4B.4.2.2 Road Network

4B.4.2.2.1 Introduction

Figure 4B.13 presents the existing road network relevant to the Project with those roads forming part of the transport route along with those likely to be used for mine-related traffic or affected by the Project identified as follows.

4B.4.2.2.2 The Transport Route

Riordan Road (SR 192)

From its intersection with Wean Road (SR 6), this closed Council road is aligned along the southern perimeter of the Project Site and southeastern corner of Vickery State Forest where it terminates. The road reserve is fenced along its northern edge, contains stands of remnant native vegetation and is traversed by the central drainage line within the Project Site.

Shannon Harbour Road (SR 93)

Shannon Harbour Road currently comprises a track graded on the natural surface which meanders throughout the native vegetation within the approximately 60m wide easement. The easement is fenced to the south but in many areas is open to the north.

The track currently incorporates no specific drainage measures and crosses nine minor and two more substantial ephemeral drainage lines over the 3.3km length between Hoad Lane and the junction with the disused road reserve.

The road is used infrequently only by adjacent landowners. Locked gates are installed at its junction with Wean Road (SR 6) and Hoad Lane (SR 95) to control unauthorised access to the adjacent properties and stock theft. Internal gates are also positioned at four locations along the road easement between Wean Road (SR 6) and Hoad Lane (SR 95).

Hoad Lane (SR 95)

The junction of Shannon Harbour Road (SR 93) and Hoad Lane currently comprises an ill-defined intersection typical of those providing access to private landholdings or rural properties. The intersection occurs mid-way up a shallow rise with visibility to the north of approximately 350m and to the south (along Hoad Lane and Blue Vale Road (SR 7)) of in excess of 1km. Traffic leaving the Shannon Harbour Road (SR 93) approaches the intersection on a shallow up-hill gradient.

