must be disposed at a facility approved to receive that type of waste.

16. ENVIRONMENTAL RISK ANALYSIS

The DGR's for the Environmental Assessment require that an ERA is undertaken for the Project. The ERA is a process designed to identify potential environmental impacts associated with the Project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. The Director-General's Requirements specify that *where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment*.

16.1 APPROACH

The steps undertaken to identify the environmental issues relevant to the Project included a review of relevant legislation, policies and guidelines (refer to Chapter 5) in addition to consultation with the community, government authorities and key stakeholders (refer to Chapter 6). This process identified the following potential environmental issue categories for the Project:-

- Flora and Fauna;
- Traffic and access;
- Social and Economic;
- Noise;
- Hazards and Risks;
- Visual impact;
- Noise; and
- Indigenous Heritage

An ERA was undertaken using the methodology described below to determine the significance of impacts associated with each environmental issue identified above. An ERA was conducted generally upon the methodology outlined in Standards Australia's document *Environmental Risk Management – Principles and Processes* and *Australian Standard AS/NZ 4360 Risk Management.*

The analysis categorised levels of risk for a given event based on the significance and manageability of effects. The measures of probability and consequence categories as well as the risk ranking matrix are detailed in the following tables.

Table 25: Measures of probability categories for ERA undertaken

RANK	PROBABILITY	DESCRIPTION
A	Almost Certain	Happens often and is expected to occur
B	Likely	Could easily happen and would probably occur
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Unlikely to happen but may occur
E	Rare	Could happen, but only in extreme circumstances

Table 26: Measures of consequence categories for ERA undertaken

RANK	CONSEQUENCE	DESCRIPTION
1	Extreme	Permanent and catastrophic impacts on the environment; Large impact area; Reportable incident to external agency; Large fines and prosecution; Operational Constraints; Substantial community concern.
2	Major	Permanent and detrimental impacts on the environment; Large impact area; Reportable incident to external agency; May result in large fines and prosecution; Operational constraints; high level of community concern.
3	Moderate	Substantial temporary or minor long term detrimental impacts on the environment; moderate impact area; Reportable incident to external agency; Action required by reportable agency; community interested.
4	Minor	Minor detrimental impacts on the environment; small impact area; Reportable incident internally; No operational constraints; some local community interest.
5	Low	Nil or temporary impacts on the environment; small or isolated impact area; Not reportable incident; No operational constraints; uncontroversial project no community interest.

Table 27: Risk Matrix for ERA undertaken

		CONSEQUENCES				
		1 Extreme	2 Major	3 Moderate	4 Minor	5 Low
Probability	A (Almost Certain)	E	E	E	H	H
	B (Likely)	E	E	H	H	M
	C (Possible)	E	E	H	M	L
	D (Unlikely)	E	H	M	L	L
	E (Rare)	H	H	M	L	L

Table 28: Unmitigated risk sources and potential environmental impacts of the Project

FC	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
Flora and Fauna	Removal of Native Vegetation as a result of land clearing.	Loss of existing vegetation communities. Loss of biodiversity.	D	3	M
	Disturbance to habitat as a result of land clearing.	Loss of existing habitat for threatened fauna. Loss of biodiversity.	D	3	M
	Disturbance to habitat as a result of operation e.g. contaminated water, dust, noise etc.	Detrimental potential impact to flora and fauna species, populations or communities. Impacts on biodiversity.	D	3	M
	Blade strike and barotraumas resulting from operation of wind turbines.	Loss of birds and bats.	C	4	M
Traffic and Access	Temporary closure or network restriction during construction.	Restriction to other properties, delayed journeys, detours.	D	4	L
	Increased traffic level on the network due to traffic movements during operation.	Increased traffic congestion, elevated risk of incidents and accidents, pavement deterioration, intersection delays.	E	5	L
Social and Economic	Changes in local employment.	Improved economic activity and job prospects. Increased employment. Improved economic activity.	N/A - Positive Impact		

