3. Existing environment

3.1 Regional context

The proposed power station site and gas pipeline route are located within the Orana and Central West Regions of NSW (see Figure 3-1). The Orana Region is located in the mid north-western area of the State and covers approximately 150,000 square kilometres (25% of the state). The region encompasses 13 local government areas (LGAs), including the Wellington LGA (Orana Regional Development Board 2007a), within which the proposed power station and the easternmost portion of the proposed gas pipeline would be located. The Wellington LGA has the second largest population in the region (behind Dubbo Shire) (see Section 3.12).

The Wellington township is approximately 360 kilometres north-west of Sydney. The town is approximately 50 kilometres south of Dubbo, with the two towns connected via the Mitchell Highway. It is also accessible by train on Country Link's Western Line, which runs from Sydney to Dubbo via Wellington.

Dubbo is the main regional hub of Orana. It is located at the meeting point of the Mitchell, Newell, and Golden highways. It has a population of approximately 39,500 and services one third of the geographical area of NSW. Surrounding towns, such as Wellington, rely on Dubbo for goods and services, and for access to State Government departments (Dubbo City Council 2004).

The Orana region has good transport infrastructure. The region is traversed by major east–west and north–south road and rail networks. The Golden Highway connects the region to the Port of Newcastle facilities, and a passenger rail service connects Orana to Sydney. The region is also connected via air with a major airport at Dubbo serviced by Qantas and Regional Express Airlines (Department of State and Regional Development 2007).

The main agricultural practices in the Orana region are cereal crops, beef, cotton and wool. Manufacturing industries in the region include food and beverages, wood products, mineral products and fabricated metal. Successful industries in viticulture and aquaculture are also developing (Orana Regional Development Board 2007a).

Directly to the south of the Orana Region is the Central West Region, encompassing 12 LGAs, including Cabonne and Parkes, through which the proposed gas pipeline would pass (see Figure 3-1).

The Central West Region has extensive rail and freight networks that link it to Sydney and the ports. This includes direct access to Botany Bay. There are two intermodal transport depots within the region, at Parkes and Blayney. These give access to 82% of Australia's population via road or rail within 24 hours (NSW Department of State and Regional Development 2007).

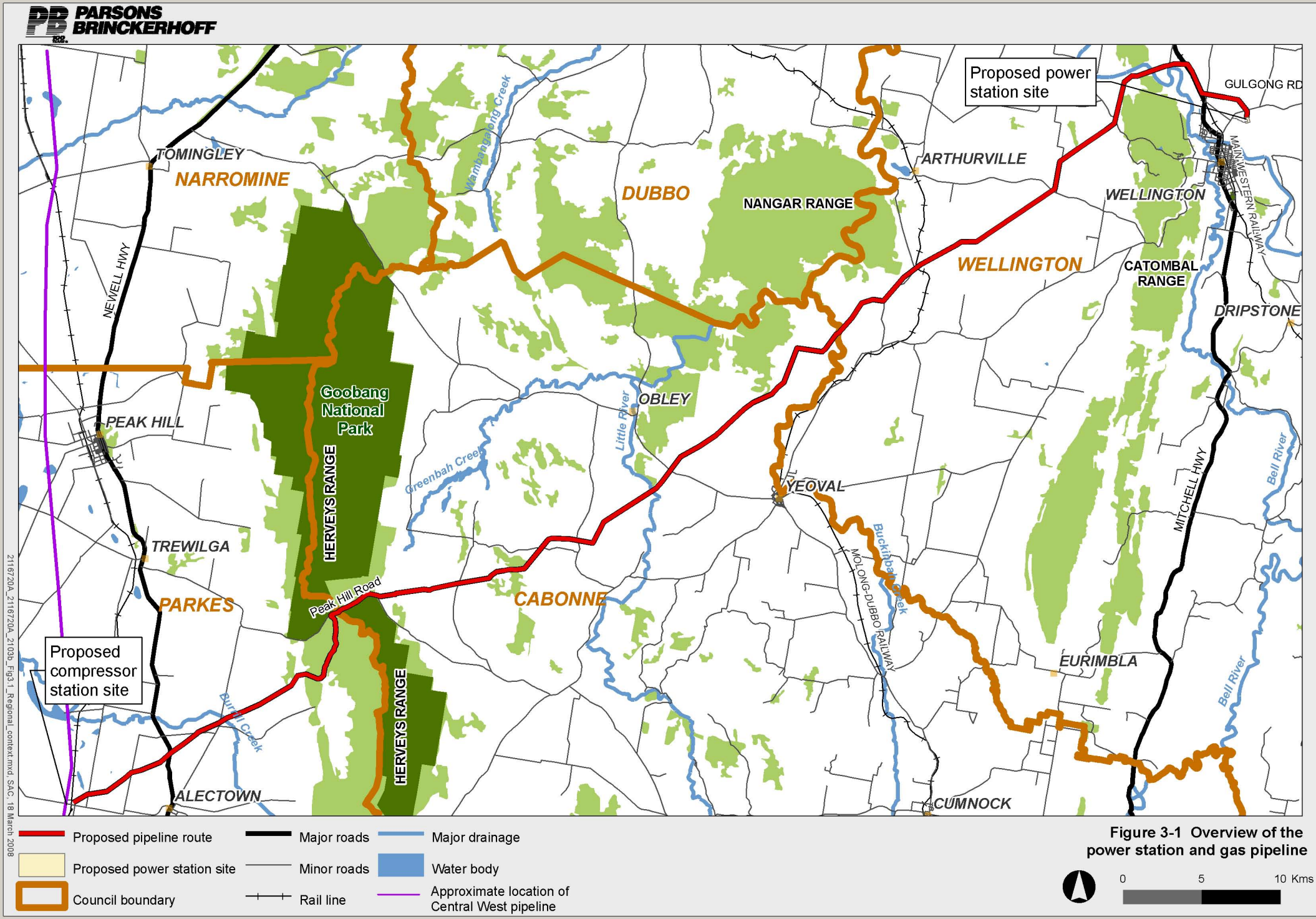

Figure 3-1 Overview of the power station and gas pipeline

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The Orana and Central West Regions experience four distinct climatic seasons. Average summer temperatures range from 12–35°C and average winter temperatures range from 1-17°C. Rainfall is fairly evenly distributed throughout the year in areas of higher elevation and tapers off down the slopes and onto the flats. The average annual rainfall in the regions ranges from 300–900 millimetres (Central West Regional Development Board 2007b; Orana Regional Development Board 2007a).

3.2 Local context

The proposed power station site is located approximately 2 kilometres north-north-east of the outskirts of Wellington (see Figure 3-2). Wellington, the second oldest town west of the Blue Mountains, lies at the foot of Mount Arthur, and the junction of the Macquarie and Bell rivers. The Wellington LGA is largely agricultural, producing crops, wool, beef and fat lambs; these industries are worth close to $50 million per year, of which almost $14 million per year comes from the production of grains for cereal (predominantly wheat and canola). As such, much of the land in the LGA has been cleared. Industrial, commercial, residential and rural-residential land is also available, and a rural high technology park is currently under development. A range of tourist attractions are also provided within the Wellington LGA, the most significant of which are the Wellington Caves Complex and Lake Burrendong (Orana Regional Development Board 2007b).

Agricultural land dominates the area surrounding the proposed power station site. TransGrid's 330/132 kilovolt Wellington substation is located immediately north of the site. A relatively new subdivision, Cadonia, is located north-east of the proposed power station site. To the north of the subdivision is the recently developed Wellington Correctional Centre. An abandoned abattoir (which was never used) is located north-east of the site. The Keston Rose Garden Café is located north-west of the proposed power station site.

As previously mentioned, the proposed gas pipeline would pass through the Wellington, Cabonne and Parkes LGAs. The pipeline would end near Alectown, a small town located on the Newell Highway to the north-east of Parkes (the major urban centre of the Parkes LGA) and west of Goobang National Park (see Figure 3-1).

Much of the land within the Cabonne and Parkes LGAs is used for grazing and agriculture. Cabonne is known as 'Australia's food basket', due to the wide variety of foodstuffs it produces (e.g. dairy, beef, lamb, venison, apples, berries, canola oil, wine, spring water, flour, eggs, honey) (Cabonne Council 2007). One of the most significant features of the Parkes LGA is the Parkes Radio Telescope.

Goobang National Park is the largest area of protected remnant native vegetation in the three LGAs. Additionally, small, parcels of state forest occur scattered across the three LGAs. Most of the remaining (unprotected) native vegetation occurs in areas unsuitable for agricultural purposes (i.e. on rocky, hilly areas) or as roadside vegetation.

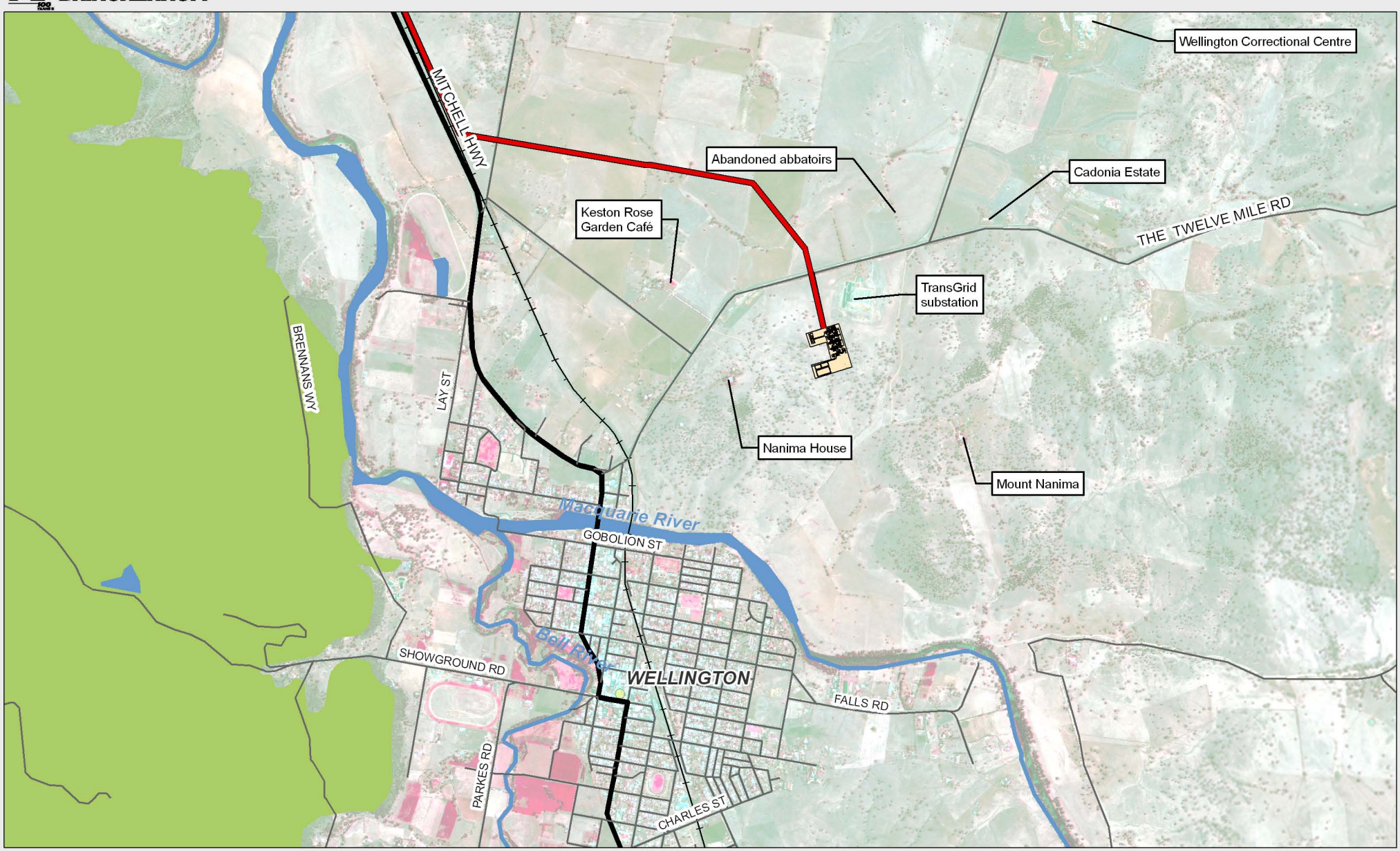

Figure 3-2 Proposed power station location

3.3 Geology, soils and landform

3.3.1 Power station site

Topography

The *Dubbo 1:250,000 Soil Landscapes Sheet* (Department of Land and Water Conservation 1999) describes the area as low, undulating hills ranging in elevation from 300–500 metres. Slopes are gently inclined, between 3% and 10%, and drainage lines are approximately 500-1,000 metres apart.

The topography of the proposed power station site is gently undulating. The site is positioned between two minor ridge lines, with a general north-west through south-east relief. The land rises immediately to the west. Contours on the site are shown in Figure 3-3. The proposed site of the power station is located in a shallow depression slightly below the level of the Gulgong Road.

Geology

Reference to the *1:250,000 Dubbo Geological Sheet SI 55-4* (National Geoscience Mapping Accord 1999) indicates that the proposed power station site is underlain by Ordovician sediments and rocks of the Oakdale Formation belonging to the Cabonne Group. This formation comprises basalt, basaltic andesite, latite lava and intrusions, volcaniclastic breccia, conglomerate, sandstone and siltstone, and minor allochthonous limestone (see Figure B-4 in Appendix B).

Soils

The proposed power station site lies within the NSW South Western Slopes Upper Slopes Bioregion. Soils in this bioregion are typically shallow and stony on steep slopes, texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. The bioregion is associated with alluvial sands, loams and clays (see Figure C-4 in Appendix C).

3.3.2 Gas pipeline route

Topography

The western portion of the Wellington LGA is generally flat to undulating. Catombal Range is located just west of Wellington and has a north–south alignment.

Topography in the Parkes LGA is generally flat to undulating.

The Cabonne LGA is located on the tablelands of the Great Dividing Range, with topography varying from steep in the east (950 metres) to slightly undulating in the west (290 metres). Mount Canobolas is the highest peak at 1,395 metres (Geolyse 2004). The southernmost portion of Nangar Range is located within the Cabonne LGA. The area within and around Goobang National Park has steep terrain, comprising Herveys Range, which is on the boundary of the Cabonne and Parkes LGAs.

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Proposed pipeline route

Power lines

2 m contours

10 m contours

Figure 3-3 Topography of power station site

0 100 200

Metres

2116720A_2105b_Fig3_3_Topography_of_Power_station_location.mxd GK April 14, 2008

Geology

Reference to the *1:250,000 Dubbo Geological Sheet SI 55-4* (National Geoscience Mapping Accord 1999) indicates that a large portion of the eastern section of the proposed gas pipeline traverses the Naringla Granodiorite granite complex, part of the Yeoval complex of the Yeoval Batholith Group (see Figures B-3 and B-4 in Appendix B).

The *1:250,000 Narromine Geological Sheet SI 55-3* (NSW Department of Mines 1972) identifies that the western section of the proposed gas pipeline would traverse a diverse range of stratigraphic units. The pipeline would be underlain by Wombin volcanics, Mungincoble chert and Dulladerry volcanics. It would also pass through sediments and rocks of the Hervey Group (Caloma, Mandangery, and Clagger sandstones and the Burrill formation), the Forbes Group (Mumbingle formation) and the Intrusives (Obley granite) (see Figures B-1 and B-2 in Appendix B).

Soils

Similar to the proposed power station, the proposed gas pipeline lies entirely within the NSW South Western Slopes Upper Slopes Bioregion. Soils are typically shallow and stony on steep slopes, with texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. The bioregion is associated with alluvial sands, loams and clays (see Figures C-1 to C-4 in Appendix C).

3.4 Air quality

Air quality data and meteorological conditions have been sourced from a combination of Bureau of Meteorology, and NSW Department of Environment and Climate Change (DECC) measured and synthetically compiled (CSIROs TAPM) data. The data set compiled is considered suitable for the purposes of this assessment.

A detailed assessment of air quality impacts was undertaken, which is provided in full in Technical Paper No. 4 – *Air Quality* A*ssessment*. This section describes the existing air quality of the area; Section 9.2 assesses the potential impacts of the project on this air quality.

3.4.1 Ambient air quality

The existing air quality for the area is considered characteristic of a rural environment. No major pollutant-generating facilities are located in the immediate locality.

Sufficiently detailed background air quality data is not currently available for the study area in terms of either dust (particulate matter less than or equal to 10 microns in diameter (PM_{10}), oxides of nitrogen (NO_x), ozone (O_3) or sulfur dioxide (SO_2) levels. No historical information was available and no site-specific monitoring was undertaken. Data provided by the DECC was, therefore, adopted in the estimation of existing background levels.

Data measured for Bargo, Bathurst and Bringelly (2004–2005) was adopted as background concentration levels for the proposed power station, which is provided in Table 3-1 and Table 3-2.