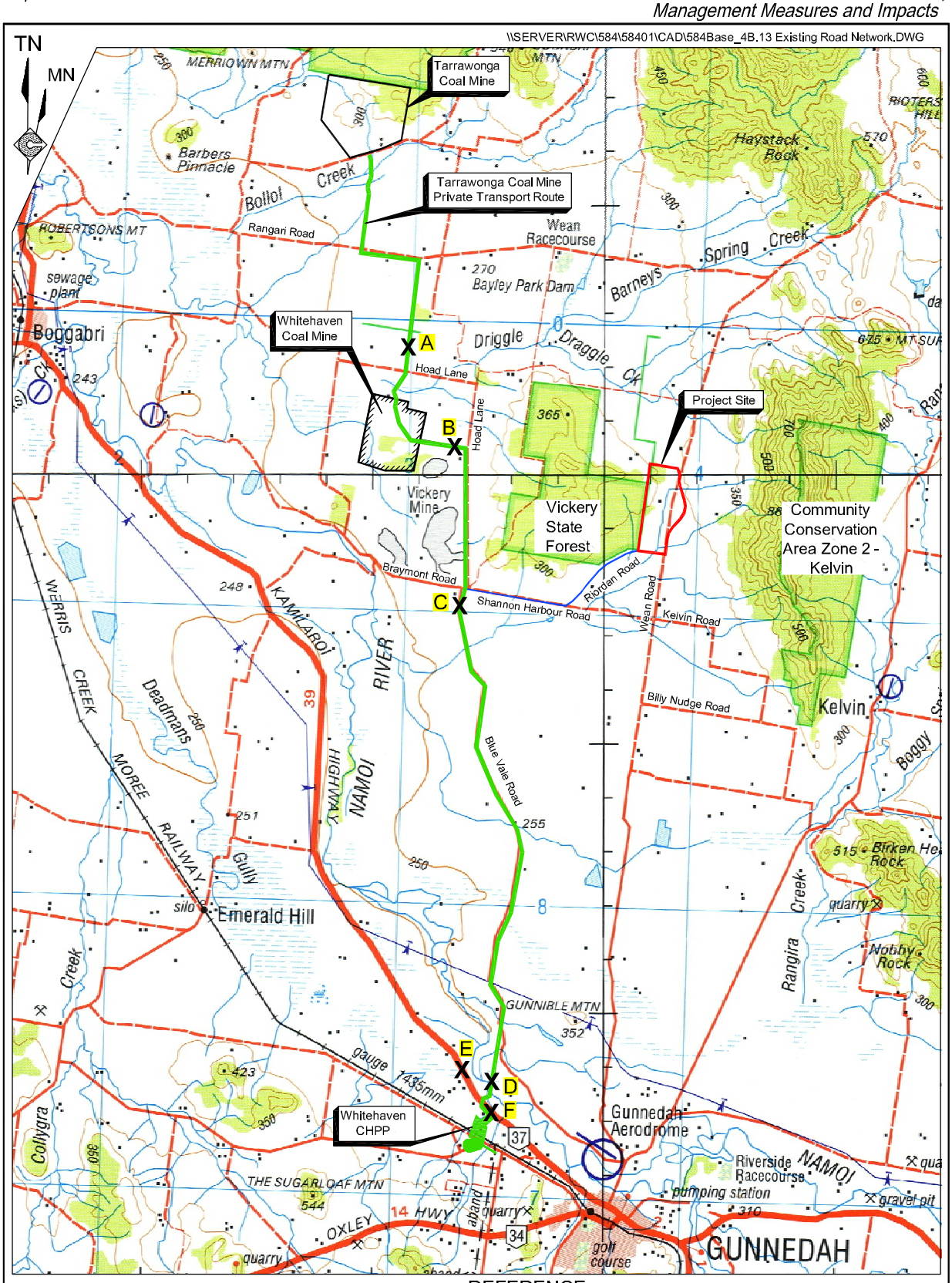


Figure 4B.13
EXISTING ROAD NETWORK

Hoad Lane, over the 200m length that would be incorporated into the transport route, comprises an 8m wide crowned bitumen pavement with 'V' drains and mitre drains constructed in accordance with Condition 7.3(a) of the Whitehaven Coal Mine Development Consent.

The sealed pavement extends northwards a further 4.9km to the junction with the private access road to the Whitehaven Coal Mine. Pavement conditions are generally good and the speed limit is 100 kph.

An agreement is in place with Gunnedah Shire Council for the maintenance of this road.

Blue Vale Road (SR 7)

The Hoad Lane (SR 95) / Blue Vale Road intersection was modified in accordance with DA 72-03-2000 and provides for the uninterrupted north-south movement of vehicles between Hoad Lane (SR 95) and Blue Vale Road. A T-intersection and 'Give Way' sign caters for local traffic entering from the west via Braymont Road.

Blue Vale Road between its intersections with Hoad Lane (SR 95) and the Kamilaroi Highway (SH 29), is 18.4km in length and comprises a 6m to 7m wide sealed pavement with 1m wide gravel shoulders. Pavement condition is generally good, with only minor areas exhibiting pavement deformation / swelling / breakup as a consequence of poor sub-grade and basecourse conditions and flooding damage. An agreement is in place between the Proponent and Gunnedah Shire Council for routine inspection and maintenance of Blue Vale Road. Both barrier and centreline markings are provided.

Blue Vale Road incorporates 11 causeways / floodways with flood indicators to 2m depth, and seven school bus parking bays with or without shelters.

The speed limit on Blue Vale Road is signposted at 100 kph.