FC	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
	Reduced property value of adjoining properties.	Reduced individual assets.	D	3	**M**
	Stimulation of local economy	Improved economic activity.	N/A - Positive Impact		
	Impacts on amenity of neighbouring properties.	Actual or perceived reduced quality of life.	D	3	**M**
Soils and Contamination	Reduction in soil quality as a result of earthworks, stripping and stockpiling.	Erosion, reduced soil capability, reduced soil stability.	B	3	**H**
	Potential erosion from exposed soils and sediments and material stockpiles caused by poor practices.	Erosion, reduced soil capability, reduced soil stability, increased sediment in nearby watercourse.	B	3	**H**
	Disturbance of contaminated lands.	Health and contamination risk.	D	3	**M**
Noise and Vibration	Increased noise levels as a result of construction and operational activities.	Amenity impacts including sleep disturbance. General disturbance.	B	3	**H**
	Vibration to surrounding properties during construction including rock hammering/piling.	Structural damage to buildings.	D	4	**L**
Hazards and Risks	Increased bushfire risk.	Risk to nearby buildings and structures.	E	3	**M**
	Potential spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures.	Contamination of land and nearby watercourse. Potential explosions and fires.	D	3	**M**
	Removal/destruction of Indigenous sites or objects.	Impact on Indigenous cultural heritage.	C	3	**H**
	Changes in visual characteristics of the Site.	Decreased visual amenity for nearby residents. Disruption of view corridors.	C	4	**M**
	Dust emissions from construction activities.	Amenity impacts. Potential health risks.	C	3	**H**
	Emissions of odours, noxious gases etc.	Amenity impacts. Potential health risks.	E	4	**L**

FC	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
	Discharge of dirty or contaminated water to watercourses.	Reduced water quality and downstream impacts.	D	4	**L**
	Sedimentation of Lake George and Taylors Creek as a result of poor soil management measures.	Increased turbidity, impacts on flow, impacts on biodiversity, downstream impacts.	D	3	**M**
	Pollution of groundwater.	Reduced groundwater quality, impacts on ecosystems at discharge point.	D	4	**L**
	Interception of groundwater.	A reduction in groundwater available to existing users, Long term changes to the groundwater flow regime, impacts to groundwater dependent ecosystems, groundwater quality impacts.	D	4	**L**
	Improper management of wastes generated on site including excavated material, vegetation, excess construction waste, human waste, general garbage etc.	Potential contamination and erosion impacts. Potential impact on flora and fauna.	D	4	**L**

16.2 ANALYSIS – RESIDUAL RISK ANALYSIS

Taking into account the Project's concept design, mitigation measures described in Chapters 7-15 and the commitments provided in the draft Statement of Commitments (Chapter 17), **Table 29** provides an assessment of the mitigated risks associated with the project, or the residual risk analysis. This has been completed for each potential environmental impact identified in **Table 28** based on the likelihood of occurrence and potential environmental consequence.

To ensure validity of results, the same probability and consequence ratings were used for this assessment as were used to analyse the unmitigated risks. For ease of reference the unmitigated risk rating has been included within the table.

Table 29: Mitigated risk sources and potential environmental impacts of the Project

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MIT RISK
Flora and Fauna	Removal of Native Vegetation as a result of land clearing.	Loss of existing vegetation communities. Loss of biodiversity.	M	D	3	M
	Disturbance to habitat as a result of land clearing.	Loss of existing habitat for threatened fauna. Loss of biodiversity.	M	D	3	M
	Disturbance to habitat as a result of operation e.g. contaminated water, dust, noise etc.	Detrimental potential impact to flora and fauna species, populations or communities. Impacts on biodiversity.	M	D	3	M
	Blade strike and barotraumas resulting from operation of wind turbines.	Loss of birds and bats.	M	C	4	L
Traffic and Access	Temporary closure or network restriction during construction.	Restriction to other properties, delayed journeys, detours.	L	D	4	L
	Increased traffic level on the network due to traffic movements during operation.	Increased traffic congestion, elevated risk of incidents and accidents, pavement deterioration, intersection delays.	H	D	3	M
Social and Economic	Changes in local employment.	Improved economic activity and job prospects. Increased employment. Improved economic activity.	N/A - Positive Impact			
	Reduced property value of adjoining properties.	Reduced individual assets	M	D	5	L
	Stimulation of local economy.	Improved economic activity.	N/A - Positive Impact			
	Impacts on amenity of neighbouring properties.	Actual or perceived reduced quality of life.	M	D	5	L