Table 3-1 Adopted background levels for Bathurst and Bargo monitoring stations

Month	Pollutant (µg/m^3)												
	Bathurst					Bargo							
	PM_{10} (TEOM)		O_3			SO_2			NO_2		O_3		
	Hourly average	Maximum 24-hour	Hourly average	Maximum 1-hour	Maximum 4-hour	Hourly average	Maximum 1-hour	Maximum 24-hour	Hourly average	Maximum 1-hour	Hourly average	Maximum 1-hour	Maximum 4-hour
Year	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05	04/05
Jan	20 / 18	36 / 36	53.3 / 49.2	196.9 / 117.7	143.4 / 113.4	0.0 / 0.0	19.9 / 17.1	5.7 / 5.7	12.3 / 10.3	59.5 / 94.3	55.6 / 49.2	207.6 / 282.5	177.6 / 196.9
Feb	22 / 16	38 / 27	51.3 / 43.1	162.6 / 119.8	139.1 / 115.6	2.8 / 0.0	34.5 / 14.2	5.7 / 5.7	12.3 / 12.3	120.6 / 85.7	51.4 / 49.2	209.7 / 218.3	192.6 / 194.7
Mar	25 / 16	70 / 29	39.0 / 36.9	124.1 / 115.6	117.7 / 113.4	0.0 / 0.0	8.5 / 14.2	2.8 / 2.8	14.4 / 10.3	104.0 / 59.5	42.8 / 40.7	164.8 / 151.9	130.5 / 141.2
April	32 / 21	73 / 37	36.9 / 28.7	104.9 / 98.4	100.6 / 94.2	0.0 / 0.0	11.4 / 19.9	2.8 / 2.8	16.4 / 18.5	83.6 / 69.4	42.8 / 36.4	**130.5 / 126.3**	**109.1 / 107.0**
May	27 / 18	53 / 31	28.7 / 26.7	104.9 / 77.0	102.7 / 74.9	**0.0 / 0.0**	**14.2 / 5.7**	**8.5 / 2.8**	**16.4 / 16.4**	**79.6 / 65.3**	**40.7 / 38.5**	**94.2 / 79.2**	**92.0 / 74.9**
June	8 / 17	13 / 45	32.8 / 30.8	74.9 / 83.5	70.6 / 81.3	**0.0 / 0.0**	**22.7 / 17.1**	**5.7 / 2.8**	**14.4 / 18.5**	**71.4 / 85.7**	**42.8 / 38.5**	**70.6 / 83.9**	**70.6 / 79.2**
July	10 / 10	19 / 16	30.8 / 30.8	72.8 / 70.6	68.5 / 70.6	**0.0 / 0.0**	**22.7 / 11.4**	**5.7 / 2.8**	**14.4 / 12.3**	**59.2 / 59.5**	**42.8 / 44.9**	**79.2 / 81.3**	**77.0 / 74.9**
Aug	11 / 11	26 / 20	**34.9 / 36.9**	**81.3 / 87.7**	**79.2 / 81.3**	**2.8 / 0.0**	**28.5 / 25.6**	**5.7 / 5.7**	**12.3 / 16.4**	**81.6 / 77.5**	**51.4 / 47.1**	**94.2 / 89.9**	**89.9 / 83.5**
Sept	**13 / 10**	**31 / 17**	**34.9 / 36.9**	**96.3 / 89.5**	**94.2 / 87.7**	**0.0 / 2.8**	**20.2 / 14.2**	**5.7 / 8.5**	**14.4 / 16.4**	**87.7 / 83.6**	**51.4 / 47.1**	**104.9 / 109.1**	**102.7 / 104.9**
Oct	**12 / 10**	**34 / 18**	**43.1 / 36.9**	**114.2 / 94.2**	**109.1 / 94.2**	**0.0 / 2.8**	**14.2 / 8.5**	**5.7 / 5.7**	**12.3 / 12.3**	**95.9 / 69.4**	**53.5 / 51.4**	**173.3 / 117.7**	**145.9 / 102.7**
Nov	**13 / 11**	**30 / 18**	**45.1 / 41.0**	**115.6 / 98.4**	**113.4 / 96.3**	**2.8 / 2.8**	**14.2 / 11.4**	**5.7 / 2.8**	**12.3 / 10.3**	**91.8 / 57.1**	**51.4 / 44.9**	**190.5 / 134.8**	**162.5 / 119.8**
Dec	**16 / 20**	**33 / 39**	**51.3 / 45.1**	**149.8 / 111.3**	**111.3 / 96.3**	**0.0 / 2.8**	**17.1 / 14.2**	**2.8 / 2.8**	**8.2 / 12.3**	**53.0 / 73.4**	**47.1 / 53.5**	**134.8 / 214**	**113.4 / 177.6**
NSW Goal (µg/m^3)		50		214	171		570	228		246		214	171
Peak	**32**	**73**	**2.6**	**196.9**	**143.4**	**2.8**	**34.5**	**8.5**	**16.4**	**120.6**	**55.6**	**282.5**	**196.9**

Source: NSW DEC Air Quality Monitoring Reports 2004 and 2005 (DEC 2005b)

Notes: µg/m^3 = micro grams per cubic metre; PM_{10} = Particulate matter ≤ 10 µm in aerodynamic diameter; TEOM = tapered element oscillating meter – 1 hour average; O_3 = ozone; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide.

Table 3-2 Adopted background levels for Bringelly monitoring station

Pollutant (µg/m^3)										
Month	Bringelly									
	PM_{10} (TEOM)		O_3			SO_2			NO_2	
	Hourly average	Maximum 24-hour	Hourly average	Maximum 1-hour	Maximum 4-hour	Hourly average	Maximum 1-hour	Maximum 24-hour	Hourly average	Maximum 1-hour
Year	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**	**04/05**
Jan	25 / 22	60 / 53	51.4 / 44.9	231.1 / 239.7	199.0 / 218.3	2.8 / 0.0	22.8 / 14.2	2.8 / 5.7	12.3 / 8.2	57.1 / 36.7
Feb	24 / 21	46 / 41	47.1 / 47.1	261.1 / 188.3	235.4 / 164.8	0.0 / 0.0	42.7 / 14.2	5.7 / 2.8	12.3 / 8.2	55.1 / 53.0
Mar	23 / 15	41 / 28	36.4 / 34.2	194.7 / 143.4	162.6 / 124.1	0.0 / 0.0	8.5 / 8.5	2.8 / 2.8	14.4 / 8.2	67.3 / 46.9
April	19 / 20	35 / 33	34.2 / 30.0	132.7 / 139.1	113.4 / 128.4	0.0 / 0.0	37.0 / 14.2	5.7 / 2.8	14.4 / 14.4	83.6 / 71.4
May	21 / 19	41 / 34	30.0 / 27.8	96.3 / 85.6	87.7 / 81.3	0.0 / 0.0	19.9 / 17.1	2.8 / 2.8	14.4 / 12.3	57.1 / 53.0
June	19 / 23	35 / 54	30.0 / 25.7	72.8 / 79.2	70.6 / 74.9	0.0 / 0.0	22.8 / 20.2	2.8 / 5.7	14.4 / 16.4	55.1 / 67.3
July	16 / 17	30 / 29	25.7 / 30.0	74.9 / 74.9	70.6 / 73.4	0.0 / 0.0	19.9 / 22.8	5.7 / 2.8	12.3 / 14.4	51.0 / 42.8
Aug	15 / 22	29 / 44	38.5 / 36.4	100.6 / 92.0	94.2 / 87.7	0.0 / 0.0	19.9 / 22.7	2.8 / 5.7	12.3 / 14.4	75.5 / 61.2
Sept	15 / 15	24 / 28	40.7 / 40.7	113.4 / 128.4	111.3 / 119.8	0.0 / 0.0	11.4 / 25.6	2.8 / 5.7	12.3 / 14.4	64.2 / 69.4
Oct	17 / 19	47 / 44	44.9 / 44.9	128.4 / 122.0	117.7 / 113.4	0.0 / 0.0	11.4 / 11.4	2.8 / 2.8	10.3 / 14.4	59.5 / 91.8
Nov	20 / 16	39 / 29	44.9 / 40.7	237.5 / 126.3	181.9 / 109.1	0.0 / 0.0	11.4 / 11.4	2.8 / 5.7	10.3 / 10.3	49.0 / 44.9
Dec	22 / 24	43 / 39	42.8 / 51.4	149.8 / 179.8	128.4 / 164.8	0.0 / 0.0	11.4 / 11.4	2.8 / 2.8	8.2 / 10.3	34.7 / 46.9
NSW Goal **(µg/m^3)**		**50**		**214**	**171**		**570**	**228**		**246**
Peak	25	60	2.4	261.1	235.4	2.8	42.7	5.7	16.4	91.8

Source: NSW DEC Air Quality Monitoring Reports 2004 and 2005 (DEC 2005b)

Notes: µg/m^3 = micro grams per cubic metre; PM_{10} = Particulate matter ≤ 10 µm in aerodynamic diameter; TEOM = tapered element oscillating meter – 1 hour average; O_3 = ozone; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide.

Although the monitoring data is not site specific, it is considered a conservative estimation of the typical (or indicative) ambient air environment for the area. The data is the best available for use in this assessment and comprises a conservative estimate of baseline conditions. In summary:

- Bargo is a rural town surrounded by farmlands where agriculture and fruit producing activities predominate. There are no major industrial activities in the locality and hence no major sources of air pollution. The Hume Highway is situated approximately 10 kilometres to the east of Bargo, but is not expected to influence measured nitrogen dioxide (NO_2) levels.
- Bathurst is located in the Central Tablelands and on the banks of the Macquarie River with higher ground rising to the south-west of the town centre. Due to the relatively cold winters, wood burning activities may lead to exceedances of the standards for PM_{10}. NO_2 has not been recorded at this location. However, due to its relative proximity to Wellington with no significant sources of air pollution, NO_2 levels are expected to be of a similar magnitude to the Wellington area.
- Bringelly is south of the Hawkesbury Basin in a semi-rural area at an elevation of approximately 53 metres south-west of Sydney. The topography of the surrounding area and the influences of sea breezes are such that this location is likely to provide worst case ambient air profiles for NO_2 and O_3. This is primarily due to significant contributions of emissions from commercial and domestic vehicles, which would not be the case for the Wellington area.

3.4.2 Meteorology

Air quality impacts are influenced by regional meteorological conditions, primarily in the form of gradient wind flow regimes, and also by local conditions, generally driven by topographical features in the form of drainage flows. Topography, wind speed and wind direction all affect the potential dispersion and transport of plumes. Regional and local dispersion meteorology at the project site has, therefore, been defined.

Wind data for Wellington indicates that wind directions vary from easterly to south-south-easterly over the seasons, but south-easterly winds predominate. A higher frequency of calm conditions was measured during the winter months for both data sets.

A site-representative regional meteorological data file was configured for the proposed power station site. The data was generated through the use of the CSIRO developed TAPM program, with synoptic conditions considered in compiling the site-specific meteorological conditions. This is required to provide a detailed and robust assessment of existing meteorological conditions.

An annual average wind speed of 3.17 metres per second was calculated for 2004–2005, with the primary wind directions from the south-east. Seasonal wind roses were in close agreement with the annual wind rose. A higher proportion of winds were present for the north through north-east vector during the winter period.

Worst-case dispersion conditions (least dispersion) from the site would normally be associated with F-class stability conditions — still/light winds and clear skies during the early morning period (stable conditions). Analysis of the referenced site-specific meteorological data indicates that F-class dispersion conditions were present for approximately 25% of the time for the years 2004–2005. A moderate frequency of F-class stabilities was indicated.

3.4.3 Topography

When assessing the impact potential from a ground level air pollutant source it is important to consider local drainage flows. The movement of cold air down a slope (generally under stable atmospheric conditions) is referred to as katabatic drift, and can result in plume entrapment and poor dispersion of air borne pollutants and the potential to cause greater off-site impacts. Katabatic drift would follow the topography of the site.

Based on the topographic information described in Section 3.3.1, there is little potential for plume entrapment; adequate dispersion in the vertical and horizontal directions is anticipated.

3.4.4 Sensitive receptors

Residential properties are located in the vicinity of the proposed power station — the nearest is approximately 700 metres from the site. The closest residence in the Cadonia subdivision is located approximately 1.6 kilometres to the north-east (most land parcels are approximately 2.5 kilometres away) and the outskirts of Wellington are approximately 2 kilometres south-west of the site.

The nearest potentially affected receptors are outlined in Table 3-3 and shown in Figure 3-4.

Table 3-3 Nearest potentially affected receptors at proposed power station site

Location	Name	Direction from power station	Approximate distance (m)[1] (from centre of project site)
1	Mount Nanima	south-east	1,300
2	Cadonia subdivision	north-east	1,600[2]
3	Keston Rose Garden Café	north-west	1,500
4	Nanima House	south-west	700

Notes: 1: m = metres; 2: Reflects the distance to the closest residence in the subdivision

There are two residential properties located in the vicinity of the compressor station that would be potentially affected by combustion emissions. These are outlined in Table 3-4 and illustrated in Figure 3-5.

Table 3-4 Nearest potentially affected receptors at proposed compressor station site

Location	Name	Direction from compressor station	Approximate distance (m)[1] (from centre of project site)
5	Mountain View, Alectown	south-east	660
6	Property A	north-east	1,650

Note: 1: m = metres

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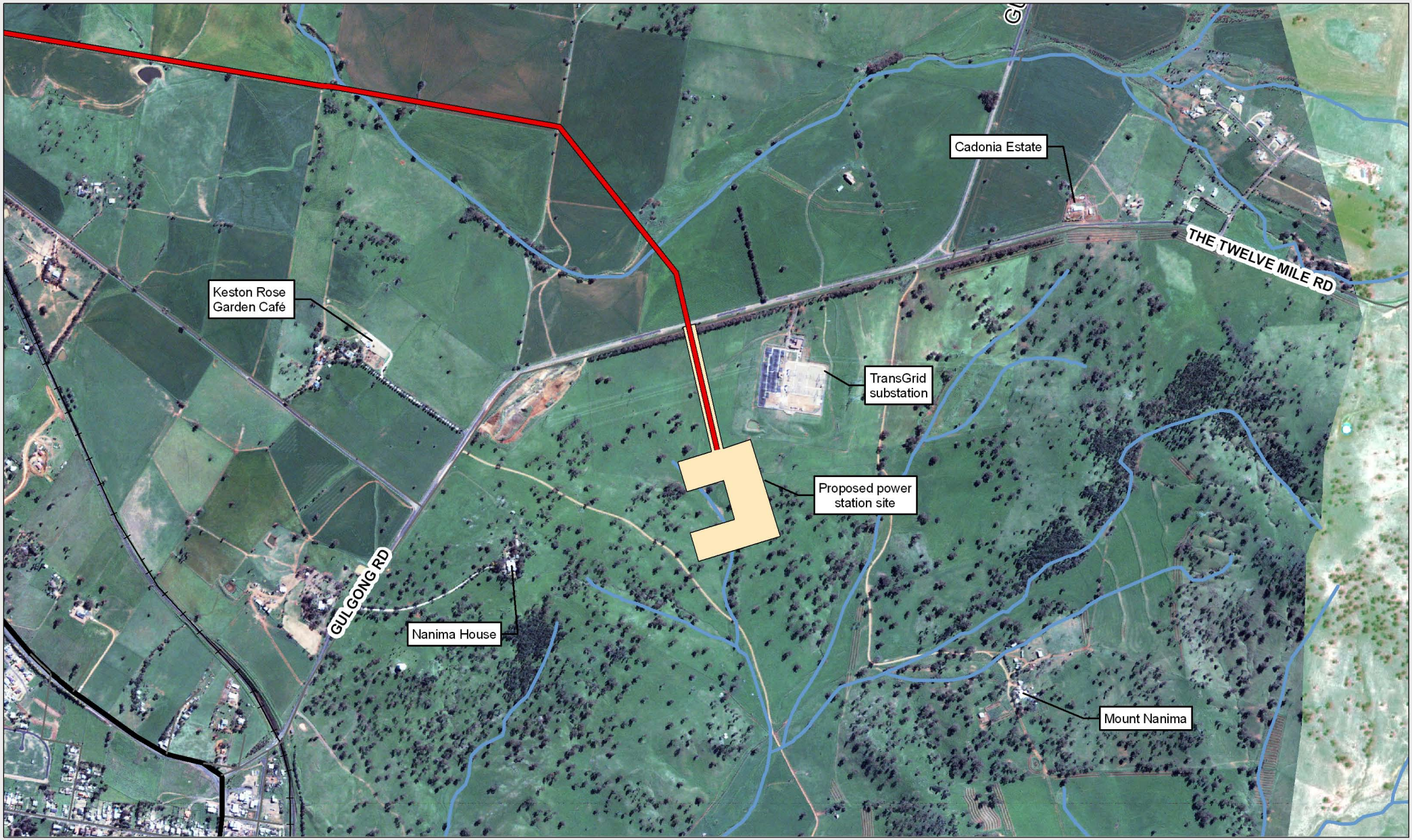
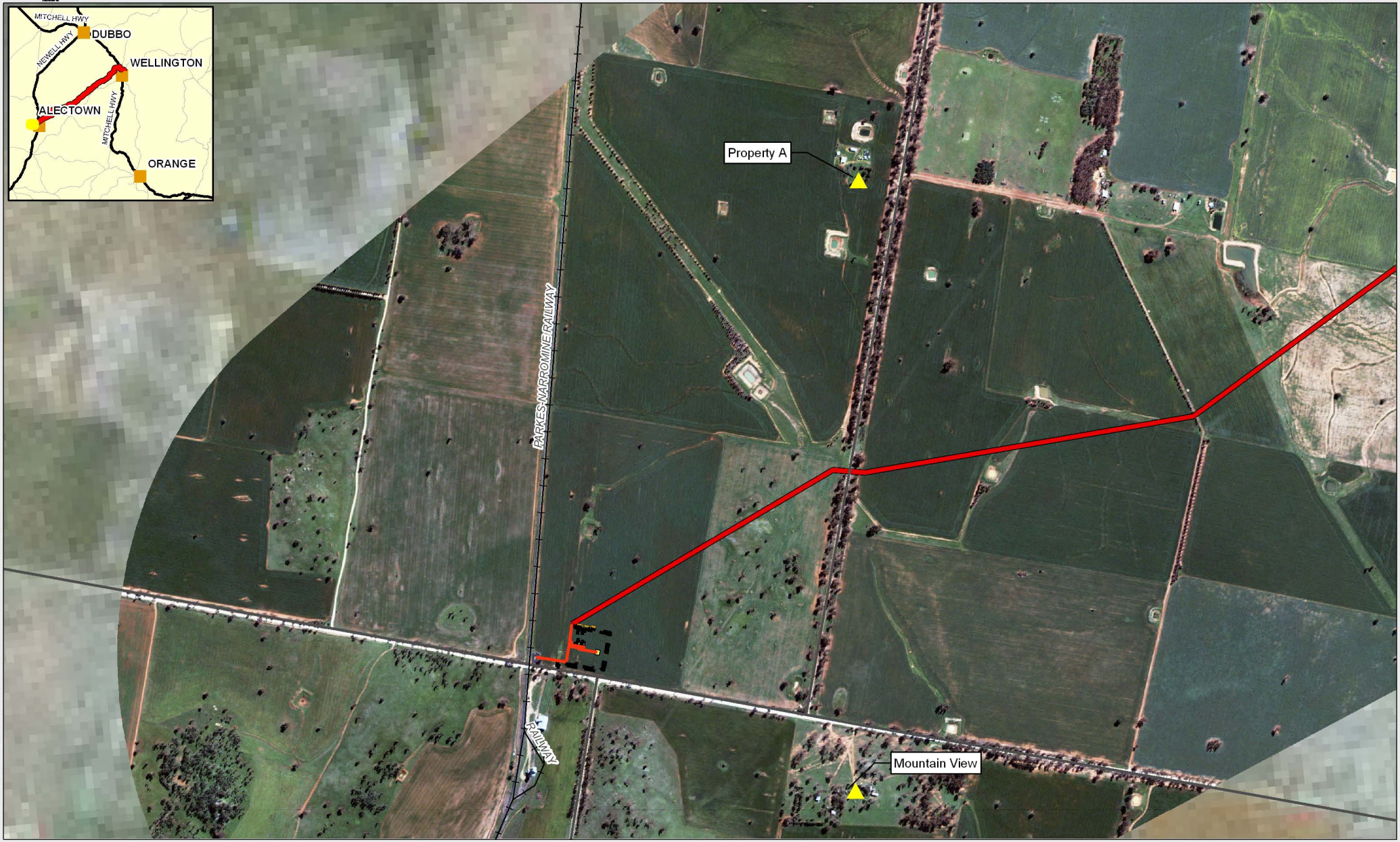


Proposed pipeline route
Proposed power station site
Major roads
Minor roads
Major drainage
Minor drainage
Water body
Rail line

Figure 3-4 Air and noise sensitive properties around the power station

0 500 1,000 Metres

PB PARSONS BRINCKERHOFF



Proposed pipeline route
Major roads
Rail line
Water body
Minor roads
Major drainage
National parks

Figure 3-5 Air and noise sensitive properties around the compressor station

0 375 750 Metres

3.5 Noise

3.5.1 Power station site

A detailed noise assessment was undertaken to evaluate construction and operational noise associated with the project, which is provided in full in Technical Paper No. 3 – *Noise and Vibration Assessment*. This section describes the existing noise environment of the area; Section 9.3 assesses the potential impacts of the project on this environment.