Kamilaroi Highway (SH 29)

The intersection of Blue Vale Road (SR 7) and the Kamilaroi Highway comprises:

- a free flow slip lane and acceleration lane for eastbound vehicles leaving Blue Vale Road (SR 7);
- a lane for west-turning vehicles leaving Blue Vale Road (SR 7). The right turn lane and free flow slip lanes are separated by a concrete barrier and island;
- a deceleration lane for eastbound vehicles on the Highway entering Blue Vale Road (SR 7); and
- a separate slip-through lane for eastbound vehicles on the Kamilaroi Highway. The eastbound slip-through and acceleration lanes extend from the intersection to the east of the entrance to the Whitehaven Siding CHPP. Dual westbound 3.5m

wide lanes extend from approximately 200m west of the Blue Vale Road (SR 7) entrance to the Siding Access Road. The left-turn free flow slip lane at the intersection is currently in poor condition, with extensive pavement stripping, pot-holing, edge break-off and gravel build-up as a consequence of both light and heavy vehicles turning the corner at speed, and drainage problems / flooding damage. Maintenance of the intersection forms part of the agreement between the Proponent and Council.

The Kamilaroi Highway pavement between Blue Vale Road (SR 7) and the entrance to the Siding Access Road, though generally in good condition, does exhibit areas of pavement deformation, principally on the northern-most lane.

East and west of the entrance to the Siding Access Road, the Kamilaroi Highway comprises a minimum 6m wide sealed pavement in good condition, with barrier and centre line marking provided. The highway speed limit is 100kph.

The Kamilaroi Highway / Siding Access Road intersection is similar in form to the intersection of the Kamilaroi Highway and Blue Vale Road (SR 7) and was designed and installed to service the former Vickery rail siding / train loader (now the Whitehaven CHPP and Rail Loading Facility) and a projected 690 coal truck movements per day. The intersection comprises:

- a free flow slip lane, merge taper and secondary lane for westbound vehicles leaving the Siding Access Road;
- a lane for right-turning vehicles leaving the Siding Access Road. The right turn lane and the free flow left slip lane are separated by an island with concrete kerbing to the north and east and by an 0.9 m high concrete barrier to the west; and
- a deceleration taper for westbound vehicles on the Highway entering the Siding Access Road.

Visibility at this intersection is 600m to the west, and approximately 800m to the east. Warning signs indicating trucks crossing are positioned to the east of the Siding Access Road intersection and lighting is provided at the intersection.

4B.4.2.2.3 Other Local Roads

Wean Road (SR 6)

Wean Road extends from Kelvin Road (SR 5) on the outskirts of Gunnedah to the Boggabri-Manilla Road (MR 357) and comprises a sealed pavement to within 7km south of the Project Site. Beyond this point, Wean Road comprises a gravel pavement. Pavement seal widths range from 3.5m to 6.5m. Sealed pavement conditions range from very good to poor, with sections of the 3.5m sealed width areas exhibiting pavement deformation, major pavement edge break-off and rutting / potholing in the unsealed shoulders. Other areas, particularly those comprising older 6m seal widths, exhibit extensive longitudinal pavement cracking. V-drains are provided to both sides of the sealed pavement.

The unsealed component of Wean Road comprises a 6m wide crowned gravel pavement with 1m to 2m wide gravel shoulders. Shallow V-drains are provided on both sides of the road, with local elevations of the road formation to cater for culverts which divert water from east to west of the road. Pavement conditions range from fair to good depending on the time since grading. The speed limit on Wean Road is 100kph.

Jaeger Lane (SR 157)

Jaeger Lane currently provides access to the "Yarrawonga" property and an eastern entry point to Vickery State Forest and comprises a 3m wide unsealed pavement with 2m wide gravel shoulders and shallow roadside V- and mitre-drains. Two drainage lines cross the road flowing to the south and may be a source of pavement erosion as a consequence of high intensity rainfall events.

4B.4.2.3 Traffic Levels

At the request of the Proponent, Gunnedah Shire Council conducted classified traffic counts (between 19 February and 3 March 2007) at various locations along the transport route and other relevant locations. Traffic counter locations are shown on **Figure 4B.13** and **Table 4B.12** presents the data collected by Gunnedah Shire Council.

The AADT traffic data provided presented in **Table 4B.12** includes both directions of travel and therefore represents traffic movements on the relevant section of road. The following reviews the data presented in **Table 4B.12** with respect to traffic generated by the existing coal mines and other local sources.