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MIT RISK
Soils and Contamination	Reduction in soil quality as a result of earthworks, stripping an stockpiling.	Erosion, reduced soil capability, reduced soil stability.	H	D	3	M
	Potential erosion from exposed soils and sediments and material stockpiles caused by poor practices.	Erosion, reduced soil capability, reduced soil stability, increased sediment in nearby watercourse.	H	D	3	M
	Disturbance of contaminated lands.	Health and contamination risk.	M	D	4	L
Noise and Vibration	Increased noise levels as a result of construction and operational activities.	Amenity impacts including sleep disturbance. General disturbance.	H	D	4	L
	Vibration to surrounding properties during construction including rock hammering/piling.	Structural damage to buildings.	L	D	4	L
Hazards and Risks	Increased bushfire risk.	Risk to nearby buildings and structures.	M	E	4	L
	Potential spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures.	Contamination of land and nearby watercourse. Potential explosions and fires.	H	D	3	M
Heritage	Removal/destruction of Indigenous sites or objects.	Impact on Indigenous cultural heritage.	H	D	3	M
Visual Amenity	Changes in visual characteristics of the Site.	Decreased visual amenity for nearby residents. Disruption of view corridors.	M	D	4	L
Air	Dust emissions from	Amenity impacts. Potential health	H	C	4	M

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MIT RISK
	construction activities.	risks.				
	Emissions of odours, noxious gases etc.	Amenity impacts. Potential health risks.	**H**	D	4	**L**
Drainage and Water Quality	Discharge of dirty or contaminated water to watercourses.	Reduced water quality and downstream impacts.	**M**	E	4	**L**
	Sedimentation of Sawyers Creek as a result of poor soil management measures.	Increased turbidity, impacts on flow, impacts on biodiversity, downstream impacts.	**M**	E	4	**L**
	Pollution of ground water.	Reduced groundwater quality, impacts on ecosystems at discharge point.	**L**	E	4	**L**
	Interception of ground water.	A reduction in groundwater available to existing users, Long term changes to the groundwater flow regime, impacts to groundwater dependent ecosystems, groundwater quality impacts.	**L**	D	4	**L**
Waste Management	Improper management of wastes generated on site including excavated material, vegetation, excess construction waste, human waste, general garbage etc.	Potential contamination and erosion impacts. Potential impact on flora and fauna.	**L**	E	4	**L**

Table 29 demonstrates that the concept design and proposed mitigation measures are anticipated to reduce the likelihood of detrimental environmental impact occurring as a result of the Project.

16.3 NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL

The health effects of many forms of renewable energy generation including wind farms; have not been assessed to the same extent as those from traditional sources such as coal-fired power stations.

However, renewable energy generation is associated with few adverse health effects compared with the well documented health burdens of polluting forms of electricity generation (Markandya and Wilkinson 2007).

The National Health and Medical Research Council (NHMRC) completed an evidence review of current literature in July 2010 on the issue of wind turbines and potential impacts on human health. The review sought to investigate evidence supporting the following statement, and ultimately concluded that:-

> *"There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines."*

The focus of the review investigated the adverse health impacts of wind turbines from the effects of infrasound, noise, electromagnetic interference, shadow flicker and blade glint. The review found numerous reports and peer reviewed journal articles concluded:-

The Australian Government review of the available evidence, including journal articles, surveys, literature reviews and government reports concluded that if the relevant planning guidelines are followed, there are no direct pathological effects from wind farms. The review also commented that resistance to wind farms from the public is likely to be reduced and annoyance avoided if communities are consulted in a meaningful way.

The final comments of the review reaffirmed that when compared to the well documented health burdens of polluting forms of electricity generation, such as electricity derived from the consumption of fossil fuels, renewable energy generation is associated with far fewer adverse health effects.

Wind power has been gaining prominence as a viable sustainable alternative to other forms of energy production. The NHMRC's literature review has provided certainty for proponents and objectors of wind farms that there is no empirical evidence to suggest that wind farms should be designed to mitigate any perceived adverse health effects in addition to complying with the relevant planning guidelines.

16.4 CONCLUSION

The key issues as identified by the DGR's (as discussed in Chapter 7-15) are:-

- Flora and Fauna;
- Traffic and access;
- Social and Economic;
- Noise;
- Hazards and Risks;

- Visual impact;
- Noise; and
- Indigenous Heritage.

This is consistent with, and reflects key issues highlighted as a result of the ERA process.

Other non-key issues identified by the ERA process beyond the key issues requiring assessment were:-

- Land Use;
- Flooding and Hydrology;
- Drainage and Water Quality
- Soils and Contamination;
- Waste Management; and
- Greenhouse Gas Emissions.