The assessment identified four residential properties within the surrounding environment of the proposed power station site, which were selected to monitor the existing ambient and background noise levels of the region. Daytime attended and long-term unattended noise monitoring was carried out.

Ground level meteorological conditions were also measured continuously over the monitoring period. Where the wind speed was greater than 5 metres per second and/or during periods of precipitation, noise measurements were excluded from the analysis.

Noise monitoring locations

The noise monitoring was undertaken at the following residential locations (see Figure 3-4):

- *Location 1:* Mount Nanima — Located approximately 1.3 kilometres south-east of the proposed power station site. Mount Nanima is situated at approximately 338 metres Australian height datum (AHD). The intervening topography between the property and the proposed power station site is characterised by regions of raised ground peaking at an approximate ground height of 350 metres AHD.
- *Location 2:* Cadonia subdivision — The closest house in this subdivision is approximately 1.6 kilometres north-east of the proposed power station site (most land parcels are approximately 2.5 kilometres away). The subdivision is located at approximately 380 metres AHD, which is 50 metres above the proposed power station footprint. The area consists of a community of residences all potentially affected by the project.
- *Location 3:* Keston Rose Garden Café — Consists of a separate residential property and commercial tea house premises located approximately 1.5 kilometres north-west of the proposed power station site. The Keston Rose Garden Café is located at an approximate ground height of 348 metres AHD. The eastern façade of the property has direct line of sight to the proposed power station site.
- *Location 4:* Nanima House — This is a single residential property located approximately 700 metres south-west of the proposed power station site. The property has an approximate ground height of 368 metres AHD. The north-eastern façade of the property has a direct line of sight to the proposed power station site.

Unattended noise monitoring

Ambient noise monitoring was undertaken from 11 to 20 May 2007; results are presented in Table 3-5.

The noise environs followed typical diurnal trends where the background noise level was reduced during the night-time period. At all four monitoring locations the evening period demonstrated an increase in noise level from the daytime averages.

The existing ambient noise environment for all periods of the daytime, evening and night-time is considered low, and is subject to a rural classification in noise terms, the quietest classification recognised by the DECC.

Table 3-5 Unattended noise monitoring results

Location	Day[1] (7 am – 6 pm)		Evening[1] (6 pm – 10 pm)		Night[1] (10 pm – 7 am)	
	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}
1. Mount Nanima						
ABL[2] range	38.5 – 50.5	23 – 31.5	28 – 34	22 – 26	24.5 – 54.5	22 – 26.5
RBL[3] (median of ABLs)	41	23.5	30.5	22.5	32	22
2. Cadonia subdivision						
ABL[2] range	45 – 54.5	23.5 – 31.5	39.5 – 55.5	22.5 – 28.5	33 – 63	21.5 – 29
RBL[3] (median of ABLs)	47.5	24.5	42	23.5	36	22
3. Keston Rose Garden Café						
ABL[2] range	30 – 41.5	27.5 – 31.5	26 – 38.5	25 – 32.5	23 – 53	23.5 – 27.5
RBL[3] (median of ABLs)	34	30	28.5	25.5	29.5	24.5
4. Nanima House						
ABL[2] range	40 – 44	27.5 – 35.5	32 – 38.5	24 – 32	30 – 61.5	22.5 – 27
RBL[3] (median of ABLs)	43	29.5	35.5	26.5	36.5	25

Notes: 1: Values expressed as dB(A), dB(A) = decibels, A-weighted, L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level, L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background), All values rounded to nearest 0.5 dB(A); 2: ABL = assessment background level; 3: RBL = rating background level.

The existing noise environment at Mount Nanima has minimal influencing noise sources. As a working farm, the local environment is subject to short-term noise influences from machinery and vehicles. The night-time period noise levels are influenced by early morning farm activity.

The Cadonia subdivision noise environment is characterised by daytime, evening and night-time periods that are subject to short-term noise influence from residential activity, local vehicle movements and fauna. The existing variation in noise level is considered minimal and infers that the period noise environments are relatively consistent.

The noise environment at the Keston Rose Garden Café is influenced by distant road traffic noise. The background noise environment of this location is characterised by a variation in noise levels consistent with diurnal trends, as the distant road traffic noise is relatively constant throughout the daytime.

The Nanima House noise environment is influenced by distant road traffic noise, which is a constant noise source. As a working farm, the noise environment is also subject to short-term noise influences from machinery and vehicles. The noise environment is relatively constant.

On 18 May 2007, at approximately 3 am, an unknown short-term noise event resulted in atypically elevated noise levels in the Wellington area, as detailed by a distinct peak in the noise logger graphs (see Appendix B in Technical Paper No. 3). This event resulted in an elevated night-time period assessment baseline level for the 18 May 2007, but did not adversely influence the period rating background level.

Attended noise monitoring

Attended daytime and night-time noise monitoring results are presented in Table 3-6. Meteorological conditions during the attended noise monitoring program were observed to be satisfactory for noise monitoring purposes.

Table 3-6 Attended noise monitoring (daytime)

Location	Time/ date	L_{A1}	L_{A10}	L_{Aeq}	L_{A90}	Comments
1. Mount Nanima	8.12 am 11/05/07	47	36	38	26	fauna, sheep and birds 29-32 fauna peak noise 62 branch movement 29 steady state 26-27
2. Cadonia subdivision	9.05 am 11/05/07	44	36	35	34	local residential activity 29-30 sprinkler system 27 car pass-by 36-38 distant traffic pass-by 28-30 steady state 25-26
3. Keston Rose Garden Cafe	10.17 am 11/05/07	49	48	42	34	distant traffic 29-33 aircraft pass by 36-48 steady state 34-35
4. Nanima House	11.05 am 11/05/07	51	46	43	35	trees rustling 46-48 fauna peak 56 distant road traffic 39-40 steady state 35-36

Notes: Values expressed as dB(A) and rounded to nearest 0.5 dB(A); L_{Aeq} = equivalent noise level (average); L_{A90} = noise level 90% of time (background); L_{A10} = noise level 10% of the time.

The attended monitoring demonstrated that the existing noise environments were influenced by local and distant road traffic, residential activity and fauna. Steady state measurements were made in the presence of minimal extraneous noise sources.

No existing industrial noise influence was measured at any of the measurement locations.

3.5.2 Gas pipeline route

The nearest receptors to the proposed compressor station are Mountain View, Alectown and Property A (see Figure 3-5).

The existing noise environment surrounding the proposed gas pipeline route is relatively quiet due to the rural nature of the region and the lack of noise generating infrastructure. There is sufficient noise buffering distance between residences and the proposed gas pipeline route.

3.6 Biodiversity

3.6.1 Landscape context

The proposed power station site and gas pipeline route lie at the northern limit of the NSW South-western Slopes bioregion (Thackway and Cresswell 1995). This bioregion consists of foothills and ranges from the western fall of the Great Dividing Range to the edge of the Riverina bioregion. Major land uses in the region include grazing of native and modified pastures, native and plantation forestry and national parks (NSW Scientific Committee 2004).

The proposed power station site and gas pipeline route are situated predominantly within country used for grazing or cropping, and as such, are largely cleared of native vegetation. Vegetation in these areas is dominated by small, fragmented patches of mixed Box Gum Woodland. River Red Gum (*Eucalyptus camaldulensis*) Woodland dominates along the major drainage lines crossed by the proposed pipeline.

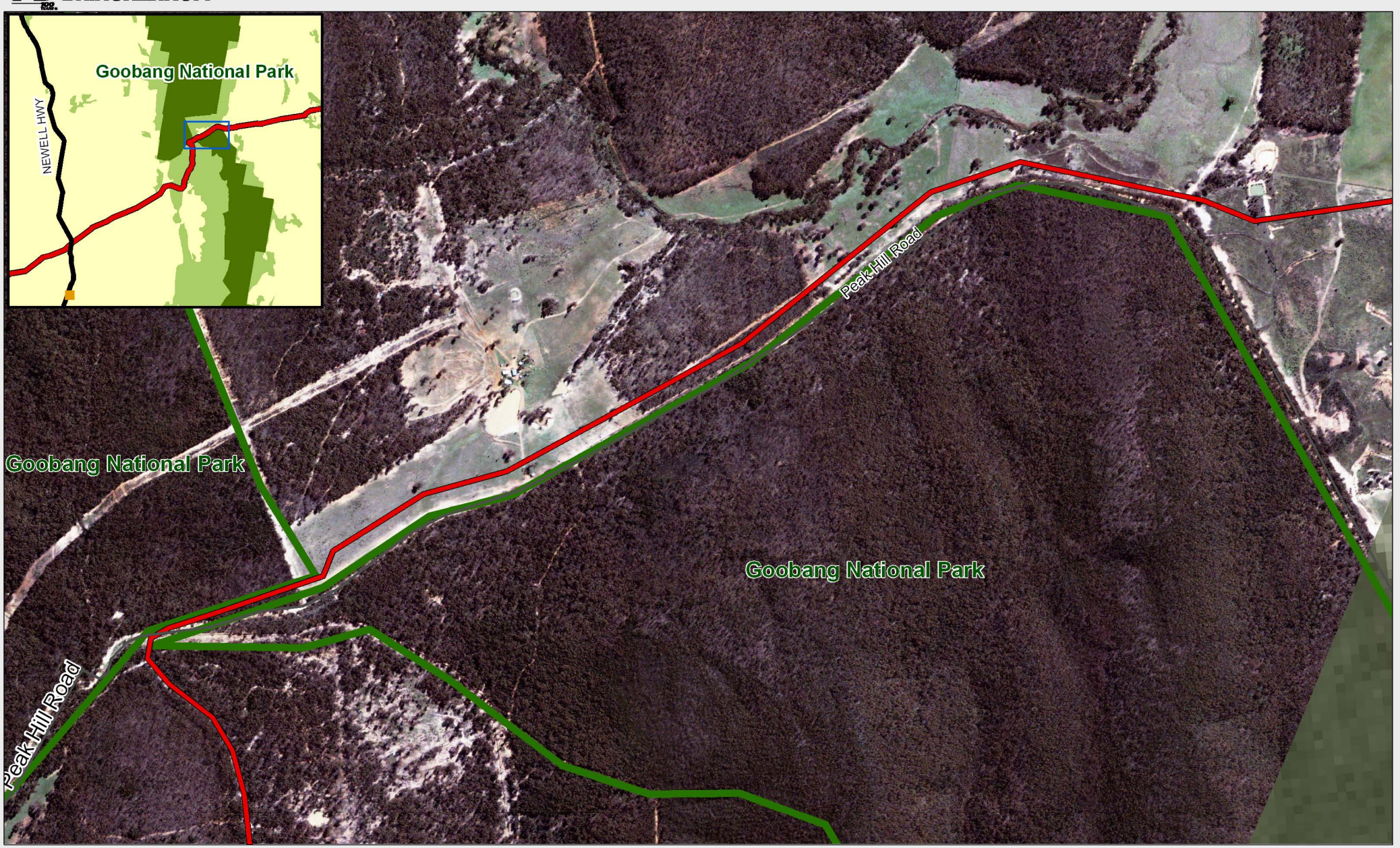
The proposed pipeline route also passes close to Goobang National Park (see Figure 3-6). Gazetted in 1995, the park is dominated by rocky ranges and slopes of Hervey Range, and is one of the largest remaining areas of natural vegetation in the central west of NSW. Vegetation in the park is dominated by various Box Ironbark Woodland communities (Porteners 1997). Many of the plant species found in the park are regarded as regionally significant because they occur at the limit of their known range.

A biodiversity survey and assessment were completed to describe the biodiversity at the proposed power station site and along the proposed gas pipeline route. The biodiversity assessment is provided in full in Technical Paper No. 1 – *Biodiversity Assessment*. This section describes the biodiversity of the area; Section 9.5 assesses the potential impacts of the project on this biodiversity.

3.6.2 Power station site

The proposed power station site is located in country that is used for grazing of modified pastures. The vegetation within the site has been modified by grazing, weed intrusion, pasture improvement (introduction of non-endemic grasses for domestic livestock, nitrogen-fixing legumes and/or fertilising) and associated land clearing. The remaining vegetation on the site is dominated by scattered paddock trees including White Box (*E. albens*) and Yellow Box (*E. melliodora*), with groundcover dominated by exotic species including Barley Grass (*Hordeum leporinum*), several species of Brome grass (*Bromus* species) and Paterson's Curse (*Echium plantagineum*). The native plant diversity at the site is low, with no threatened species of plant identified or considered likely to occur.

Approximately 20 paddock trees scattered within a 4.2-hectare area occur within the proposed power station construction footprint.



Proposed pipeline route
Goobang National Park
Major roads
Minor roads
Major drainage
Water body
Rail line

Figure 3-6 Gas pipeline route in the vicinity of Goobang National Park

0 250 500 Metres

The scattered White Box and Yellow Box paddock trees indicate that the original native vegetation community would have been White Box, Yellow Box, Blakely's Red Gum Woodland (Box Gum Woodland), which is an endangered ecological community (EEC) listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act). The definition of the Box Gum Woodland EEC varies under each Act; however, both Acts define the community based on the condition of the patch, in particular the dominance and diversity of native species in the understorey. Due to the low native diversity, overall dominance of weeds and low likelihood for natural regeneration, the woodland at the proposed power station site is not considered to form part of either listed EEC.

Despite the modified condition of native vegetation at the proposed power station site, the scattered paddock trees are important fauna resources in a fragmented landscape, providing stepping stones for the movement of species between large fragments of habitat (Bennett 1990; Wilson and Lindenmayer 1995). Some mature paddock trees also provide hollows that are important roosting and nesting resources for a range of native fauna including bats, possums and birds. No threatened species of animal were recorded at the proposed power station site; however, the site is likely to provide habitat for the following species:

- Brown Treecreeper (*Climacteris picumnus*)
- Grey-crowned Babbler (*Pomatostomus temporalis*)
- Regent Honeyeater (*Xanthomyza Phrygia*)
- Glossy Black-cockatoo (*Calyptorhynchus lathami*)
- Turquoise Parrot (*Neophema pulchella*)
- Superb Parrot (*Polytelis swainsonii*)
- Grey Falcon (*Falco hypoleucos*)
- threatened species of microbat.

3.6.3 Gas pipeline route

The proposed gas pipeline route (approximately 100 kilometres in length) traverses six vegetation communities and associated fauna habitat types across two broad landform types, which are identified in Table 3-7 and shown in Figure 3-7.

Table 3-7 Vegetation communities identified along the gas pipeline route

Landform/vegetation community	Extent within footprint (ha)[1]	Extent within 1 km of footprint (ha)[1]	Percent clearing within 1 km^2 of footprint
Low ranges, hills and plains			
White Box, Yellow Box, Blakely's Red Gum Woodland (Box Gum Woodland)	3.3	949.3	<1%
Fuzzy Box Woodland	0.5	49.2	1%
River Red Gum Woodland	3.1	283.0	1%
Scattered paddock trees including some areas of former Box Gum Woodland	14.0	1023.6	1%
Other vegetation (plantings)	0.0	9.0	0%

Landform/vegetation community	Extent within footprint (ha)[1]	Extent within 1 km of footprint (ha)[1]	Percent clearing within 1 km[2] of footprint
Rocky ranges and slopes			
Ironbark, Black Cypress Pine Open Forest	7.7	1220.4	1%
Tumbledown Red Gum, Dwyer's Red Gum Woodland	6.4	470.1	1%
Red Ironbark, Red Stringybark Woodland	2.3	46.2	5%
Total vegetation	**37.2**	**4050.9**	**1%**

Notes: 1. ha = hectares; 2. km = kilometres

Box Gum and Fuzzy Box Woodlands

The low ranges, rounded hills and alluvial plains of the area correspond with areas of fertile soils used for grazing and dry land agriculture (cropping) and are extensively cleared of native vegetation. Within the cleared areas, scattered paddock trees of numerous Box Gum species indicate that the former vegetation communities would have been dominated by Box Gum and Fuzzy Box Woodlands. The understorey associated with these paddock trees is highly modified by routine cropping, grazing, weed intrusion and/or pasture improvement, and little or no recruitment of new canopy trees was observed. As such, scattered paddock trees do not form part of the native vegetation communities.

White Box, Yellow Box, Blakely's Red Gum Woodland (Box Gum Woodland) is a grassy woodland or open woodland in which the canopy is dominated by one or more of the following species: White Box, Yellow Box and/or Blakely's Red Gum. Other eucalypt species may also be locally co-dominant. Box Gum Woodland occurs in the tablelands and western slopes on a range of moderate to highly fertile soils of NSW from Queensland to the Victorian border (Lindenmayer and Fischer 2006). It is a listed EEC under the TSC Act and a critically endangered ecological community (CEEC) under the EPBC Act (dependent on criteria).

Fuzzy Box Woodland is a community dominated by Fuzzy Box (*E. conica*) in association with Western Grey Box, Yellow Box and other eucalypt species. Fuzzy Box Woodland on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains bioregions is a listed EEC under the TSC Act. This community occurs mainly in the Dubbo-Narromine-Parkes-Forbes area (Gibbons and Lindenmayer 2002). However, Fuzzy Box is more widely distributed than the listed EEC and may occur in association with other eucalypt species to form other communities. Fuzzy Box Woodland may also be consistent with the national listing of Box Gum Woodland in cases where Yellow Box is one of the dominant canopy species, as occurs along the proposed gas pipeline route.

Patches of Box Gum and Fuzzy Box Woodlands along the proposed gas pipeline route were assessed on a patch-by-patch basis. Patches considered to form part of the native vegetation communities occurred in linear patches adjacent to roads and several isolated patches in paddocks (see Figure 3-8). The condition of all patches of Box Gum and Fuzzy Box Woodland was modified by fragmentation, edge effects and weed intrusion. However, the patches considered to comprise ecological communities had moderate to high diversity of native species, and recruitment of canopy species was observed.