Heavy Vehicle Traffic

Based on the traffic count data presented in **Table 4B.12**, the total number of daily truck movements between the Tarrawonga and Whitehaven Coal Mines and Whitehaven CHPP is 232 (Movements at Site F – Movements at Site E). This leaves an average of 52 heavy vehicle movements (18.3%) on Blue Vale Road attributable to sources other than coal transport from the two mines (65 at southern end of Blue Vale Road – Site D, and 39 at the northern end of Blue Vale Road – Site C).

Notably, the measured daily number of movements generated by the two coal mines (232) was below the forecast average daily traffic generation of 320 (see **Table 2.7**) as production at the Tarrawonga and Whitehaven Coal Mines were not at maximum levels at the time of assessment.

Table 4B.12
Current AADT Levels of the Transport Route

Traffic Count Site[3]	Location	Total Vehicles	AADT		
			Total	Light Vehicles	Heavy Vehicles
A	Tarrawonga Coal Mine Haul Road[1]	1 667	269	94 (35%)	175 (65%)
B	Whitehaven Coal Mine Access Road[2]	6 021	429	133 (31%)	296 (69%)
C	Blue Vale Road (200m south of Hoad Lane)[2]	8 240	589	318 (54%)	271(46%)
D	Blue Vale Road (north of the Kamilaroi Highway)[1]	3 707	530	233 (44%)	297 (56%)
E	Kamilaroi Highway (west of Blue Vale Road)[2]	24 201	1 729	1 279 (74%)	450 (26%)
F	Kamilaroi Highway (east of Blue Vale Road and west of Siding Access Road)[2]	31 823	2 273	1 591 (70%)	682 (30%)
Note 1: Traffic Counts Conducted for 1 week (19/2/2007 to 25/2/2007) Note 2: Traffic Counts Conducted for 2 weeks (19/2/2007 to 4/3/2007) Note 3: See F**igure 4.13**					
Source: Gunnedah Shire Council					

At the recorded traffic levels and coal transport between the hours of 7:00am and 10:00pm, this equates to approximately 18.9 heavy vehicle movements per hour[6]. On average, 15.5 of these movements were attributable to the transport of coal from the two operating coal mines.

Light Vehicle Traffic

The increase in light vehicles between Sites B and C represents the volume of non-project related traffic travelling on Blue Vale Road, presumably between the rural properties south of Hoad Lane and Boggabri. The increase in light vehicles between Sites B and D represents the volume of non-project related traffic travelling on Blue Vale Road, presumably between the rural properties south of Hoad Lane and Gunnedah. Based on the traffic count figures, traffic generated by the two mines represents between 40% and 60% of daily light vehicle traffic.

4B.4.2.4 Bus Services

Table 4B.13 identifies those periods of the day when a school bus is likely to be travelling on the Blue Vale Road component of the proposed coal transportation route. The time period between the outbound and inbound travel represents when the bus service is on roads beyond the transport route.

[6] This assumes no heavy vehicle movements occur between 10:00pm and 7:00am. This is supported by the traffic count data which recorded the majority of movements between 6:00am and 10:00pm.

Table 4B.13
School Bus Service of Blue Vale Road

Morning			Afternoon			
Time	**Direction**	**Status**	**Time**	**Direction**	**Status**	**Comments**
7:00am to 7:15am	O	NC	3:30pm to 3:45 pm	O	C	5 stops (all with in laybys)
8:00am to 8:15am	I	C	4:30pm to 4:45 pm	I	NC	
O = Outbound, ie. from Gunnedah I = Inbound, ie. to Gunnedah C = Children on board NC = No children on board						

The operator of the school bus which travels along Blue Vale Road, ie. part of the existing coal haulage route between the Whitehaven and Tarrawonga Coal Mines and the Kamilaroi Highway, reports that coal truck driver behaviour is generally good. Traffic along the Kamilaroi Highway, a main link between Gunnedah (and areas east) and Boggabri / Narrabri (and areas west), consequently includes both tourist and school buses.