Climate change and sustainability has also been considered as part of this report. Social and economic impact has been identified as a new key issue due to the significant positive impact that the Project would have on the local, regional and national economy.

The Residual Risk Analysis demonstrates that the proposed safeguards and management measures as detailed in the Statement of Commitments (Chapter 17) are anticipated to reduce the risk of environmental impact to an acceptable level.

Notwithstanding the ERA completed for the Project, the construction and operation of CWFI was undertaken in accordance with the CEMP and OEMP that established the management framework for environmental issues relation to the construction and operational phases. A Construction Compliance Report completed by Connell Wagner in October 2008 concluded that the effectiveness of the environmental controls implemented for the construction of CWFI were generally effective in managing the potential impacts of the construction activities. From the experience of CWFI, there had been some areas were the CEMP was incomplete. Consequently, the CEMP was modified to address these issues and the additional management controls will be included in any future environmental management program developed for the construction and operation of CWFII.

The Proponent benefits from the experience acquired during the development, construction and operation of the CWFI. From these experiences, improvements to the environmental management controls have been implemented and proven to improve the effectiveness of the CEMP. It is anticipated that a similar CEMP and OEMP will be prepared and implemented prior to the construction and operation of CWFII.

17. DRAFT STATEMENT OF COMMITMENTS

The Director General's Requirements issued for the Project require the inclusion of a draft Statement of Commitments (SOC) incorporating or otherwise capturing measures to avoid, minimise, manage, mitigate, off-set and/or monitor impacts identified in the specialist reports of the Environmental Assessment. The SOC must clearly articulate the desired environmental outcome of the commitment and cover the life of the project through design, construction, operation and decommissioning phases of the project. The SOC must be achievable, measureable (with regard to compliance), and time specific where relevant. To meet these requirements a draft SOC is detailed below.

17.1 DRAFT STATEMENT OF COMMITMENTS

A comprehensive set of commitments have been developed which incorporate the specific recommendations from the specialist reports and further consultation with the community and government agencies. The following table details the draft Statement of Commitments for the Project. The NSW Department of Planning would be the responsible approval agency for these commitments. All draft commitments are proposed to be undertaken by the Proponent.

Table 30: Draft Statement of Commitments

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	GENERAL COMPLIANCE		
1	The Proponent will be responsible for environmental impacts resulting from the actions of all persons on site, including contractors, sub-contractors and visitors.	During Construction CEMP/OEMP	Manage
2	The Proponent will meet the requirements of the Director-General in respect of the implementation of any measure necessary to ensure compliance with the Conditions of Approval.	Prior to Construction Department of Planning	Compliance

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
3	The Proponent will submit a Pre-Construction Compliance Report to the Director-General at least two weeks prior to the commencement of construction (or within a time agreed to by the Director-General). The Pre-Construction Compliance Report will include details of:- a) How the Conditions of Approval required to be addressed prior to construction have been complied with. b) When each relevant condition of this Approval was complied with, including submission dates of any required report and/or approval dates. c) Any approvals or licences required to be issued by relevant Government Agencies prior to the commencement of construction.	Prior to Construction Department of Planning	Monitor
4	The Proponent will provide the Director-General with a Construction Compliance Report within six weeks of the end of the first six months of construction (or at any other time interval agreed to by the Director-General). The Environmental Representative must certify the adequacy of the report before it is submitted to the Director-General. The Construction Compliance Report must be made publicly available and include:- a) Information on compliance with the Construction Environmental Management Plan (CEMP) and the Conditions of Approval. b) Information on compliance with any approvals or licences issued by Relevant Government Agencies for Construction. c) Information on the implementation and effectiveness of environmental controls. The assessment of effectiveness should be based on a comparison of actual impacts against performance criteria identified in the CEMP. d) A summary and analysis of environmental monitoring results.	During Construction Department of Planning	Monitor