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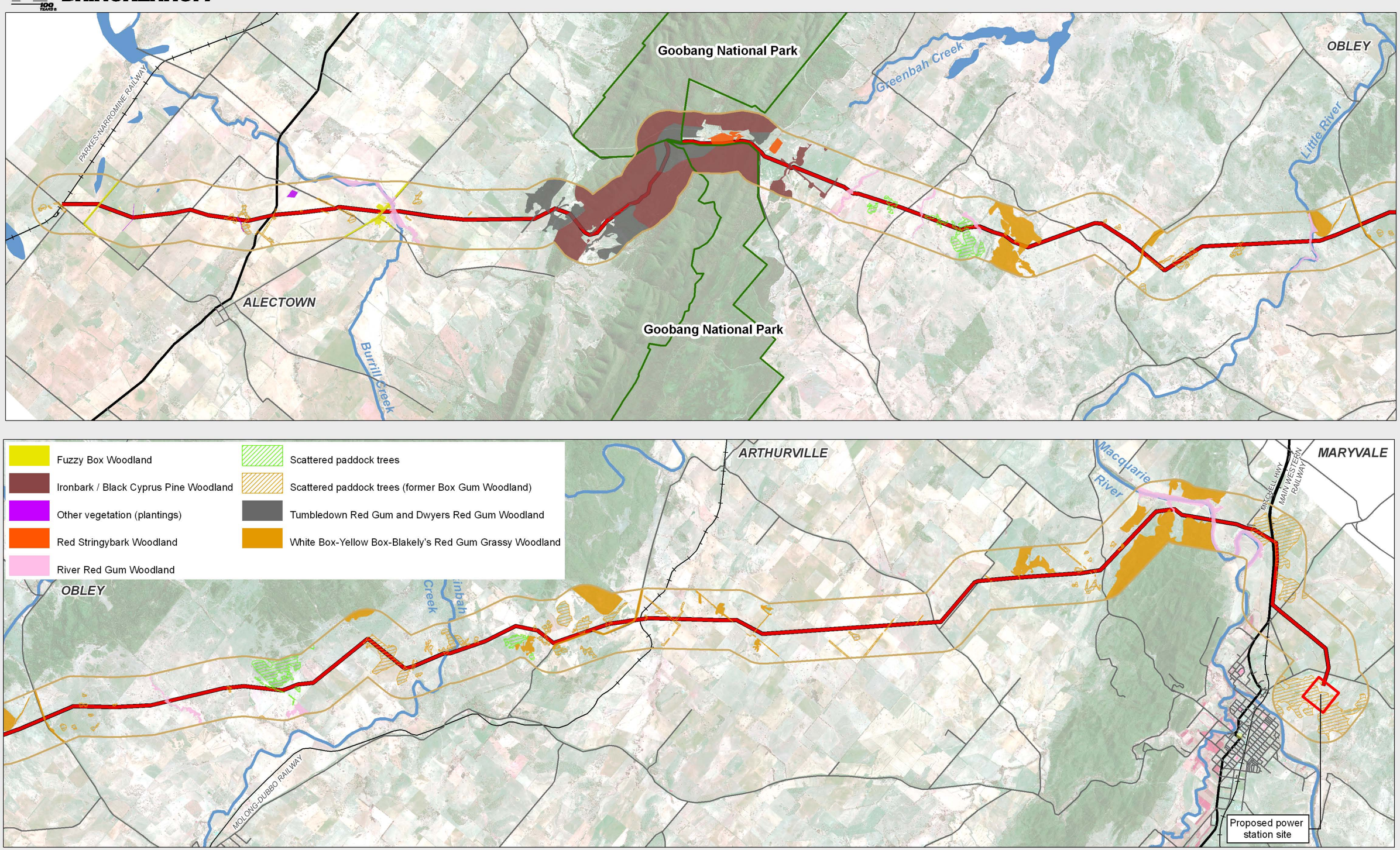

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Figure 3-7 Vegetation communities in the study area

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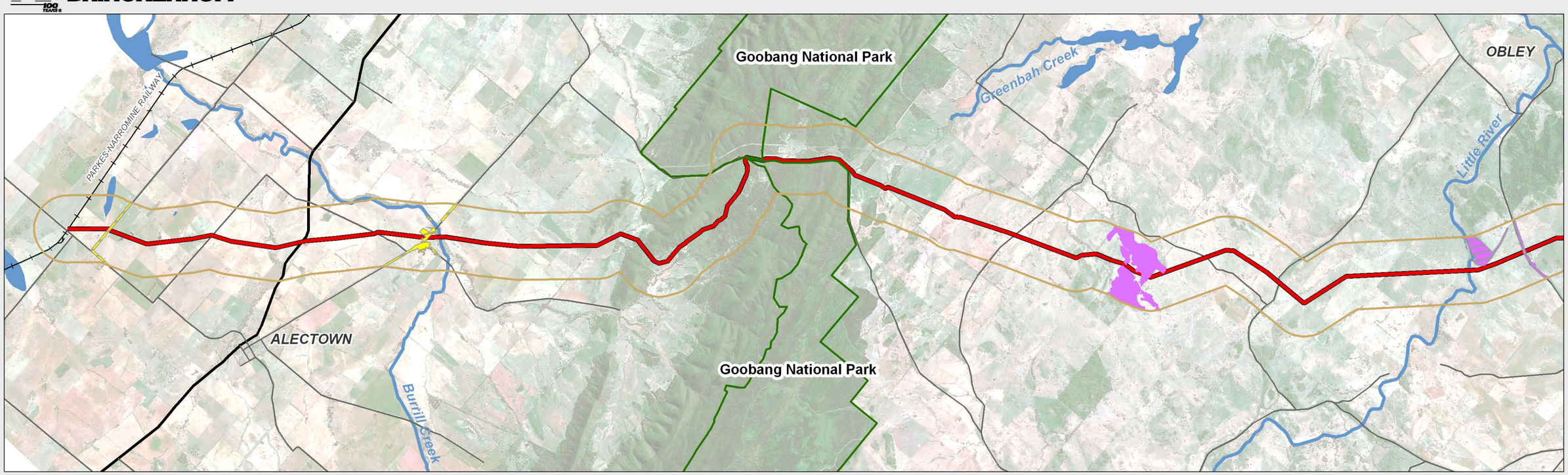


Proposed pipeline route
Proposed power station site
Study area
Major roads
Minor roads
Rail line
Major drainage
Water body
National parks

EPBC Act Endangered ecological communities
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

TSC Act Endangered ecological communities
Fuzzy Box Woodland
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland

0 2.5 5 Kms

Figure 3-8 Endangered ecological communities in the study area

21167/20A_2139_Fig3_8_EEC.mxd GK, 14 April, 2008

No threatened species of plant were identified in the Box Gum and Fuzzy Box Woodlands. However, these vegetation communities may provide habitat for two threatened species of plant: *Swainsona recta* and *S. sericea*.

Although highly modified, the small patches of Box Gum and Fuzzy Box Woodlands and scattered paddock trees support a diverse assemblage of native fauna. Blossoms and seeds from the eucalypts provide food resources for numerous species of bird and may also support some arboreal mammals. Native and exotic grasses also provided abundant food resources for many bird species and macropods. Small woodland fragments and isolated paddock trees also provide stepping stones for the movement of animals across the landscape and tree hollows for roosting and nesting for a range of native fauna.

The Box Gum and Fuzzy Box Woodlands, and to a lesser extent the scattered paddock trees, are likely to provide habitat for numerous threatened species of animal including: Brown Treecreeper, Grey-crowned Babbler, Regent Honeyeater, Glossy Black-cockatoo, Turquoise Parrot, Superb Parrot, Grey Falcon, Greater Long-eared Bat (*Nyctophilus timoriensis*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) and Little Pied Bat (*Chalinolobus picatus*).

River Red Gum Woodland and aquatic habitats

River Red Gum Woodland generally comprises tall open woodland dominated by large River Red Gums (*E. camaldulensis*) in association with Rough Barked Apple (*Angophora floribunda*) and River Oak (*Casuarina cunninghamii*) at some sites. This community is not considered threatened in the NSW South-western Slopes bioregion.

River Red Gum Woodland occurs exclusively on alluvial soils along major drainage lines crossed by the pipeline including the Macquarie River, Buckinbah Creek and Little River (see Figure 3-7). These drainage lines also correspond with fertile soils used for grazing and cropping and have been cleared beyond the extent of the river channel. As a result of disturbances associated with grazing, cropping and edge effects, the understorey in the River Red Gum Woodland along the gas pipeline route is highly modified and dominated by exotic species. No threatened species of plant were identified in the River Red Gum Woodland, nor were any considered likely to occur based on the suitability of habitat.

Due to their association with drainage lines, River Red Gum Woodlands occur as long linear patches that provide important fauna habitat linkage across the otherwise cleared landscape. River Red Gums are large trees that provide a high abundance of tree hollows as well as important roosting and nesting sites for a range of native fauna, including arboreal mammals (e.g. koalas, possums and gliders known to occur in the area) and woodland birds.

The drainage lines along which River Red Gum Woodland occurs, as well as numerous farm dams and a smaller drainage line (not lined by River Red Gum Woodland), provide aquatic habitats that are essential for a large proportion of the terrestrial fauna and aquatic biota including fish. Four main drainage lines are intersected by the proposed gas pipeline route:

- Macquarie River — a large permanent river with dense River Red Gum Woodland and highly disturbed banks from livestock grazing. The river provides major fish habitat, including for the endangered Macquarie Trout Cod (*Maccullochella macquariensis*).
- Buckinbah Creek — a small, semi-permanent drainage line lacking riparian woodland. Dense patches of Common Reed (*Phragmites australis*) and other sedges and rushes occur in the channel. The creek provides moderate fish habitat.

- Little River — a small, permanent river lined by River Red Gum Woodland with a modified understorey and moderate fish habitat.
- Burrill Creek — an ephemeral drainage line with an incised channel lined by modified River Red Gum Woodland with a damp grasslands understorey. This is unlikely to provide fish habitat.

Aquatic habitats are important for water birds such as the Australian Wood Duck (*Chenonetta jubata*), Grey Teal (*Anas gracilis*), Black Swan (*Cygnus atratus*) and Pacific Black Duck (*Anas superciliosa*). Other species that occur in association with the aquatic habitats include the Eastern Long-necked Tortoise (*Chelodina longicollis*), Broad-palmed Frog (*Litoria latopalmata*), Peron's Tree Frog (*L. peroni*) and Giant Banjo Frog (*Limnodynastes interioris).*

Two threatened species of animal were recorded in association with River Red Gum Woodland and aquatic habitats associated with the Macquarie River: the Powerful Owl and Blue Billed Duck (see Figure 3-9). The River Red Gum Woodland and aquatic habitats are also likely to provide habitat for the following threatened species of animal: the Brown Treecreeper, Hooded Robin (*Melanodryas cucullata*), Black-chinned Honeyeater (*Melithreptus gularis*), Gilbert's Whistler (*Pachycephala inornata*), Grey-crowned Babbler, Speckled Warbler (*Pyrrholaemus sagittatus*), Diamond Firetail (*Stagonopleura guttata*), Glossy Black-cockatoo, Turquoise Parrot, Superb Parrot, Masked Owl (*Tyto novaehollandiae*), Barking Owl (*Ninox connivens*), Grey Falcon, Greater Long-eared Bat, Yellow-bellied Sheathtail Bat, Little Pied Bat, Squirrel Glider (*Petaurus norfolcensis*), Koala (*Phascolarctos cinereus*) and Trout Cod.

Forests and woodlands associated with rocky ranges and slopes

Rocky ranges and slopes occur in association with Herveys Range along the proposed gas pipeline route. This is also where the proposed route passes close to Goobang National Park and the largest patches of remnant native vegetation.

The rocky ranges and slopes correspond with areas of lower fertility soils that are less suitable for intensive grazing of livestock or cropping. As such, these areas have been subject to less land clearance than the surrounding low ranges, rounded hills and alluvial plains. However, woodlands along the rocky ranges and slopes have been disturbed by selective logging, pulse grazing and feral goats.

Three vegetation communities occurred in association with the rocky ranges and slopes (see Figure 3-7):

- Ironbark, Black Cypress Pine Open Forest was the dominant vegetation type on this landform. This community was dominated by Red Ironbark (*E. fibrosa*) and Mugga Ironbark (*E. sideroxylon*) in association with Black Cypress Pine (*Callitris endlicheri*) and other *Eucalyptus* species.
- Tumbledown Red Gum, Dwyer's Red Gum Woodland occurred at the south-western end of Herveys Range and comprises shrubby woodland dominated by Tumbledown Red Gum (*E. dealbata*) and Dwyer's Red Gum (*E. dwyeri*) and other *Eucalyptus* species.
- Red Ironbark, Red Stringybark Woodland occurred on the eastern side of Herveys Range and comprises shrubby woodland dominated by Red Stringybark (*E. macrorhyncha*) in association with Red Ironbark and other *Eucalyptus* species.

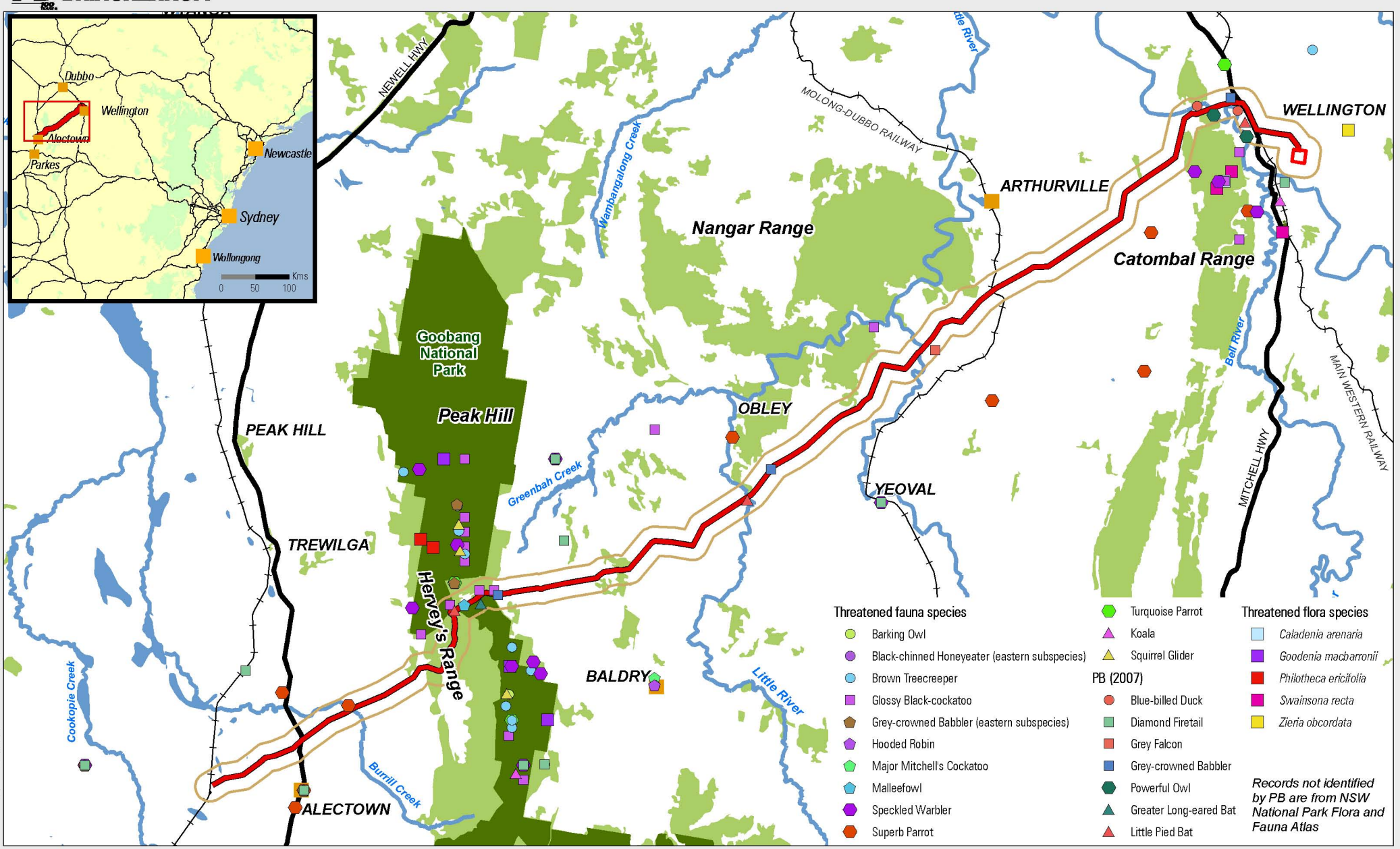


Figure 3-9 Observed locations of threatened species in the study area

None of the vegetation communities identified on the rocky ranges and slopes are considered threatened.

No threatened plant species were recorded in the vegetation communities along Herveys Range. One threatened plant species is considered likely to occur — *Tylophora linearis*. Suitable habitat was not identified along the proposed pipeline route for other threatened species of plant known to occur elsewhere in Goobang National Park.

The large area of forest and woodland associated with Herveys Range provides important fauna habitats that are likely to support species unable to survive in the fragmented landscapes on the low ranges, rounded hills and alluvial plains. This area of habitat is also likely to provide an important landscape-scale wildlife corridor.

Three threatened bird and microbat species were recorded in the forest and woodland associated with Herveys Range: the Hooded Robin, Speckled Warbler Diamond Firetail, Greater Long-eared Bat, Yellow-bellied Sheathtail Bat and Little Pied Bat. The forest and woodland associated with Herveys Range are also likely to provide habitat for the following threatened animal species: the Black-chinned Honeyeater, Gilbert's Whistler, Regent Honeyeater, Glossy Black-cockatoo, Turquoise Parrot, Superb Parrot, Bush-stone Curlew (*Burhinus grallarius*), Powerful Owl, Masked Owl, Barking Owl, Squirrel Glider and Koala.

Summary of state biodiversity issues of conservation significance

The biodiversity assessment identified two EECs (see Figure 3-8) and 12 threatened animal species (see Figure 3-9) of state conservation significance within the proposed power station site and/or along the proposed gas pipeline route; these are identified in Table 3-8. No threatened species of plant were recorded. In addition to the species identified during the current surveys, potential habitat was also identified for three threatened species of plant and 11 threatened species of animal of state conservation significance. No listed critical habitat occurs within the study area and none is likely to be affected by the proposal.

Table 3-8 Summary of state listed threatened biodiversity known or predicted in the study area

Name	Conservation significance[1]	Recorded[2]	Predicted habitat[2]
Threatened ecological communities			
White Box, Yellow Box, Blakely's Red Gum Woodland	E	P	
Fuzzy Box Woodland on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	E	P	
Threatened plants			
Tylophora linearis	E		P
Swainsona recta	E		P
Swainsona sericea	V		P
Threatened animals			
Birds			
Blue-billed Duck	V	P	
Brown Treecreeper	V	P	S
Hooded Robin	V	P	
Black-chinned Honeyeater	V		P
Gilbert's Whistler	V		P
Grey Crowned Babbler	V	P	S
Speckled Warbler	V	P	
Diamond Firetail	V	P	
Turquoise Parrot	V		P, S
Regent Honeyeater	E1		P
Superb Parrot	V	P	S
Bush-stone Curlew	E1		P
Glossy Black-cockatoo	V		P, S
Powerful Owl	V	P	
Masked Owl	V		P
Barking Owl	V		P
Grey Falcon	V	P	S
Mammals			
Greater Long-eared Bat	V	P	
Yellow-bellied Sheathtail Bat	V	P	
Little Pied Bat	V	P	
Squirrel Glider	V		P
Koala	V		P
Fish			
Trout Cod (*Maccullochella macquariensis*)	E		P

Notes: 1: State Conservation Significance: V= Vulnerable, E1 and E = Endangered (TSC Act and *Fisheries Management Act 1994*) ; 2: Recorded and predicted habitat: P = species recorded or predicted to occur along the gas pipeline, S = species recorded or predicted to occur at the power station site.