4B.4.3 Changes to Existing Roads and Traffic Levels

4B.4.3.1 Changes to the Local Road Network

The following features have been incorporated into the design of the transport route to ensure the impact on local roads and road users is minimised. Where these have been previously outlined or discussed, reference is made to the relevant sub-section.

(i) The intersection constructed between Shannon Harbour Road and Hoad Lane with would conform with the appropriate Austroads standards. **Figure 4B.14** presents the conceptual design of the intersection which includes:

- a BAL type intersection for vehicles turning south from Shannon Harbour Road onto Hoad Lane. This provides a tapered shoulder of 75m to a maximum width of 3m approximately 10m from Hoad Lane. The 3m wide gravel shoulder would extend through the intersection and taper back to 1m approximately 80m to the south of the intersection on Hoad Lane. A sealed merging lane of 20m in length would provide for safe entrance of traffic onto Hoad Lane; and
- an AUR type intersection for vehicles turning east onto Shannon Harbour Road from Hoad Lane. This provides a sealed pavement width extension to 7m for a distance of 45m to the south and 15m to the north of the intersection to allow for safe vehicle pass-by. A 3m gravel shoulder would be provided for this 60m section tapering back to 1m within 80m to the north and south.

The existing intersections of the transport route, ie. Hoad Lane – Braymont Road, Braymont Road – Kamilaroi Highway and Kamilaroi Highway – Whitehaven CHPP and Siding Access Road also conform with Austroads standards.