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	e) The number and details of any complaints, including a summary of the main areas of complaint, action taken, response given and intended strategies to reduce recurring complaints. f) Details of any review and amendments to the CEMP resulting from Construction during the reporting period. g) Any other matters relating to compliance with the Conditions of Approval or as requested by the Director-General.		
5	The Proponent will submit a Pre-Operation Compliance Report to the Director-General at least two weeks prior to the commencement of Operation (or within a time agreed to by the Director-General). The Pre-Operation Compliance Report will include details of:- a) How the Conditions of Approval required to be addressed prior to commencement of Operation have been complied with. b) When each relevant condition of this Approval was complied with, including submission dates of any required report and/or approval dates. c) Any approvals or licences required to be issued by Relevant Government Agencies prior to the commencement of Operation.	Prior to Operation Department of Planning	Monitor
	ENVIRONMENTAL MANAGEMENT		
6	**An Environmental Impact Audit Report – Construction** will be prepared and submitted to the Director-General within three months of Construction completion, or at any other time interval agreed to by the Director-General. The Director-General may request the Proponent to make the construction audit report available to other Relevant Government Agencies. The Environmental Impact Audit Report – Construction will:-	Prior to Operation Department of Planning	Monitor

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	a) Identify the major environmental controls used during Construction and assess their effectiveness. b) Summarise the main environmental management plans and processes implemented during Construction and assess their effectiveness. c) Identify any innovations in Construction methods used to improve environmental management. d) Discuss the lessons learned during Construction, including recommendations for future wind farm developments.		
7	**An Environmental Impact Audit Report – Operation** will be prepared and submitted to the Director-General within three months after a 24 month period of Operation and then at any additional periods requested by the Director-General. The Director-General may request the Proponent to make the operation audit report available to other Relevant Government Agencies and Council. The Environmental Impact Audit Report – Operation will:- a) Be certified by an independent person at the Proponents expense. The certifier must be approved by the Director-General prior to the preparation of the audit report. b) Assess the effectiveness of implemented mitigation measures and safeguards. c) Assess compliance with the systems for operation maintenance and monitoring. d) Discuss the results of consultation with the local community particularly any feedback or complaints.	Prior to Operation Department of Planning	Monitor

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
8	Prior to commencement of Construction, the Proponent will nominate a suitably qualified and experienced Environmental Representative(s) (ER) whose appointment requires the approval of the Director-General. The Proponent will employ the ER(s) on a full time basis, or as otherwise agreed by the Director-General, during the Construction and Commissioning. An ER will also be employed during Operation. The ER will be:- a) The primary contact point in relation to the environmental performance of the Development. b) Responsible for all management plans and monitoring programs. c) Responsible for considering and advising on matters specified in the Conditions of Approval, and all other licences and approvals related to the environmental performance and impacts of the Development. d) Responsible for receiving and responding to complaints. e) Given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur. The Proponent will obtain approval from the Director-General for changes to the appointment of the ER during Construction. The Proponent must notify the Director-General of any changes to the appointment during Operation.	Prior to Construction CEMP	Manage and monitor
9	A Greenhouse and Energy Management Strategy will be prepared to ensure the use of non-renewable resources from Construction and Operation is minimised.	Prior to Construction	Minimise

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	The strategy will incorporate but not necessarily be limited to:- a) Design and layout plans to balance the generation and requirement for fill materials, minimising the amount required to be transported to the site from off-site sources. b) Work schedule and methods that minimise equipment idle time and double handling of material. c) Instructions to throttle down and switch off idle construction equipment particularly when trucks are waiting to access the site or while being loaded and unloaded. d) Measures to ensure equipment is regularly and correctly maintained for energy efficient operation. e) Management practices to ensure site office equipment and lights are switched off after hours except for security lighting. f) Instructions to use local materials and recycled materials (demolition materials, construction materials, paper, glass etc.) where appropriate.		
CONSTRUCTION MANAGEMENT			
10	The Proponent will prepare and implement a Construction Environmental Management Plan (CEMP) in accordance with the Department's publication entitled Guideline for the Preparation of Environmental Management Plans (2004) or its latest revision. The CEMP will be prepared in consultation with the Relevant Government Agencies and Councils, and certified by the ER as being in accordance with the Conditions of Approval.	Prior to Construction CEMP	Manage