Summary of national biodiversity issues of conservation significance

The EPBC Act identifies seven matters of national environmental significance protected under the Act. Five of these matters relate to biodiversity:

- World Heritage properties
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas.

No World Heritage properties, Ramsar Wetlands or Commonwealth marine areas listed under the EPBC Act were identified through application of the EPBC Protected Matters Search Tool at the proposed power station site, along the proposed gas pipeline route, or in the surrounding area.

One CEEC (see Figure 3-8) and two animal species (see Figure 3-9) of national conservation significance were recorded within the proposed power station site and/or along the proposed gas pipeline route; these are identified in Table 3-9. No threatened species of plant were recorded. In addition to the species identified during the current surveys, potential habitat was also identified for two threatened species of plant and two threatened species of animal listed under the EPBC Act. No listed critical habitat occurs within the study area and none is likely to be affected by the proposal.

Table 3-9 Summary of nationally listed threatened biodiversity known and predicted in the study area

Name	Conservation significance[1]	Recorded[2]	Predicted habitat[2]
Threatened ecological communities			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	P	
Threatened plants			
Tylophora linearis	E		P
Swainsona recta	E		P
Threatened animals			
Birds			
Regent Honeyeater	EM		P, S
Superb Parrot	V	P	S
Mammals			
Greater Long-eared Bat	V	P	S
Fish			
Trout Cod (*Maccullochella macquariensis*)	E		P

Notes: 1: National conservation significance: V = Vulnerable, E = Endangered, M = Migratory, CE = Critically Endangered (EPBC Act); 2: Recorded and predicted habitat: P = species recorded or predicted to occur along the gas pipeline. S = species recorded or predicted to occur at the proposed power station site.

In addition to the threatened ecological communities and species identified above, 19 species of bird recorded within the study area are recognised under the migratory provisions of the EPBC Act. A further eight migratory bird species are predicted to occur in the area that were not recorded during surveys for the biodiversity assessment. While migratory birds may occur in the area, the site is not classed as an 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (Department of the Environment and Heritage 2006) and potential impacts to these species are not considered to have potentially significant.

3.7 Hydrology and water quality

3.7.1 Regional hydrology

The Macquarie River and its tributaries form the main drainage system over the wider Dubbo region. The Macquarie River flows north-west from Euchareena to Dubbo in the central-southern part of the region. The main tributaries are the Talbragar River in the north, the Cudgegong River in the east, and the Bell and Little Rivers in the south. The Macquarie River catchment is large and supports a wide agricultural community as well as a number of tributaries and the Macquarie Marshes.

3.7.2 Power station site

The proposed power station site is located within the Macquarie River Catchment, approximately 32 kilometres downstream from Burrendong Dam. Land use within the catchment is predominantly rural, supporting sheep and cattle grazing and dryland farming.

The site is located within the upper reaches of an unnamed tributary, which flows south for approximately 2 kilometres before joining the Macquarie River just upstream from the town of Wellington (see Figure 3-10). The site has an elevation of approximately 330 metres AHD and a slope of approximately 2%.

The proposed power station site is not affected by flooding from the Macquarie River. Wellington Council flood mapping indicates that the site is located approximately 1 kilometre from the extent of the Macquarie River floodplain during the 0.5% annual exceedance probability (AEP) event, which is the flood event that Wellington Council uses for planning purposes (*pers comm.* John Clague, Acting Manager Planning Services, Wellington Shire 24 December 2007).

Average rainfall and evaporation data in Wellington (Station 065035) is presented in Figure 3-11. Rainfall records have been maintained at this station for the period from 1946 to 2005 and evaporation records for the period from 1965 to 2005. Rainfall and evaporation rates are comparable during winter months; however, during summer periods, evaporation significantly exceeds rainfall.

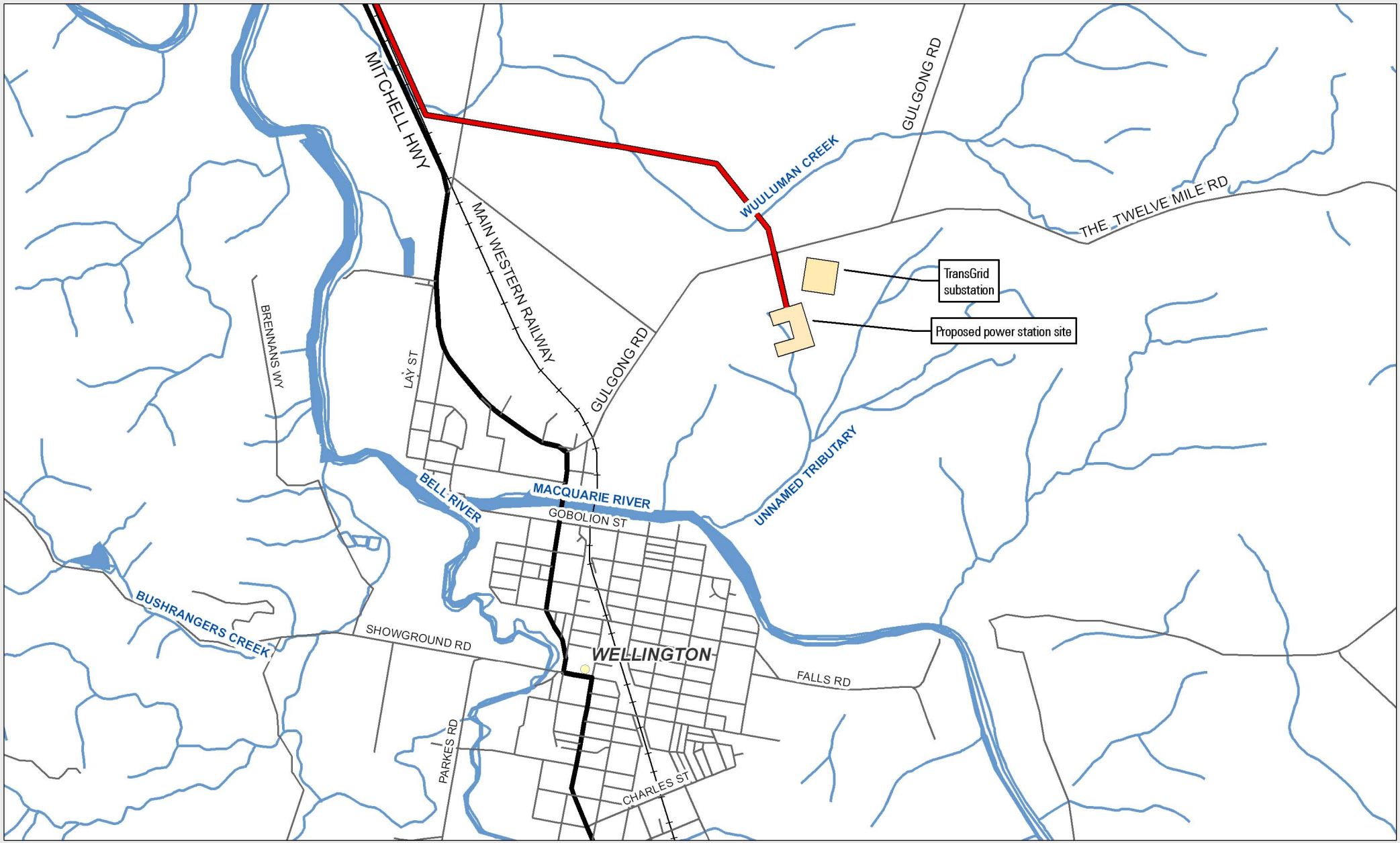
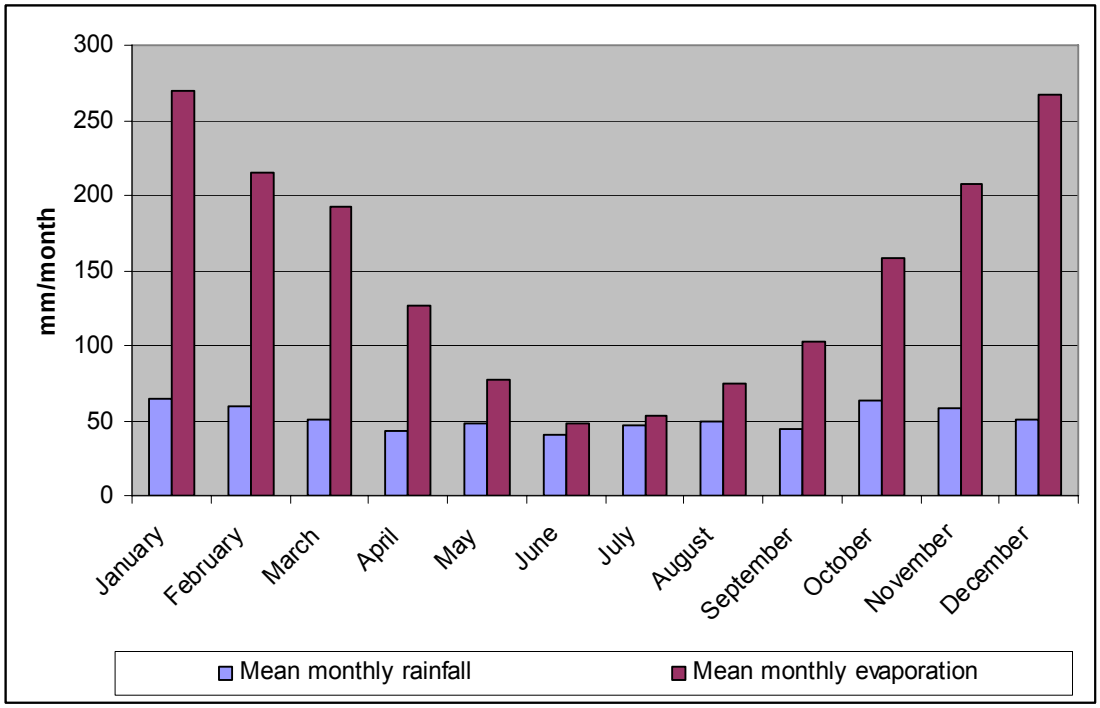


Figure 3-10 Hydrology in the vicinity of the power station



Source: Wellington Station 065053

Notes: mm = millimetres; Rainfall data: 1946–2005; Evaporation data: 1965–2005.

Figure 3-11 Average rainfall and evaporation in Wellington

3.7.3 Gas pipeline route

The proposed pipeline route crosses numerous watercourses within the Macquarie River and Bogan River catchments (see Figure 3-12). In addition to numerous smaller unnamed tributaries within the Macquarie River Catchment, the proposed pipeline route crosses the following rivers and creeks:

- Macquarie River
- Wuuluman Creek
- Barneys Creek
- Gundy Creek
- Buckinbah Creek
- Little River
- Redbank Creek
- Cookamobil Creek
- Budgebegambil Creek.

In addition to numerous smaller unnamed tributaries within the Bogan River catchment, the proposed route crosses the following creeks:

- Burrill Creek
- Burrandong Creek.

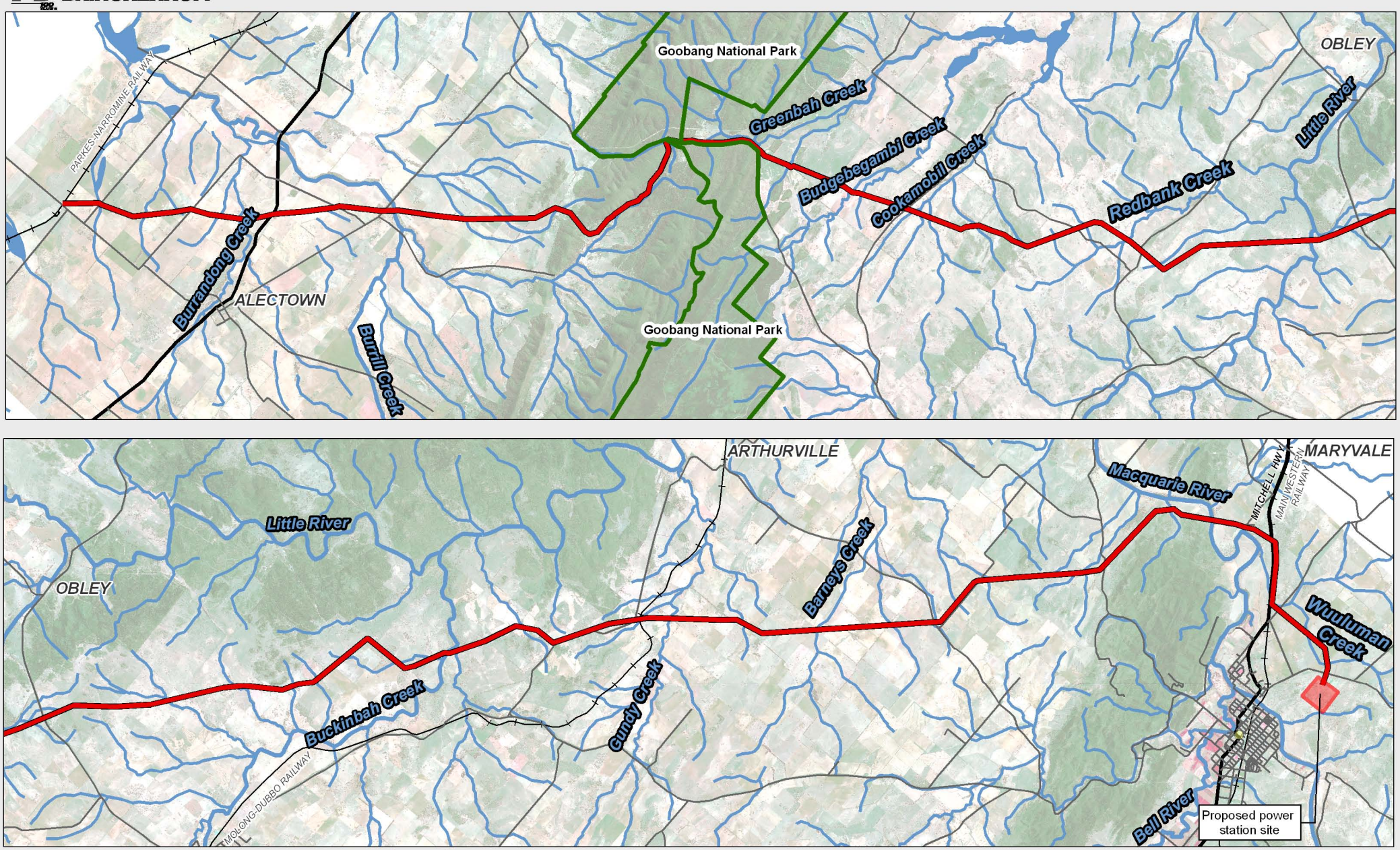


Figure 3-12 Hydrology in the vicinity of the pipeline route

3.8 Aboriginal heritage

A detailed Aboriginal heritage assessment was undertaken to evaluate the potential impacts of the project on the area's Aboriginal heritage. This full assessment is provided in Technical Paper No. 2 – *Heritage Assessment.* This section describes the nature of the known Aboriginal heritage of the study area, based upon a review of relevant archaeological reports and publications, and a search and review of previously recorded sites in the DECC's Aboriginal Heritage Information Management System (AHIMS) database. Section 9.6 assesses the potential impacts of the project on this Aboriginal heritage.

3.8.1 Regional context

The Wellington area is situated within Wiradjuri territory (Tindale 1974). Wiradjuri may describe both the people living within the territory and the language spoken, although there would have been a number of different dialects. Wiradjuri is the largest Aboriginal language group in NSW, and means 'people of the three rivers', being the Macquarie, Lachlan and Murrumbidgee Rivers (NSW National Parks and Wildlife Service 2003).

These people would have been divided into small groups of varying sizes. The nuclear family was the smallest, comprising the immediate kin who shared a landscape. A number of these smaller groups of up to 20 individuals would have formed a band of 80–150 individuals who utilised a large area in which to roam and search for food, or to meet ceremonial or social obligations. Evidence from early settlers indicates the territory of these bands had a radius of up to 65 kilometres (Barber 1996; Pearson 1981).

Post-European contact Aboriginal archaeological evidence in the area is represented most frequently in reuse of European materials, such as glass, for flaking; and in scarred and carved trees which, due to typical species lifespan, are not likely to predate this period (Le Maistre 1993). These types of contact sites have been identified on land between Wellington and Wallerawang, and are in themselves significant (Cubis 1982).

Aboriginal occupation of the region to the south of Hill End has been found to extend over 7,000 years; however, an excavated granite rock shelter site displayed no formal tool types within the deposit. Meanwhile, a Botobolar rock shelter site north-east of Mudgee displays a scraper-dominated pre-Bondaian (<5,000 years ago) tool industry, with the most recent level dated to 5590 ± 90 B.P. The upper excavation levels revealed a Bondaian (>5,000 years ago) industry characterised by types of retouched flakes known as backed artefacts, and a more diverse tool range with a date of 1170 ± 60 B.P. The contrast between these two sites shows that Botobolar was an occupation or habitation site, whereas the Granites site was probably only used as a shelter site during tool manufacture (Pearson 1981).

These investigations were extremely significant as they not only provide evidence for the antiquity of Aboriginal occupation in the Macquarie River valley, but also proposed a model of Aboriginal open campsite location. This model proposed that open sites would be located on level, well-drained ground close to water, with a sunny aspect, protection from prevailing winds and adequate fuel.

3.8.2 Local context

Ethnographic accounts indicate that the population of the Upper Macquarie was probably divided into three local groupings or clans, which occupied land in the general areas of Wellington, Mudgee-Rylestone, and Bathurst. These clans may have coincided with three Wiradjuri linguistic dialects recorded in the early 19th Century (Günther 183[?]). Pearson (1981) estimated that the extent of clan territories approximated a 40–48 kilometre radius, although such estimates are known to be tenuous and vary widely.

Local movements of people were associated with several purposes: hunting and gathering, social occasions and ceremonial gatherings. James Günther, a missionary at the Wellington Wiradjuri Mission from 1837–1843, noted that the number of Wiradjuri camped near the Mission fluctuated periodically between none to over 80 individuals. This was influenced by war or ceremonial demands, such as men's initiation ceremonies or burbungs, when men would leave camp for nearby ceremonial grounds (Günther 183[?], Pearson 1981).

Prior to European contact, riverine environments were fundamental for Wiradjuri diet and subsistence needs. Riverine environments, like those of the Macquarie and Bell Rivers and their tributaries, were exploited seasonally for an abundant variety of natural resources.

Gigmalarie Creek on the Macquarie River, approximately 14 kilometres south-east of Wellington, is a localised example of an extensive campsite that the Wiradjuri returned to periodically over time. The extensive use of the site is evident in the accumulation of stone artefacts, which have formed a scatter stretching in a 50-metre wide band 3 kilometres along the riverbank (Pearson 1981). Therefore, it is likely that open campsites and artefact scatters are situated in proximity to waterways (<500 metres), as these environments were the most abundant and resource-rich zones. Sites in these environments are also the most likely to survive given the impact of farming practices on the grasslands and plains (Pearson 1981).