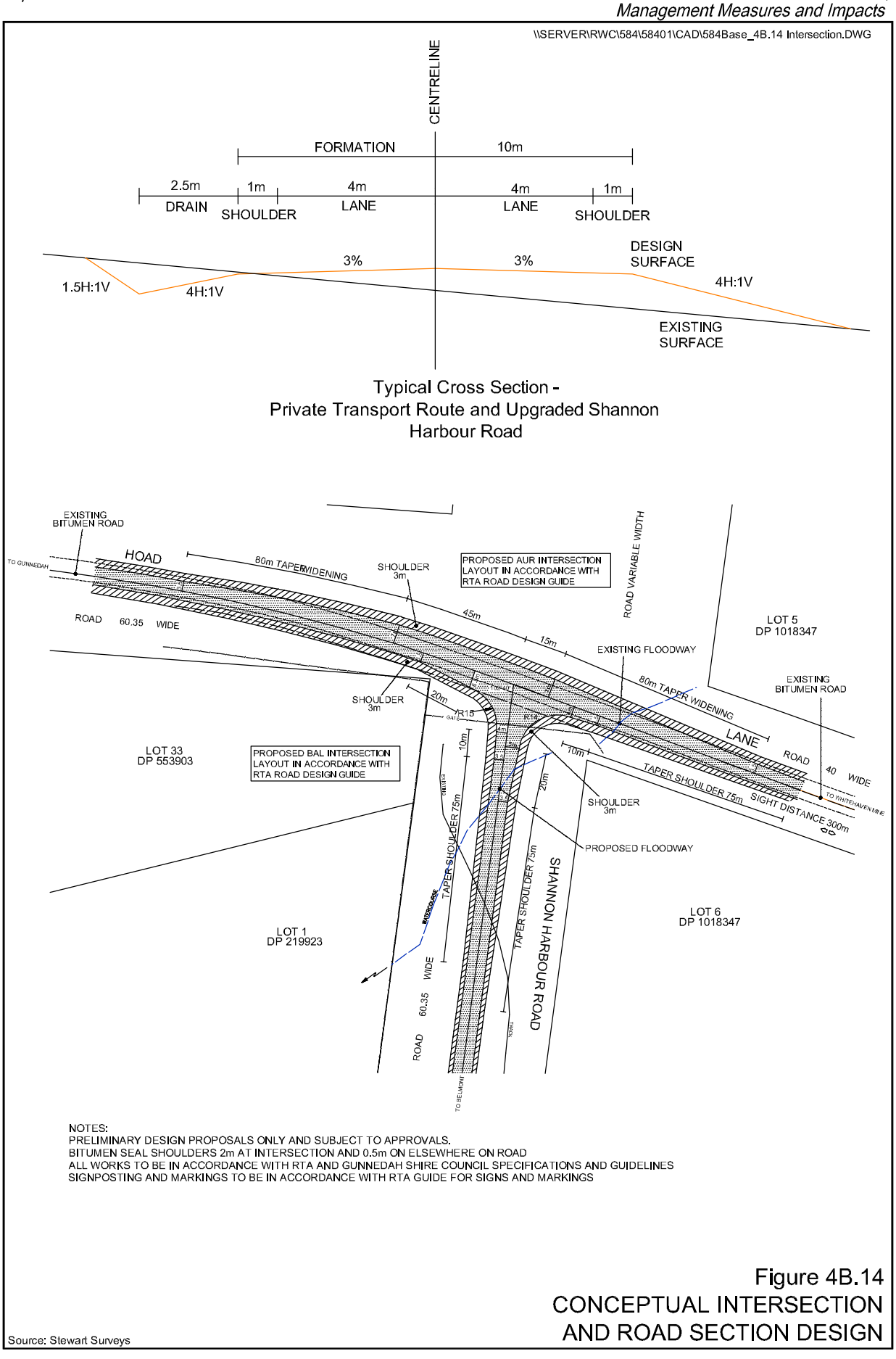


Figure 4B.14
CONCEPTUAL INTERSECTION
AND ROAD SECTION DESIGN

Source: Stewart Surveys

(ii) Design and engineering details for the proposed road and intersection construction works would be submitted to the relevant Council and/or the RTA for approval prior to construction.

(iii) All roads would be constructed or incorporated into the transport route would be sealed.

(iv) Shannon Harbour Road would remain closed at the Wean Road end and be sign-posted as a "No Through Road" at the Hoad Lane end to discourage use by traffic other than coal trucks, mine site employees and local land owners.

(v) All public road sections of the transport route would be marked with centre and edge line markings.

It is also proposed to relocate sections of Wean Road and Jaeger Lane to accommodate the proposed limit of mining. In both cases, design and engineering details for the proposed road realignment would be submitted to the relevant Council and/or the RTA for approval prior to construction. A traffic management plan would be implemented for the duration of the construction activity and if required signs highlighting the altered road conditions erected for the duration of the Project.

The Proponent has also commissioned an audit of the intersections of Blue Vale Road and the Siding Access Road onto the Kamilaroi Highway to assess safety and performance, as well as conformance (or otherwise) with Austroads standards. Based on the results of the review, the Proponent would undertake an intersection upgrade, in conjunction with the NSW RTA, to ensure these intersections provide satisfactory safety standards and intersection performance. It does, however, need to be noted that there have been no accidents / incidents at this intersection since 2002 when the Proponent first commencing to use this intersection.

4B.4.3.2 Changes to Local Traffic Levels

Table 4B.14 summarises the anticipated changes to heavy vehicle traffic on Blue Vale Road as a consequence of the Belmont Coal Project.

During the traffic monitoring period, coal traffic was approximately 75% of the predicted daily average (a consequence of Tarrawonga Coal Mine not achieving maximum production rate). If the Belmont Coal Project does not proceed, and production at the Tarrawonga Coal Mine achieves maximum production, anticipated heavy vehicle traffic levels would increase in 2008 to 372 (320 coal / 52 other) before reducing to 272 (220 coal / 52 other) as production from the Whitehaven Coal Mine ceases.

The introduction of coal transportation from the Belmont Coal Project would result in total daily heavy vehicle movements increasing to 476 in 2008 and 512 in 2009 (as production from the Whitehaven Coal Mine ceases and production from the Belmont Coal Project reaches its maximum level).