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	AIR QUALITY CONTROL		
11	An Air Quality Management Strategy will be prepared to control dust and air emissions resulting from Construction and Operation. The strategy will include but not necessarily be limited to:- a) Wetting of access tracks with water during dry and wind periods. b) Stabilisation of exposed soils and stockpiles. c) Placement of stockpiles in sheltered locations, where necessary. d) Restrict traffic to defined tracks and roads and implement speed limits. e) Restoration of disturbed areas as soon as possible.	Prior to Construction CEMP	Manage and mitigate
	TRAFFIC AND ACCESS MANAGEMENT		
12	As part of the CEMP, a Construction Traffic and Transport Management Sub-Plan will be prepared in consultation with Goulburn Mulwaree Council, Palerang Council, the RTA and NSW Police. The Sub-Plan will:- a) Include the mitigation measures outlined in Chapter 11.4 of the Environmental Assessment report. b) Provide effective permanent drainage works within the properties in the vicinity of each entrance to divert stormwater away from driveways and away from public roads. c) Identify designated transport routes for heavy vehicles to the Development Site. d) Include measures to minimise traffic disruption through Goulburn and in the vicinity of the Development Site.	Prior to Construction CEMP	Manage and mitigate

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	e) Include measures to manage Construction traffic to ensure the safety of:- i. Livestock and limit disruption to livestock movement. i. Equestrian activities. ii. School children and limit disruption to school bus timetables. f) Include a community information program to inform the community of traffic disruptions resulting from the construction program. g) Outline a complaints management procedure for traffic impacts.		
	FLORA AND FAUNA MANAGEMENT AND MITIGATION		
13	A Flora and Fauna Management Sub-Plan will be prepared as part of the CEMP. The Sub-Plan will be prepared in consultation with the DECCW and include:- a) Plans showing terrestrial vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities were recorded. b) Methods to manage impacts on flora and fauna species (terrestrial and aquatic) and their habitat which may be directly or indirectly affected by the Development. These will include:- i. Procedures for vegetation clearing, soil management and minimising other habitat damage (terrestrial and aquatic) during Construction.	Prior to Construction CEMP	Avoid, manage and mitigate

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	ii. Performance criteria against which to measure the success of the methods. c) Rehabilitation details including:- i. Identification of locally native species to be used in rehabilitation and landscaping works, including flora species suitable as a food resource for threatened fauna species. ii. The source of all seed or tube stock to be used in rehabilitation and landscaping works including the identification of seed sources within the Site. Seed of locally native species within the Development Site should be collected before Construction commences to provide seed stock for revegetation. iii. Methods to re-use topsoil (and where relevant sub-soils). iv. Measures for the management and maintenance of all preserved, planted and rehabilitated vegetation (including aquatic vegetation). d) The mitigation measures outlined in Chapter 9.6 of the Environmental Assessment report. e) A Weed Management Strategy including:- i. Identification of weeds within the Development Site and adjoining areas. ii. Weed eradication methods and protocols for the use of herbicides.		

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	iii. Methods to treat and re-use weed infested topsoil. iv. Strategies to control the spread of weeds during Construction. f) A program for reporting on the effectiveness of terrestrial flora and fauna management measures against the identified performance criteria. Management methods must be reviewed where found to be ineffective. g) The Proponent has committed up to a maximum of $100,000 to go towards a conservation offset for the Project to improve the biodiversity values as a way of compensation for any unavoidable impacts	Prior to Operation	
	SOIL AND WATER QUALITY MANAGEMENT		
14	A Construction Soil and Water Management Sub-Plan will be prepared as part of the CEMP. The Sub-Plan will be prepared in consultation with Relevant Government Agencies and Council. The Sub-Plan will:- a) Incorporate the mitigation measures identified in Chapter 13.5 of the Environmental Assessment report. b) Where relevant, be consistent with the Department of Land and Water Conservation's Guidelines for the Planning, Construction and Maintenance of Tracks (1994); RTA's Guidelines for the Control of Erosion and Sedimentation in Road Works, the DIPNR Constructed Wetlands Manual and Landcom's manual entitled Managing Urban Stormwater: Soils and Construction (2004). c) Identify the Construction activities that could cause soil erosion or discharge sediment or water pollutants from the Development Site.	Prior to Construction CEMP	Mitigate