To test this in the context of the project, a search of the AHIMS database, together with a review of previous Aboriginal heritage studies conducted in the Wellington-Alectown area, indicated that sites in the district were commonly located within walking distance of water sources or associated with stands of mature native trees, reflecting known consistencies in site location on a much broader geographic scale.

3.8.3 Known Aboriginal heritage

The DECC AHIMS includes a database and recorded site cards for all Aboriginal sites, items, places and other heritage objects that have been reported to the DECC. This database is not a comprehensive listing of all Aboriginal sites, items or places in NSW.

A search of the AHIMS database identified 25 previously recorded Aboriginal sites within a 10 kilometre buffer of the proposed power station site and pipeline route (including the compressor station), the results of which are summarised in Table 3-10, and presented in Figures 3-13 and 3-14.

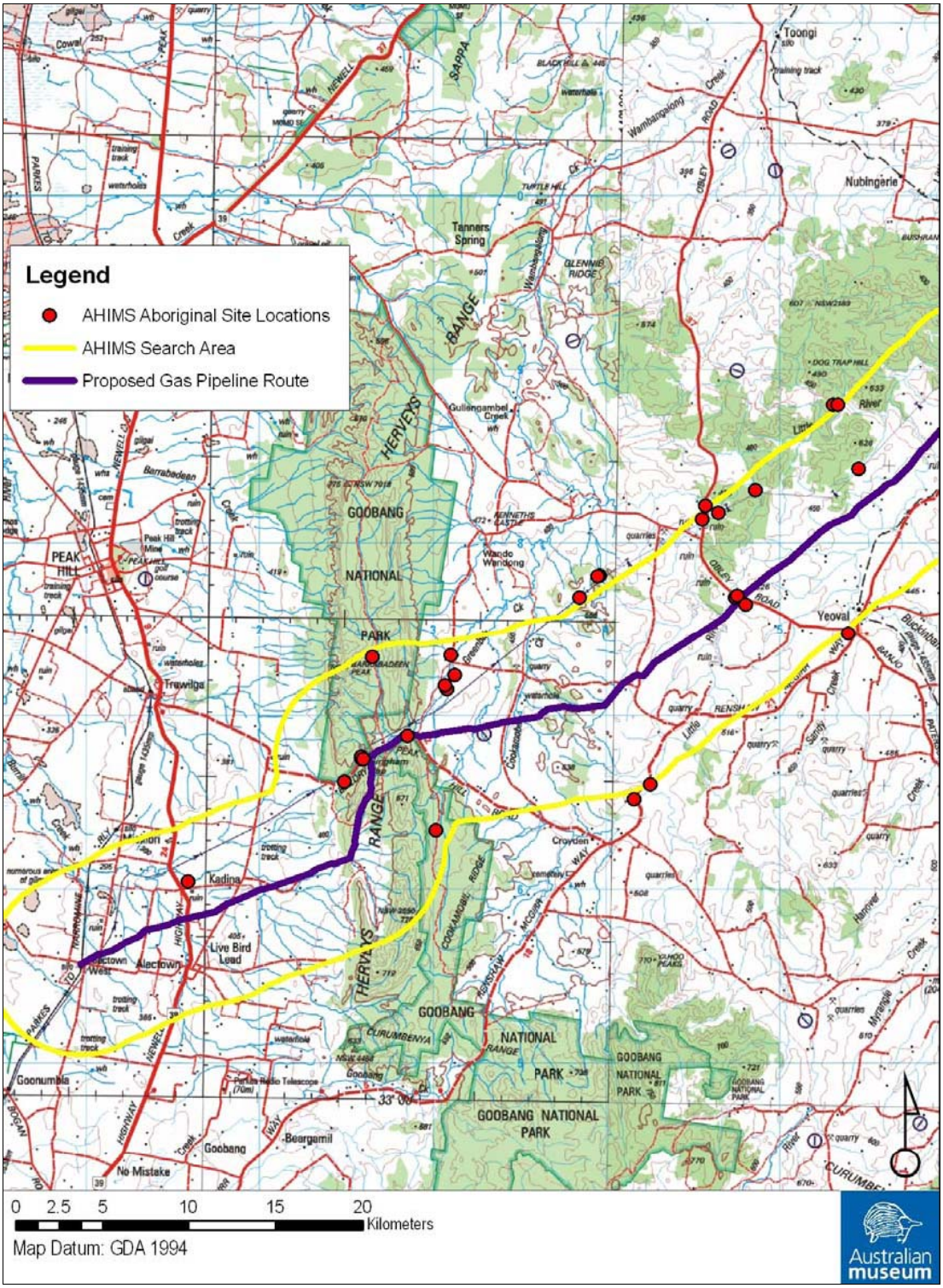
Table 3-10 Aboriginal sites previously recorded near the study area

Site type	Number present	Percentage (%)
Artefact scatter	13	52
Scarred tree	6	24
Burial mound, carved tree	2	8
Bora ground	1	4
Grinding grooves	1	4
Stone arrangement	1	4
Stone cairns	1	4
Total	**25**	**100**

Source: Technical Paper No. 2

The search indicated that there were no Aboriginal sites, objects, places or other heritage values registered within the study area (being the 200 metre corridor around the proposed power station and pipeline route). Analysis of the distribution of these sites indicated the following:

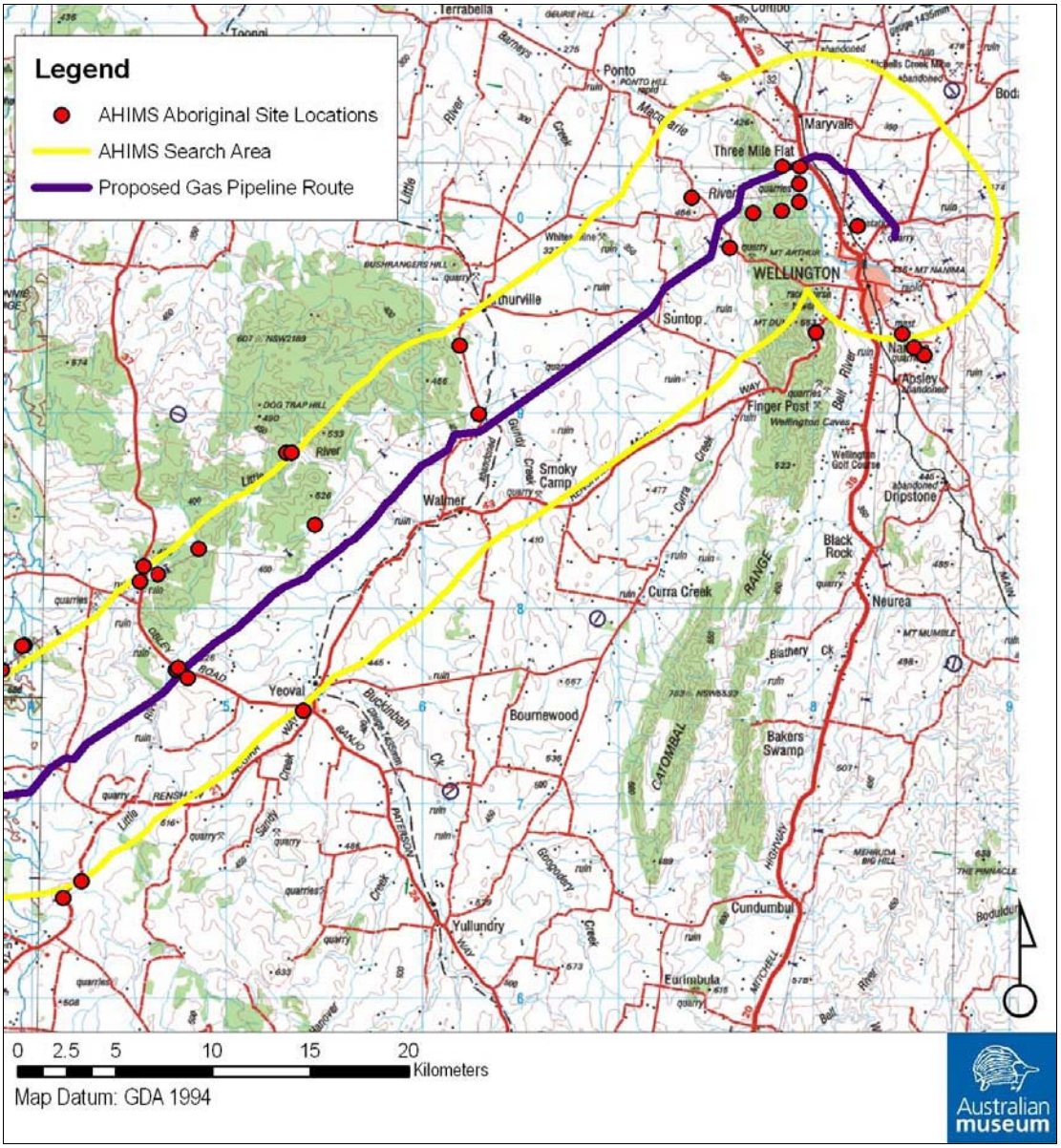
- Artefact scatters form the majority of Aboriginal heritage sites present in the local area.
- Scarred trees are the second most common site type present in the local area, with six previously recorded.
- Geologically associated site types, such as quarries and rock engravings, are unlikely to be found within the study area due to the lack of exposed suitable geological deposits.



Source: Technical Paper No. 2

Note: Due to the scale of this map, sites that appear to be close to the proposed gas pipeline route are, in fact, no closer than 1kilometre from the study area, and no previously recorded Aboriginal heritage sites were within the surveyed pipeline route and buffer area.

Figure 3-13 Aboriginal sites within 10 kilometres — western section



Source: Technical Paper No. 2

Note: Due to the scale of this map, sites that appear to be close to the proposed gas pipeline route are, in fact, no closer than 1kilometre from the study area, and no previously recorded Aboriginal heritage sites were within the surveyed pipeline route and buffer area.

Figure 3-14 Aboriginal sites within 10 kilometres — eastern section

3.9 Historic heritage

A detailed historic heritage assessment was undertaken to evaluate the potential impacts of the project on the area's historic heritage. This full assessment is provided in Technical Paper No. 2 – *Heritage Assessment.* This section describes the nature of the known historic heritage of the study area. Section 10.2 assesses the potential impacts of the project on this historic heritage.

3.9.1 Early history

The first European to enter the Wellington Valley was Surveyor-General John Oxley in 1817, who was returning from an expedition along the Lachlan River. Oxley sighted and named Herveys Range, later to become Goobang National Park (see Section 3.6).

Population growth on the nearby Bathurst Plains during the 1820s, and the ensuing demand for new grazing lands, drove pastoral expansion into outlying regions. Large grazing properties were established throughout the Central Tablelands as cattle stations, with many changing to sheep stock by 1828. Wellington, however, remained largely cattle country into the 1830s. The Wellington Valley was truly frontier territory, however, and remained as such until at least the 1840s (Griffin NRM 2004).

The primary records concerning early settlement of the Parkes district are the diaries of Surveyor-General Major Thomas Mitchell, who visited the area in 1835. He discovered a cattle station near the Goobang Creek, the first recorded white settlement in the area. However, wandering pastoralists were probably moving through the area prior to this (NPWS 2001).

Pastoral settlement led to the overtaking of the traditional lands and lifestyles of the Wiradjuri people.

Early settlement patterns

The early settlement patterns of the region are summarised in Table 3-11.

Table 3-11 Early settlement patterns

Year	Event
Convict settlement	
1819	Roaming pastoralists took advantage of the good grazing land in Wellington Valley.
1823	Convict stock station established – the 1st official European settlement between Wellington and Parkes.
1830	Convict stock station closed.
The Wiradjuri Mission	
1830s	Wiradjuri Mission operated as a source for consumables valued by the Wiradjuri.
1845	Wiradjuri Mission was abandoned.
Pastoralism	
1835	Pastoral stations established to north, east and west of Hervey Range. Wandering pastoralists and squatters moved into the area surrounding the present town of Parkes.
1848	Over 80 stations listed within the boundaries of the Wellington Pastoral District.
Gold	
1850s	Gold miners settle across the Central Tableland. Mining continued up to the First World War and through to the present day.
1856	Gold discovered in Bathurst. Wellington and Montefiores were deserted.
1862	Gold first discovered near Parkes.
1880s and 1890s	Gold rushes in the Tomingley and Peak Hill districts.

Year	Event
Development of urban centres and townships	
1830s and 1840s	Surveyors laid out plans for projected villages throughout the Central Tableland.
1846	Government granted approval to begin a new township on land previously occupied by the convict stock station and the Wiradjuri mission. Town of Wellington developed.
1858	Montefiores partially demolished. Some houses relocated to Wellington.
1906	All suitable land in Wellington County taken up.
Turn of 20th Century	Growth of Wellington reached a hiatus.
Later developments	
1897	Hervey Range reserved as State Forest.
1995	Hervey Range designated as Goobang National Park.

Early homesteads

The development of agriculture and pastoralism saw an increase in the number of homesteads in the region. Known homesteads in the vicinity of the project include:

- Goonoo Goonoo (formerly Ganoo)
- Keston (also known as Bella Vista)
- Nanima.

3.9.2 Known historic heritage

The *Heritage Act 1977* provides protection for significant heritage items, sites and places in NSW of non-Aboriginal origin through the State Heritage Register. The study area has not been listed on the register and is not the subject of an Interim Heritage Order.

The Register of the National Estate (RNE) was originally established under the *Australian Heritage Commission Act 1975*. In 2004 a new national heritage system was established under the EPBC Act and, as a result, a significant level of overlap occurs between the RNE and heritage lists at the national, state and territory, and local government areas. To address the situation, the RNE has been frozen since February 2007.

Within the vicinity of the project, Nanima House is registered on the RNE and The Lion of Waterloo Hotel (the oldest standing licensed hotel west of the Blue Mountains) is included as an indicative place.

3.10 Landscape and visual environment

3.10.1 Power station site

Visual character of the site and surrounds

The visual character of the proposed power station site is one of picturesque rolling slopes and hills, which collectively form gentle folds in the landscape. Beyond this immediate landscape are more dramatic landforms and ranges, which heighten the visual quality of the area.

The landscape is scattered with mature remnant Eucalyptus trees that create informal patterns across the landscape with an absence of straight or contrived lines. Therefore, the area surrounding the proposed power station site has a high visual quality, whereby quality increases with the greater variation in landform, topography and mature vegetation.

The proposed power station site itself is part of a broader valley, between Mount Nanima to the east and the Catombal Ranges to the west. The functional character of the site and its context is agricultural, with paddocks featuring both cropping and grazing. It also includes the presence of several houses, which is consistent for an area in proximity to a town.

Within this otherwise picturesque landscape there are several built features that detract from the visual character of the area, which can be viewed from various points nearby and more remotely from the proposed power station site. These include:

- the existing 330/132 kilovolt (kV) Wellington substation immediately north of the site
- the council-owned quarry located along Gulgong Road just north of the site
- numerous heavy-gauge power line structures running towards the site
- a new jail that appears in the landscape as a broad and expansive grey-roofed building
- an abandoned red-brick building that was a proposed abattoir.

Other recent developments include the newer rural residential subdivision of Cadia Place and Cadonia Drive, which feature 15 urban residential sized blocks. A further 42 x 1 hectare lots have been approved at One Tree Hill, to the north of Gulgong Road. These have yet to be developed.

There are no known special landscape values of the site itself and Aboriginal heritage surveys have confirmed that the site contains no items/sites of Aboriginal significance (see Section 9.6).

Mount Nanima (436 metres AHD) is recognisable from a distance and acts as a marker in the landscape from within the town of Wellington. It is a distinct geographic feature on the side of the Macquarie River. A hill further north of the proposed power station site, referred to locally as ‘one tree hill’ (414 metres AHD) also stands out from a distance. On the opposite side of the river, west of the site, the Catombal Range runs in a north–south direction with Mount Arthur (541 metres AHD) located directly west of Mount Nanima. Between these two features, the Macquarie and Bell rivers form an important regional geographic feature.

Visual catchment of the proposed power station site

Close distance — from Gulgong Road

When heading north along Gulgong Road, the proposed power station site is obscured by the folds in the landscape, including the hill of Nanima House (371 metres AHD). The site is tucked behind the existing substation, which can be seen only in glimpses from this direction. The curve in the road is such that the view is focused in a more north-western line towards the abandoned abattoir.

Black Cypress Pine and Mugga Ironbark have been planted along Gulgong Road to provide visual screening for a TransGrid substation. These maturing trees aid in screening views to the proposed power station site.

When travelling along Gulgong Road from the east and towards Wellington, the valley landform in which the proposed power station site would sit becomes more apparent. Power lines are more apparent on this approach and, as the eye follows the lines, the view often terminates back at the substation, which again is seen mainly in glimpses along the road.

Middle and broad distance — 1–3.5 kilometres

Within Wellington, south-west of the proposed power station site, views of the site from the river or from within the main central commercial area are completely obscured by the vegetation along the river. Further up-slope, on the western side of town, open views to the proposed power station site are evident from certain vantage points within the old hospital site at Hermitage Hill (346 metres AHD). Views from along Falls, Warne and Maxwell Roads, down-slope from Hermitage Hill, are all likely extend through to the proposed site from certain vantage points.

Views of the proposed power station are unlikely from the Mitchell Highway to the north-west of the site, as the Keston Hill area (371 metres AHD) to the west would act as a visual barrier.

Views to the proposed power station site from the Montefiores area are also unlikely, as Nanima Hill would effectively block the site.

Sensitive receptors

The topography of the area is such that sensitive visual receptors have been identified both within the close, middle and broad distances. Table 3-12 identifies and briefly discusses these sensitive receptors in relation to the visual environment. The locations of these sensitive receptors are illustrated on Figure 3-15.

Table 3-12 Sensitive visual receptors around the proposed power station site

Site no.	Site name	Site features
1	Nanima House	▪ Edwardian building (c1907) noted in local heritage listings as 'one of the most interesting and intact examples in NSW'. ▪ Set within an established garden that features mature trees, including a trio of remnant White Box to the north of the house. ▪ Situated upslope, approximately 700 metres south-west of the proposed power station site.
2	Keston Rose Garden Café	▪ Relatively new (c2005) café with wide verandas along the north and east of the building. ▪ Set within an impressive rose garden, which features maturing trees and a centrally located water feature. ▪ Tree plantings along driveway. ▪ Views from the building feature the top section of Mount Nanima to the south-east, cluttered views (due to the existing substation) to the west, open views across the surrounding pastoral landscape to the north and enclosed views to the south (due to the rose gardens and arbors). ▪ Approximately 1.5 kilometres north-east of the proposed power station site.
3	Keston Homestead	▪ Victorian Italianate building (c1890). ▪ Verandas to the eastern and northern sides of the building. ▪ Garden features mature trees and plantings, including an individual *Cedrus* sp. and overgrown Grape vines (*Vitus vinnifera*) along the east-facing veranda. ▪ Located adjacent to (west of) the Keston Rose Garden Café.
4	Keston Log Cabin	▪ New house with minimal garden. ▪ Located just south-west of Keston Homestead.