Table 4B.14
Proportional Changes in Blue Vale Road Heavy Vehicle Traffic (AADT)

	Heavy Vehicle AADT		
	Coal	**Other**	**Total**
2007 Traffic			
Existing [1]	232	52	284
Predicted (based on anticipated coal production)	320	52	372
2008 Traffic [2]			
Anticipated 2008 Traffic (No Belmont Coal Project)	320	52	372
Proposed 2008 Traffic (Including Belmont Coal Project)	424	52	476
2009 Traffic [3]			
Anticipated 2009 Traffic (No Belmont Coal Project)	220	52	272
Proposed 2009 Traffic (Including Belmont Coal Project)	460	52	512

Note 1: Average of traffic count data based on traffic recorded between 19/2/2007 to 25/2/2007) (see **Table 4B.12**).
Note 2: Anticipated average daily heavy vehicle traffic generation for 2008 (see **Table 2.8**).
Note 3: Anticipated average daily heavy vehicle traffic generation for 2009 and beyond (see **Table 2.8**).

The number of heavy vehicle truck movements would therefore increase by 228 movements[7] from the current measured levels (based on the recorded figures of **Table 4B.12**). Assuming no major change in heavy vehicle traffic generation from other sources, the proportion heavy vehicle traffic attributable to the transportation of coal would increase from 81.7% (see Section 4B.4.2.3) to 89.8%.

In order to assess the impact of this increase in coal truck movements on other road users, ie, hourly truck movements, three operating scenarios were considered. These were:

(i) coal transportation restricted to the hours of operation currently employed at the Whitehaven and Tarrawonga Coal Mines (7:00am to 10:00pm);

(ii) coal transportation undertaken 24 hours per day but limited during the night-time hours of 10:00pm to 7:00am; and

(iii) coal transportation undertaken 24 hours per day with no limitation on truck movements during night-time hours.

Restricted Transportation Hours (7:00am to 10:00pm)

The average number of coal truck movements per hour on Blue Vale Road is currently 15.5 (232 movements over 15 hours). In the absence of coal transport from the Belmont Coal Project, this is anticipated to increase to 21.3 in 2008 as the Tarrawonga Coal Mine achieves maximum production.

[7] The projected increase in heavy vehicle traffic movements reduces to 108 when anticipated 2008 traffic is accounted for.

The addition of coal transport from the Belmont Coal Project would increase this further to 28.3 per hour in 2008 and 30.6 per hour in 2009.

24 Hour Transportation (Restricted Movements 10:00pm to 7:00am)

In order to calculate the average hourly truck movements generated by the Belmont Coal Project, it has been assumed that the proportion of trucks operated between 10:00pm and 7:00am would be half the number operated during the established coal transport period of 7:00am to 10:00pm. The average hourly number of coal truck movements anticipated during these two periods (at maximum production) is calculated as follows.

$$\left.\begin{aligned} 15x + 9y &= 240 \\ x &= 2y \end{aligned}\right\} \quad \text{Where } x = \text{7:00am to 10:00pm period \& } y = \text{10:00pm to 7:00am period}$$

- $\therefore 30y + 9y = 240$
- $\therefore 39y = 240$
- $\therefore y = 6.2$
- $\therefore x = 12.4$

Therefore, during the hours of 7:00am to 10:00pm, the average number of coal truck movements per hour would approximate 12.4, reducing to approximately 6.2 movements per hour during the 10:00pm to 7:00am period.

Coal truck movements from the Tarrawonga Coal Mine in 2009 would approximate 14.7 (220 movements over 15 hours). Therefore, hourly coal truck movements on Blue Vale Road are estimated to be as follows.

- 7:00am to 10:00pm : 26.9
- 10:00pm to 7:00am : 6.2

24 hour Transportation (Constant 24 hour traffic generation)

If the number of hourly truck movements between 10:00pm and 7:00am was to remain unchanged over 24 hours, ie. coal delivery to the Whitehaven CHPP remained constant, the number of hourly truck movements generated by the Belmont Coal Project would approximate 10 (240 movements over 24 hours).