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	d) Describe management methods to minimise soil erosion or discharge of sediment or water pollutants from the Development Site including a strategy to minimise the area of bare surfaces during Construction. e) Describe the location and capacity of erosion and sediment control measures.		
	f) Identify the timing and conditions under which Construction stage controls will be decommissioned. g) Include contingency plans to be implemented for events such as fuel spills. h) Identify how the effectiveness of the sediment and erosion control system will be monitored, reviewed and updated.		
	OPERATION MANAGEMENT		
15	The Proponent will prepare and implement an Operation Environmental Management Plan (OEMP) in accordance with the Department's publication entitled Guideline for the Preparation of Environmental Management Plans (2004) or its latest version. The OEMP will be prepared in consultation with the Relevant Government Agencies and Councils, and will be certified by the ER as being in accordance with the Conditions of Approval. The OEMP is to be submitted for the approval of the Director-General no later than one month prior to the commencement of Operation, or within such period otherwise agreed to by the Director-General.	Prior to Operation OEMP	Manage
16	Operation will not commence until written approval of the OEMP has been received from the Director-General. Upon receipt of the Director-General's approval, the Proponent will supply a copy of the OEMP to the DECCW and Councils as soon as practicable.	Prior to Operation Department of Planning	Compliance

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	ONGOING FLORA AND FAUNA MANAGEMENT AND MITIGATION		
17	An Operation Flora and Fauna Management Sub-Plan will be prepared as part of the OEMP. The Sub-Plan will include:- a) Plans showing terrestrial vegetation communities, important flora and fauna habitat areas, areas to be protected, and areas to be planted.	Prior to Operation OEMP	Avoid, manage and mitigate
	b) Methods for managing flora and fauna and their habitats which are directly or indirectly affected by the Development. c) The mitigation measures outlined in Chapter 9.6 of the Environmental Assessment report. d) Strategies to control the spread of weeds during Operation.		
18	A Bird and Bat Adaptive Management Program will be prepared as part of the OEMP and undertaken by a suitably qualified expert and will:- a) Incorporate monitoring, and a decision matrix that clearly describes how the Proponent will respond to the outcomes of monitoring. b) Set out monitoring techniques, taking into account best practice bird and bat monitoring methods for wind farms such as those identified in the current editions of AusWEA Best Practice Guidelines for the Implementation of Wind Energy Projects in Australia and Assessing the Impacts of Wind Farms on Birds – Protocols and Data Set Standards.	Prior to Operation OEMP	Mitigate and Monitor

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	c) Account for natural and human changes to the surrounding environment that might influence bird and/or bat behaviour such as changes in land use practices and significant changes in water levels in nearby water-bodies. d) Incorporate a decision making framework that sets out specific actions and when they may be required, to reduce identified impacts on birds and bats. Identify "at risk" bird and bat groups and include monthly censuses of their movements.		
19	The Proponent will prepare annual reports commencing 12 months from the start of Operation describing the activities undertaken with the Bird and Bat Adaptive Management Program. The reports will be prepared within two months of the end of the reporting period and be provided to the Director-General. The reports will address the:- a) Outcomes of monitoring. b) Application of the decision making framework. c) Need for mitigation measures. d) Progress with implementation of mitigation measures. e) Effectiveness of the mitigation measures.	Prior to Operation Department of Planning	Monitor

SOC	COMMITMENT	PROJECT PHASE	OBJECTIVE
	OPERATION SOIL AND WATER QUALITY MANAGEMENT AND MITIGATION		
20	An Operation Soil and Water Management Sub-Plan will be prepared as part of the OEMP. The Sub-Plan will:- a) Include regular inspection of disturbed ground, particularly after rain, to ensure sediment control devices are maintained. b) Incorporate the use of appropriate containment facilities for chemical storage in the control room, bunding around the padmount transformers, and facilities building to prevent discharge to the ground. c) Include measures to maintain site tracks to prevent erosion and discharge of sediment from the site.	Prior to Operation OEMP	Minimise
	HAZARDS AND RISKS		
21	A plan of the completed Capital II Wind Farm following construction identifying the final locations of each WTG, including grid co-ordinates and relative levels (Australian Height Datum) will be provided to the Civil Aviation Safety Authority and Air Services Australia	Prior to Operation (following erection of all WTGs)	Minimise
	VISUAL AND LANDSCAPE		
22	a) The Proponent will ensure that the wind turbines are consistent in their design with the existing wind turbines of Capital I Wind Farm. b) The wind turbines will have a matte white finish and consist of three blades which is consistent with the existing wind turbines.	Prior to Operation OEMP	Minimise

18. CONCLUSION

The Capital II Wind Farm project comprises up to 55 wind turbine generators and associated infrastructure with a total renewable energy generating capacity of approximately 100 megawatts. The Project application proposes two separate layouts, of which only one will be constructed.

The CWFII Project presents an opportunity to harness a commercial wind resource. The Project would be capable of generation up to 315,000 MWh per year of electricity without any emissions from burning fossil fuels, without the need to supply fuel from another source such as mined coal, and without the need to use cooling water.