Site no.	Site name	Site features
5	Mount Nanima	▪ Features a mature garden and solid fence on the northern side of the house. ▪ Driveway features mature remnant stands of White Box, with the scenic quality disturbed by three sets of transmission lines that traverse the drive within the space of 500 metres, as well as open views onto the substation both on approach and departure from the homestead. ▪ Located approximately 1.3 kilometres south-east of the proposed power station site.
6	Cadonia Drive and Cadia Place	▪ Part of a relatively recent subdivision area north-east of the proposed power station site on the opposite side of the Gulgong Road. ▪ The highest dwelling facing in a south-westerly direction is 32 Cadonia Drive, which has a clear view across the proposed power station site through to Nanima House. A ridgeline with trees is located between this site and the proposed power station site.
7	One Tree Hill subdivision	▪ New subdivision adjacent the Cadonia Drive/Cadia Place subdivision. ▪ No development has occurred.
8	Falls, Maxwell and Warne Roads	▪ The top end of Maxwell Street (down slope from Hermitage Hill) is likely to have houses with rear views facing north towards the proposed power station site.
9	13 Cousin Drive	▪ Situated on the eastern side of Wellington, just down slope of Hermitage Hill. ▪ The view catchment is broad from this site, including Mount Nanima, 'one tree hill,' Wellington, and the Macquarie River.
10	Cadia Cottage	▪ Part of the Macquarie Stud. ▪ Located south and down-slope of the proposed power station site, through several paddocks.
11	Hermitage Hill	▪ Old hospital site. ▪ A registered Heritage Trust building. ▪ The north facing balcony of the main building has views towards the proposed power station site.

3.10.2 Compressor station site

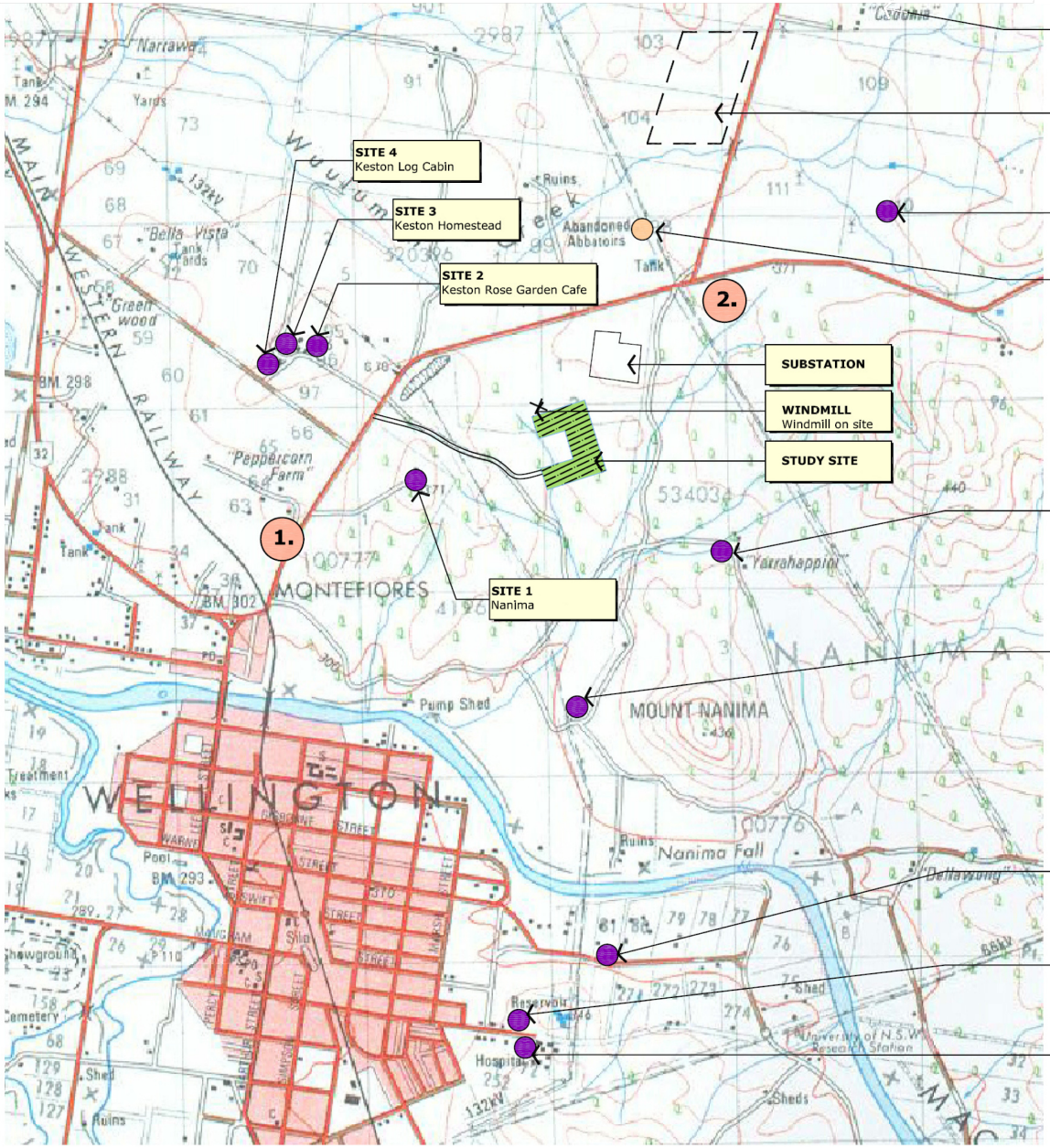
Visual character of the site and surrounds

The approach to the proposed compressor station site travelling west along Alectown West Road is generally an unsealed, narrow country road, featuring several sharp beds and turns. The road has a remote, isolated character that is heighted by the roadside vegetation, which comprises remnant Box/Native Pine vegetation communities, including understorey species (*Danthonia* and *Wahlenbergia* species, and chenopod communities).

IMAGE 1: Aerial map

PHOTO 1: View towards site from Keston Rose Garden Cafe

PHOTO 2: View fom Nanima House verandah



NOTES

1. No views from the road to the development site on approach from Wellington, due to topography, mound from existing quarry and existing scattered mature Eucalyptus in front of the site.

2. Limited views or glimpses from the road to the development site on approach to Wellington, due to topography, existing stands of vegetation that are in place to screen the substation and scattered mature Eucalyptus throughout the site.

Figure 3-15 Sensitive visual receptors at the proposed power station site

Scale: NTS
Date: 15-02-08

The approach to the proposed compressor station site is relatively flat, as are the paddocks surrounding the site, which are generally broad acre cropping or pasture paddocks. Few built features can be seen from the road, heightening the sense of isolation. These include a cluster of buildings approximately 2 kilometres north-east of the site and 'Mountain View', which is located just off the road to the south-east of the proposed compressor station site. Grain storage and silo structures are situated directly south of the compressor station site adjacent to the Parkes-Narromine Railway Line. This complex includes structures to a height of 18 metres, a dirt access-way and warning signs for the rail crossing.

Other than the existing offtake station in its south-western corner, the proposed compressor station, only a few paddock trees (with estimated heights of approximately 15–20 metres) are present at the site.

Visual catchment of the proposed compressor station site

Close distance — within 1 kilometre

The compressor station site and the immediate surrounds are of a similar height (320 metres AHD). There are several rises in topography to the south-east and south-west to 340 metres AHD. These landforms would form the backdrop of the proposed compressor station when viewed from the north. The landscape to the north of the site gently slopes away and includes many interlinking ephemeral watercourses.

The proposed compressor station would be approximately half the height of the existing mature vegetation. As such, the full form of the vegetation's canopy could still be appreciated even at a close distance to the compressor station site.

There are no known special landscape values associated with the immediate area.

Middle distance — 1–3 kilometres

The closest cross-road, Mickibi Road, is 1 kilometre to the east of the proposed compressor station site. Along the western side of the road is a mature line of Native Cypress Pine with heights between 15 and 20 metres. The trees are located at the same elevation as the proposed compressor station. It is assumed that from broad distances beyond this point, towards Alectown, the site would not be visible because of these trees.

The approach to the compressor station site from the west is well vegetated, with a slight rise in topography. It is assumed that from broad distances beyond this point to the west of the study site, the site would not be visible because of this rise and associated vegetation.

Travelling towards the proposed compressor station site from the south along the unsealed road to Parkes there would be some views onto the site, although part of these views would include the existing storage grain shed and silos, which are higher than the proposed compressor station. It is unknown how often this road is used.

Sensitive receptors

Four sensitive receptors have been identified around the proposed compressor station site. Table 3-13 identifies and briefly discusses these sensitive receptors in relation to the visual environment. The locations of these sensitive receptors are illustrated on Figure 3-16.

Table 3-13 Sensitive visual receptors around the proposed compressor station site

Site no.	Site name	Site features
1	Property A	▪ Approximately 1.8 kilometres north-north-east of the proposed compressor station site. ▪ Generally well vegetated with mature remnant vegetation.
2	Property B	▪ Located approximately 1 kilometre east of Property A. ▪ Mature surrounding vegetation and a screen of native Cypress Pine along Mickibri Road.
3	Myalls	▪ Located approximately 2 kilometres south-west of the proposed compressor station site. ▪ Scattered remnant vegetation occurs between this and the proposed compressor station site. ▪ The grain and silo complex is visible from this receptor.
4	Mountain View	▪ Located approximately 1.2 kilometres south-east of the proposed compressor station site on the southern side of Alectown West Road. ▪ Scattered vegetation occurs between this and the proposed compressor station site.

3.11 Land use and property

3.11.1 Power station site

Since European settlement, land use in the project area has been primarily agricultural. Much of the land has been cleared for sheep and cattle grazing, and cropping. Wellington was first settled in 1823, and is the oldest European town west of the Blue Mountains. Wellington and its hinterland are well-situated for agriculture, benefiting from their location in a fertile valley on the banks of the Macquarie and Bell rivers and their tributaries, and in proximity to Lake Burrendong.

In the greater Wellington region, the fertile river flats of the Macquarie and Bell rivers are intensively cropped with market gardens, and irrigated fodder and cash crops (e.g. maize, peas and lucerne hay). Several dairies are located in the region; however, most of the land is used for mixed farming. Yabby farming and flower growing are two relatively new industries to be developed in the region.

Approximately 40 hectares of land would be required for the proposed power station, which would have a footprint of approximately 6 hectares. The land upon which the power station is proposed is owned partly by a private land owner and partly by TransGrid. The private land is currently being used as grazing land, and has sparse vegetation. This land is currently zoned 1(a) Rural under the *Wellington Local Environment Plan 1995*. The TransGrid land contains the 330/132 kV Wellington substation.

The land surrounding the proposed power station site is used predominantly for agricultural purposes. Several residences are located in the vicinity of the proposed power station, one of which runs the Keston Rose Garden Café.

Appendix D provides a map that identifies land ownership in the project area.

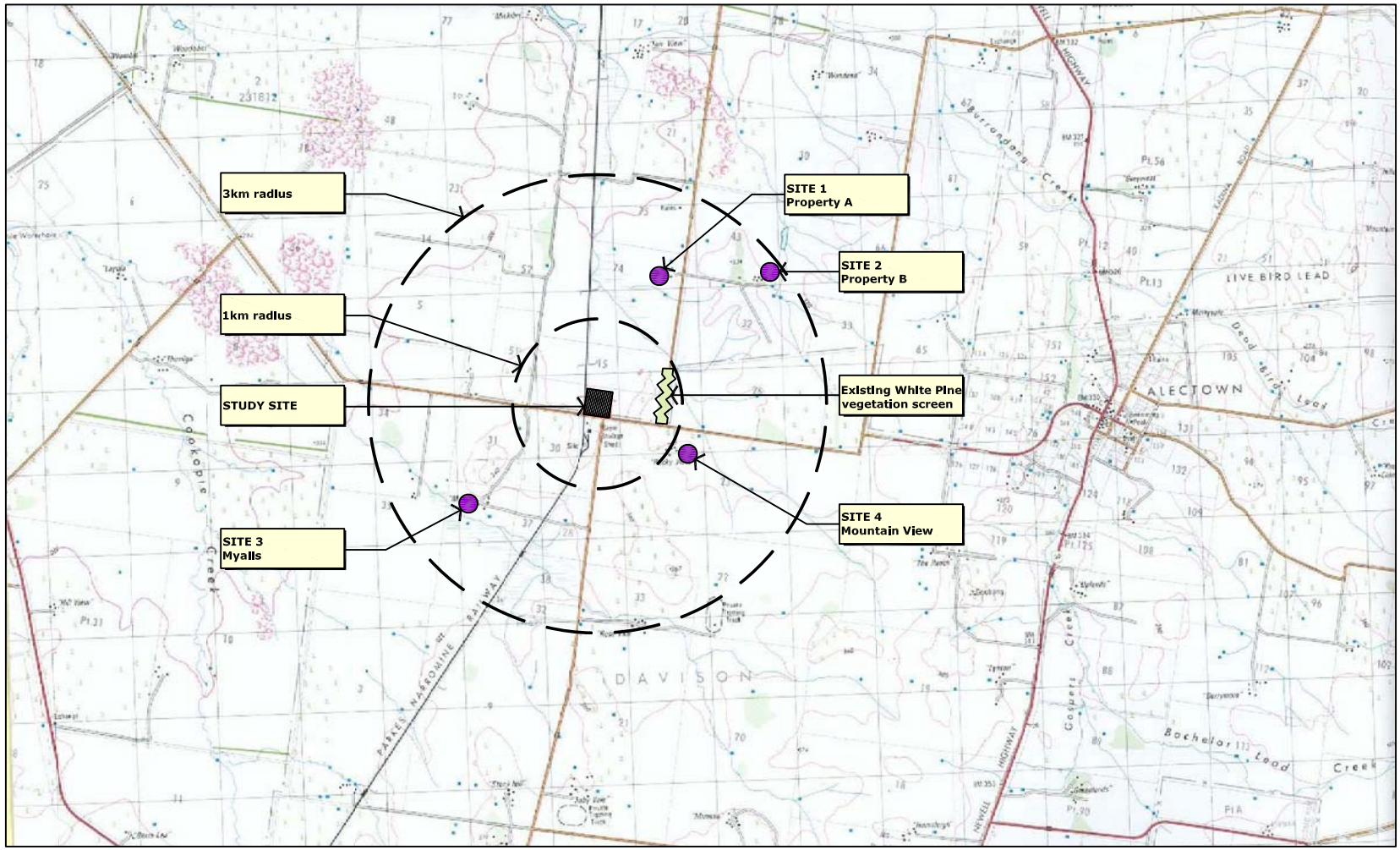


PHOTO ONE: Silo grain storage complex on the rail.

PHOTO 2: Existing tree screen along Micklbri Rd

PHOTO 3: The study site including the existing substation.

Figure 3-16 Sensitive visual receptors at the proposed compressor station site

Scale: NTS
Date: 15-02-08

3.11.2 Gas pipeline route

The proposed 100 kilometre gas pipeline is expected to affect approximately 55 private land owners and five public/private authorities. The land through which the pipeline passes, in both the Parkes and Cabonne LGAs, is predominantly cleared agricultural land. As at 2001, the Parkes LGA had 5,496 square kilometres (90% of the total land area) of potential agricultural holdings. The majority of this land is used for pasture growth (3,114 square kilometres) and cropping (1,576 square kilometres). The remaining rural land is used for intensive industries, such as feed lots and mineral extraction, and for state and national forest reserves (Parkes Shire Council 2006). Similarly, Cabonne Shire has 5,932 square kilometres of agricultural land. The Shire is experiencing a change of land use from horticulture and grazing to the production of high input agricultural activities, such as viticulture (Geolyse 2004).

The proposed gas pipeline would also traverse some Crown land, including the Macquarie River. A small section of the pipeline would also be constructed along the alignment of Peak Hill Road, which passes between two parcels of Goobang National Park. Various local (Council) and State (RTA) roads would be traversed by the proposed pipeline, as would the Bowenfels-Dubbo Line of the Main Western Railway and the Molong-Dubbo Railway, which are both owned by the Australian Rail Track Corporation.

3.12 Socio-economic context

3.12.1 Power station site

The Wellington LGA is part of the Orana region, which covers approximately 25% of NSW and is home to a population of 120,000 people. It is the largest region in NSW and produces over $850 million worth of agricultural commodities a year. The region is popular as a tourist attraction with over 1.25 million people visiting annually. The Orana region is also rich in Aboriginal culture (Department of State and Regional Development 2007).

The Wellington LGA has a population of 8,654 people, and as of 2004, the population density was 2.1 persons per square kilometre. In 2004, 8.4% of the population was unemployed (Australian Bureau of Statistics (ABS) 2004). The Department of Planning has projected that the population will remain relatively stable, with an average growth rate ranging from 0.1 to negative 0.4. It estimates that at 2031 the population will be 8,250 people (Department of Planning 2005).

The proportion of young people in Wellington is greater than that in NSW as a whole. In 2004, 22.2% of persons under were 14 years old, while in NSW, 19.7% of the population was in this age group. Wellington also has a higher proportion of older persons than NSW — the population aged over 65 years was at 19% and 13% in 2004 for Wellington and the whole of NSW respectively (ABS 2004).

A large majority of the Wellington labour force is employed in the agriculture, forestry and fishing industries. Based on employee numbers, retail trade, and health and community services are the second and third largest industries respectively (Orana ACC 2007).

The agricultural industry in the Wellington LGA is worth $60.2 million (ABS 2004). The more fertile river flats of the Macquarie and Bell rivers are intensively cropped, including market gardens, vegetable growing, irrigated fodder, and cash crops such as maize, peas and

lucerne hay. There are also several dairies in Wellington. The majority of the land, however, is used for mixed farming. Areas unsuited for such purposes are often used for grazing. Recently, yabby farming and flower growing have also been introduced to the area (Department of Natural Resources (DNR) 2004).

Tourism is another important, growing industry in Wellington. The LGA is home to the Wellington Caves Complex, the Wellington Japanese Gardens, Lake Burrendong and the Arboretum (Orana ACC 2007).

The socio-economic assessment undertaken prior to the development of the Wellington Correctional Centre (BBC Consulting Planners 2003) anticipated that the operational centre would employ around 210 staff, approximately 60% of whom would move into the area and 40% of whom would be locally recruited, thus making the Wellington Correctional Centre a significant employer in the local area.

3.12.2 Gas pipeline route

The Central West region has a population of 172,790 people and covers 63,262 square kilometres. It has a diverse business and industry base consisting of primary production ($600 million per year), mining ($550 million per year), manufacturing ($1,100 million per year), tourism, retail and wholesale trade, property and business services, health and community services, and education. The tourism industry is also growing in this region due to its reputation for fine food and wine coupled with beautiful countryside and natural attractions. The tourism industry is growing by 16% per annum (NSW Department of State and Regional Development 2007).