The anticipated energy generated from the Project will off-set the equivalent of approximately 315,000 tonnes of CO_2 emissions per year which is equivalent to removing up to 63,000 cars off the road. The Project clearly demonstrates a good example of a renewable energy initiative with certain greenhouse gas saving benefits.

In the prologue to his decision in *Taralga Landscape Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* [2007] NSWLEC 59; (2007) 161 LGERA 1 (the Taralga wind farm proceedings), Preston CJ said the following with respect to wind farms in a rural landscape:-

> *"The insertion of wind turbines into a non-industrial landscape is perceived by many as a radical change which confronts their present reality. However, those perceptions come in differing hues. To residents, such as members of Taralga Landscape Guardians Inc (the Guardians), the change is stark and negative. It would represent a blight and the confrontation is with their enjoyment of their rural setting.*
>
> *To others, however, the change is positive. It would represent an opportunity to shift from societal dependence on high emission fossil fuels to renewable energy sources. For them, the confrontation is beneficial – being one much needed step in policy settings confronting carbon emissions and global warming*."

Wind farms affect only a very small part of the land they occupy and tend to have little effect on other land uses. Wind farms are proven to co-exist with many types of land uses, as shown by the ongoing grazing and cropping practices carried out on the CWFI site following the operation of the wind farm.

An Environmental Management Plan for both the construction and operational phases of the Project will be prepared to provide a management framework that will control potential impacts on the environment. It will include practical and achievable management actions, performance requirements, a system of monitoring, reporting and auditing and implementation of corrective action.

The objective of the EMP is to provide for the effective management of the environmental concerns and potential adverse environmental effects arising from the CWFII project.

The Project contributes to the State's electricity requirements and entails significant greenhouse gas benefits by resulting in no net greenhouse gas emissions during operation. The Project is consistent with the priorities and targets of the NSW State Plan including "*achieve a 60% cut in greenhouse gas emissions by 2050 in line with the Federal Governments targets*" and "*achieve 20% renewable energy consumption by 2020 in light of the Federal Government's expanded Renewable Energy Target*".

The Project is unlikely to have any significant impacts to the biodiversity of the site and there is a very low risk to threatened species or their habitat. The potential risks in relation to blade collision can be effectively managed through the implementation of the Bird and Bat Adaptive Management Plan. The considered visual and noise impacts acknowledge that there will be some residual impacts however these do not outweigh the Project's broader public interest with respect to renewable energy generation.

The Project will provide a range of benefits while the potential impacts are considered to be manageable and is therefore in the public interest. The few adverse impacts can be mitigated to acceptable levels by the implementation of the CEMP and OEMP, however the benefits are extensive and far outweigh any perceived or potential impacts, and include the following:-

- The Project utilises renewable energy to produce approximately 100 megawatts of electrical power when operating at full capacity;
- The Project provides additional generation power to assist the National Electricity Market to be able to forecast demands;
- Additional renewable energy generation assists the diversification of supply sources and can increase security of supplies;
- The Project contributes to the Federal Governments Renewable Energy Target scheme;
- The Project reduces the carbon intensity of electricity generation from fossil fuel powered sources to provide savings of greenhouse gas emissions of up to 315,000 tonnes per year (compared to electricity generation from a coal burning power station);
- When implemented in accordance with the controls and management plans identified in this Environmental Assessment, the Project is unlikely to compromise the environmental values of the locality including visual, flora and fauna, heritage or water quality and does not place undue stress on local resources;

- The Project is located on cleared grazing land and is able to operate compatibly with the existing grazing operations;

- The Project utilises the existing infrastructure associated with the Capital I Wind Farm, thereby reducing the requirements for additional access roads, and a major substation; and

- The Project is located in an established renewable energy precinct established by the NSW Government where wind farms are generally accepted and supported by the majority of the community.

The Australian Government National Health and Medical Research Council recently completed a review of the available evidence regarding the health implications of wind turbines. Following review of the available evidence, the paper concluded that "*there are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines*."

This Environmental Assessment has identified and addressed the environmental issues likely to be associated with the Project. Having regard to the material in the foregoing sections and the significant environmental advantage of the Project, it is concluded that the overall environmental impact will be acceptable and any residual impacts would outweigh the Project's broader public benefit with respect to renewable energy generation.

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