The cities of Orange and Bathurst are the economic hubs of the Central West region (Central West Regional Development Board 2007a).

The proposed gas pipeline would pass through the Parkes and Cabonne LGAs of the Central West region.

Parkes LGA

The Parkes LGA is home to approximately 15,000 people (ABS 2004), with a population density of 2.5 persons per square kilometre. It is estimated that the population size will not change dramatically — annual population growth rates are estimated to be between 0.0% and 0.1% to 2031 (Department of Planning 2005).

Unemployment rates in the Parkes LGA are higher than the state average at 6.3%. Children under the age of 14 make up 23% of the population and persons over 65 comprise 15.8% of the population. Agricultural production was valued at $97.9 million in 2001 (ABS 2004).

Cabonne LGA

The Cabonne LGA has a population of approximately 12,600 people and a population density of 2.1 persons per square kilometre (ABS 2004).The population has been projected to have a growth rate of between negative 0.2% and 1.4% over the next 24 years. This would see the population at 13,360 by 2031 (Department of Planning 2005). Approximately one fifth of the Cabonne population is made up of young children less than 14 years of age. Cabonne also has a relatively large population of persons above the age of 65 (16%). Unemployment rates are relatively low, at 3.5%. The area is known as ‘Australia’s Food Basket’ as it produces $141.3 million worth of agricultural produce annually (ABS 2004).

3.13 Traffic and transport

3.13.1 Road network

The road network in the region of the proposed power station and gas pipeline comprises the following state, local and regional roads (RTA classifications), which are shown in Figure 3-17:

- Mitchell Highway (State Road) —linking Molong and Dubbo via Wellington
- Obley Road (Local Road) — linking Molong and Dubbo via Obley and Yeoval
- Baldry–Peak Hill Road (Local Road) — linking Baldry and Peak Hill through Goobang National Park
- Main Road (MR) 233 (Regional Road) — known as Renshaw McGirr Way between Parkes and Wellington via Baldry and Yeoval; known as Gulgong (Mudgee) Road from Wellington to Mudgee via Gulgong
- Newell Highway (National Highway) —linking Parkes and Dubbo via Peak Hill.

The RTA has recently proposed that the classification of Gulgong Road be upgraded to a 'state road' and Obley Road to a 'regional road'.

Gulgong Road is a two-lane sealed bitumen road approximately 7 metres wide with unsealed shoulders, providing the main link between Mudgee and Wellington. Gulgong Road also provides access to Wellington connecting into the Mitchell Highway. The posted speed limit is 100 kilometres per hour. To the east of the proposed power station site the road forms an intersection with Twelve Mile Road (see Figure 3-18). This is a Y-junction under give way control — no turn lanes are provided. The current intersection is considered a poor arrangement with give-way traffic from Twelve Mile Road running on a straight alignment through the intersection. The RTA has highlighted that this intersection should be realigned in the future.

The Mitchell Highway is a typical two-lane bitumen-sealed road with a total carriageway width of 11 metres, made up of a 3.5 metre lane and 2 metre sealed shoulder in each direction. The highway is sign posted as 110 kilometres per hour in rural areas and 60 kilometres per hour through Wellington.

The intersection between the Mitchell Highway and Gulgong Road is in the north of Wellington and forms a T-junction under give-way control. A right-turn lane is provided from the Mitchell Highway into Mudgee Road and an acceleration lane is provided for right-turning traffic from Gulgong Road into the Mitchell Highway.

The latest available RTA road traffic data (2002 traffic volumes) is provided in Table 3-14, which shows the 2002 annual average daily traffic (AADT) volumes for roads in the area of the proposed power station and along the pipeline alignment. AADT is the annual average daily traffic assessed as the total volume of traffic recorded over a calendar year and divided by the number of days in that year.

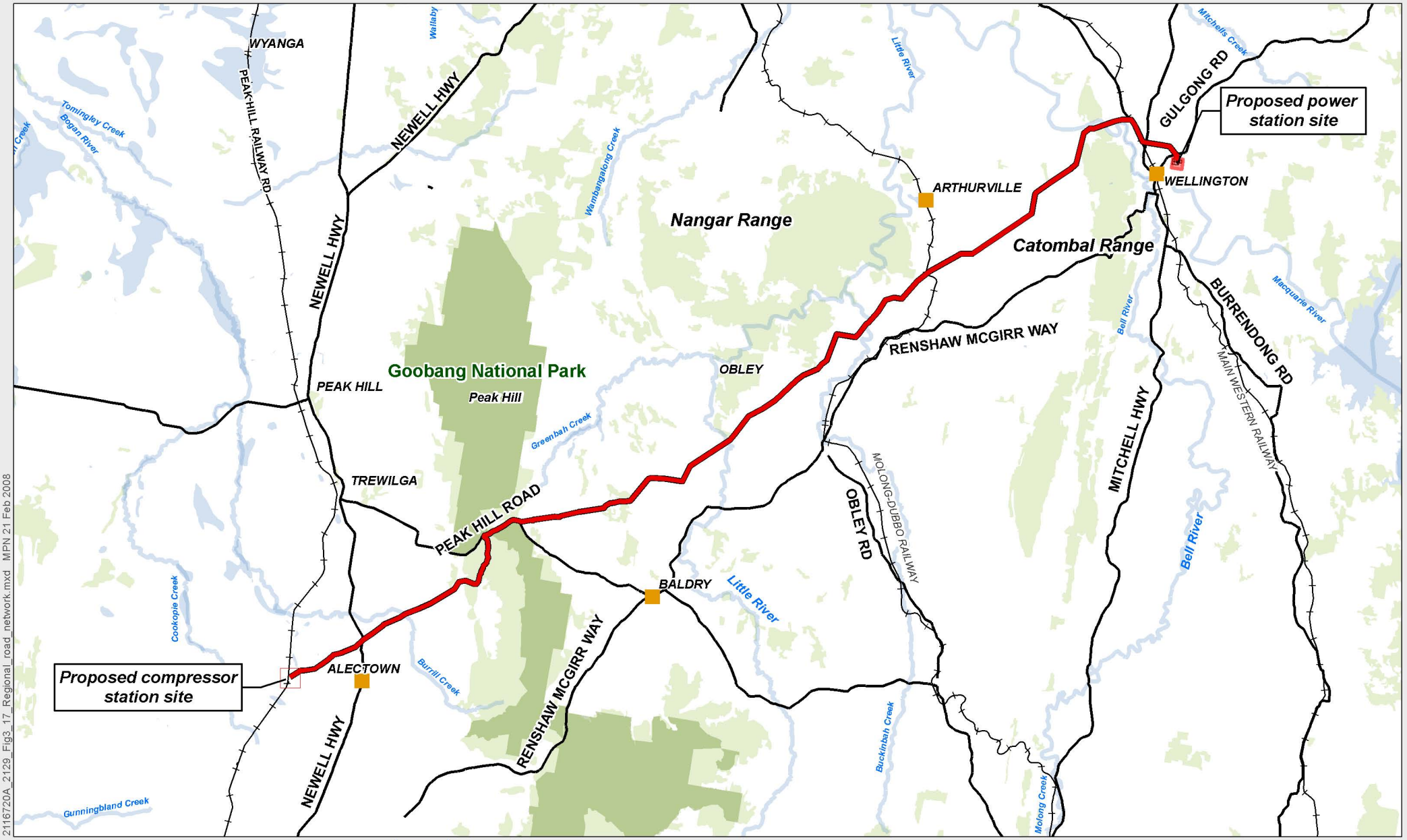
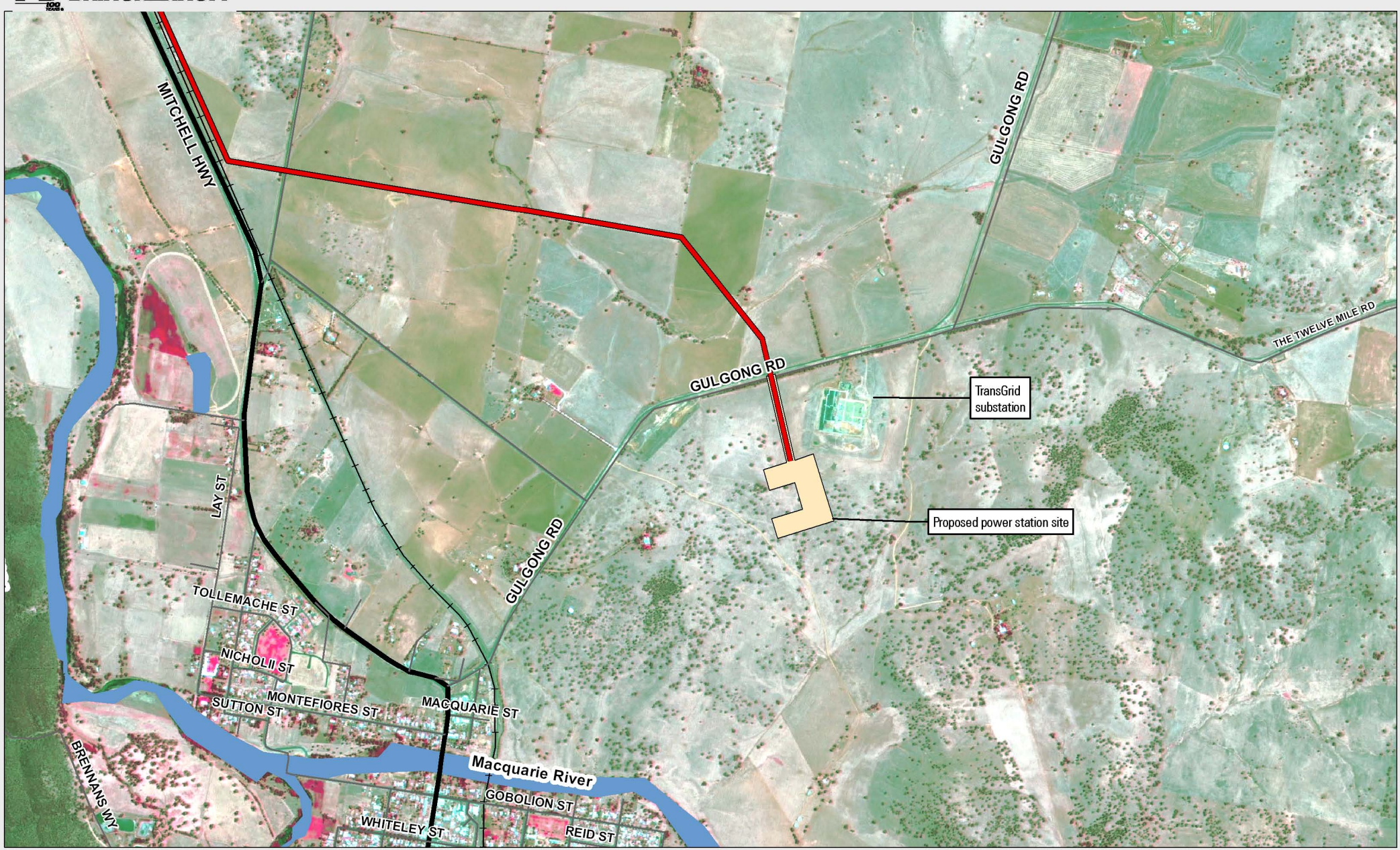


Figure 3-17 Regional road network

PARSONS BRINCKERHOFF



Proposed pipeline route
Proposed power station site
Major roads
Minor roads
Rail line
Major drainage
Water body

Figure 3-18 Local road network

0 500 1,000 Metres

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Table 3-14 2002 AADT traffic volumes

Location	Nearest town	2002 RTA traffic volume (AADT)	Average annual growth rate 1988–2002	Extrapolated 2007 AADT
Gulgong Road (MR 233) at Mitchell Highway	Wellington	1,168	1.3%	1,246 (1,573)[1]
Lee Street (Mitchell Highway) at Macquarie River Bridge	Wellington	7,154	1.7%	7,783
Percy Street (Mitchell Highway) north of Showground Road	Wellington	7,791	-2.3% (taken from 1996)	6,935
MR 233 at Yeoval	Yeoval	488	5.4%	635
Newell Highway south of Peak Hill	Peak Hill	4,618	3.4% (taken from 1996)	5,300

Source: NSW Road and Traffic Authority (2002)

Note: The 1,246 AADT figure for Gulgong Road does not consider the recent opening of the Wellington Correctional Centre, which is located further east along Mudgee Road. The 'Traffic Impact Assessment Report of the proposed Mid-Western Correctional Centre' prepared by Traffix in June 2003 stated that an increase of traffic along Mudgee Road due to the development would be in the order of 352 trips (176 in, 176 out). The report stated that 93% of these movements would be to/from the west giving an increase of 327 trips at the proposed power station site. This would give an estimated total AADT of 1573.

The capacity of a road system is related to its level of service (LoS) A to F classification in accordance with AustRoads guidelines. LoS is a fundamental performance measure, used in the planning, design and operation of roads, providing the basis for determining the number of lanes to be provided in the road network. An LoS of A represents average speeds greater than 93 kilometres per hour and an LoS of F represents average speeds less than 72 kilometres per hour. The current LoSs of roads in the project area were estimated using Table 3.9 of the *Guide to traffic Engineering, Part 2, Roadway Capacity* (AustRoads 1999 p12) and are shown in Table 3-15.

Table 3-15 Existing LoS on roads in the project area

Location	Estimated 2007 volume	LoS
Gulgong Road (MR 233) at Mitchell Highway	1,573	A
Lee Street (Mitchell Highway) at Macquarie River Bridge	7,783	B
Percy Street (Mitchell Highway) north of Showground Road	6,935	B
MR 233 at Yeoval	635	A
Newell Highway south of Peak Hill	5,300	B

Generally, most of the routes currently operate at an acceptable LoS for two-lane two-way rural roads, with average speeds greater than 88 kilometres per hour expected.

3.13.2 Accident history

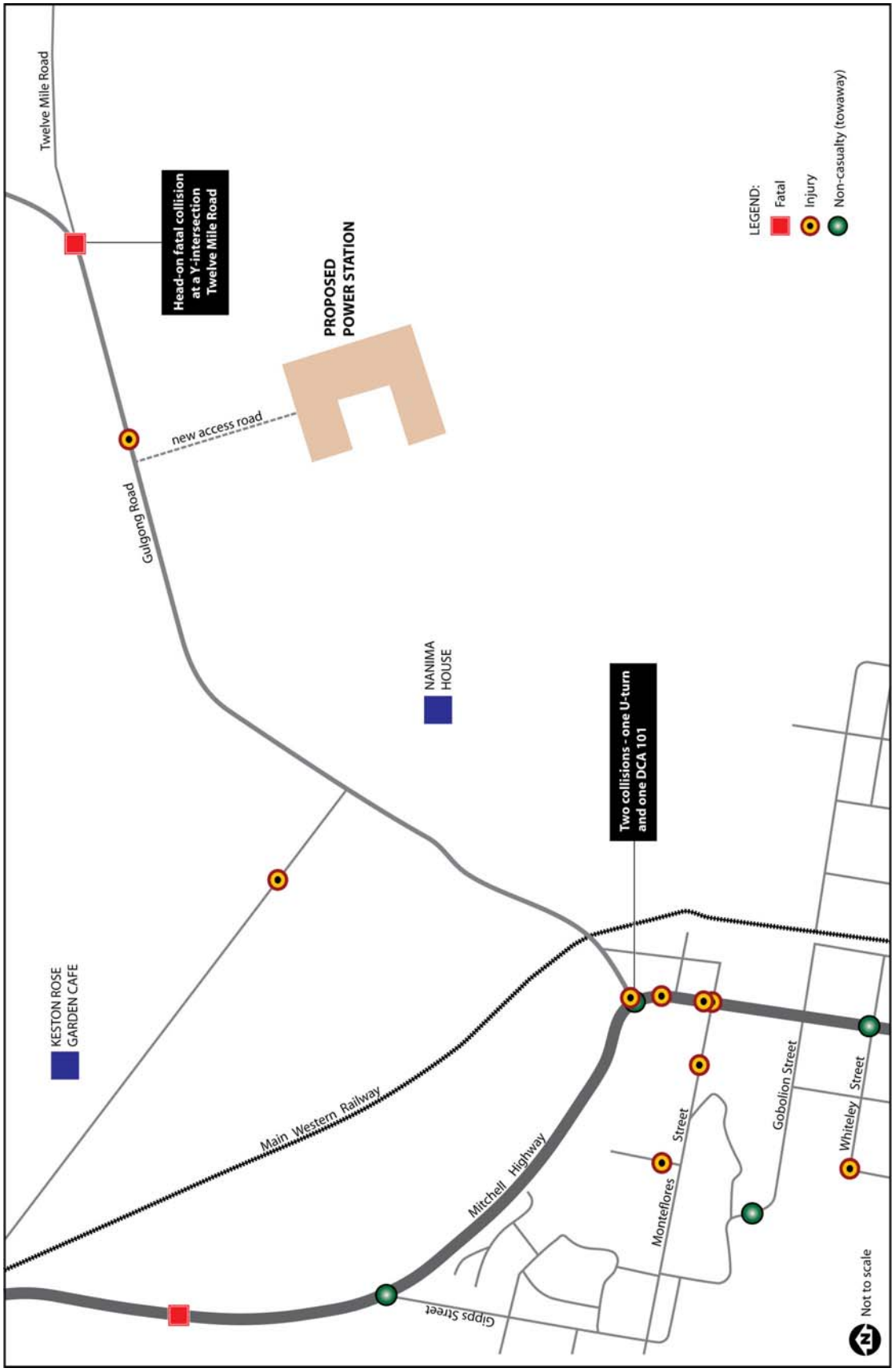
Figure 3-19 shows the accident history in the vicinity of the proposed power station site. The assessment covers the period from 2002 to 2006. A fatal accident occurred in 2006 with a head-on collision between a car and motorcyclist near the intersection of the MR 233 (Gulgong Road) and Twelve Mile Road. At the time the police indicated that speed was the contributing factor; it is not clear if the road alignment contributed to the accident.

Two crashes have occurred at the intersection of the MR 233 (Gulgong Road) and the Mitchell Highway. One incident was a u-turn movement into the path of an oncoming truck, which resulted in a tow-away. The other incident was a turn movement, which resulted in injury. Considering the traffic volumes at this intersection, it is not evident that there are any existing problems with this intersection arrangement.

3.13.3 Public transport

The railways in the project area are the Main Western Railway and the Molong–Dubbo Railway. The Main Western Railway currently operates one daily passenger service in each direction between Dubbo and Sydney. There are currently no passenger services on the Molong–Dubbo Railway; the number of freight services on these railways is unknown.

There is currently a bus service that operates 3 days per week within Wellington and Montefiores. The service is known as Interlink and operates in three loops, three times per day. There are no known services that operate along Gulgong Road.



Source: NSW Roads and Traffic Authority (2007)

Figure 3-19 2002–2006 accident history for roads in the project area