Coal truck movements from the Tarrawonga Coal Mine in 2009 would approximate 14.7 (220 movements over 15 hours). Therefore, hourly coal truck movements on Blue Vale Road are estimated to be as follows.

- 7:00am to 10:00pm : 24.7
- 10:00pm to 7:00am : 10.0

Table 4B.15 presents a summary of the predicted hourly truck movements associated with each scenario, and the predicted increase over current and anticipated 2008 coal traffic levels. The number in parentheses represents the maximum number of movements, equivalent to 30% more than the average.

Table 4B.15
Proportional Changes in Blue Vale Road Heavy Vehicle Traffic (AADT)

Transportation Scenario	Hourly Truck Movements		Increase on:	
	7:00am to 10:00pm	10:00pm to 7:00am	Current Level (2007)	Anticipated 2008 Level
Restricted Transportation Hours (7:00am to 10:00pm)	30.6 (40)	0	15.1	9.3
24 hour Transportation (restricted movements 10:00pm to 7:00am)	26.9 (35)	6.2 (8)	11.4	5.6
24 hour Transportation (constant 24 hour traffic generation)	24.7 (32)	10 (13)	9.2	3.4

With reference to **Table 4B.15**, 24 hour coal transportation from the Belmont Coal Project would have the advantage of reducing the number of hourly truck movements on Blue Vale Road during the hours when the road is most likely to be used by other vehicles. Acknowledging concerns that may be held by the local community and NSW government agencies, the Proponent is prepared to restrict truck movements between 10:00pm and 7:00am to approximately 50% of the number within the 7:00am to 10:00pm period (Scenario 2).

Other advantages of 24 hour transportation (Scenario 2) operations are considered in Section 4B.4.5.1, along with possible disadvantages and negative impacts.

4B.4.4 Operational Safeguards and Ongoing Maintenance

4B.4.4.1 Operational Safeguards

The following safeguards would be implemented to ensure impacts on motorists sharing the subject roads are minimised.

(i) All transport activities would be undertaken strictly in accordance with the Project approval and environment protection licence. Deliveries of any "oversize" loads, eg. processing plant or large earthmoving/mining equipment, would be undertaken in accordance with RTA and Council restrictions on transport hours and safety/warning requirements.

(ii) While transport would be undertaken 24 hours per day, truck movements along the transport route between 10:00pm and 7:00am would be restricted to fewer than 8 per hour.

(iii) On school days, the Proponent would maintain and extend the communication system currently in use at the Whitehaven and Tarrawonga Coal Mines between the truck drivers and the local school bus driver. The system has been negotiated between the Proponent and local bus driver and involves two-way radio communication to ensure that trucks do not exceed 40km/hr when travelling in the vicinity of the school bus. The regular communication of a morning and afternoon for the short period when the school buses are operational provides for a high level of safety and minimal disruption to coal transportation. It is noted that the need for regular two-way communication is not necessary for trucks and buses travelling along Blue Vale Road as a number of sealed bus bays are in place.

(iv) Applying a covered load policy to all trucks transporting coal from the mine and backloading coarse reject from the Whitehaven CHPP.

(v) Ensuring all trucks transporting coal are well maintained and that the drivers act in a courteous manner at all times. Trucks assessed to be unroadworthy or not carrying covers would not be loaded.

(vi) Drivers would be required to operate in accordance with a Transport Policy and Code of Conduct. The Policy and Code, which would be similar to that developed for the Whitehaven and Tarrawonga Coal Mines, would identify aspects such as travelling speeds, general behaviour, avoidance of exhaust brakes, load coverage, complaints and disciplinary procedures. The Policy and Code would apply to all employee and contractor-owned vehicles.

(vii) Landowners and surrounding residents would be contacted prior to initial construction and the commencement of any upgrading works to inform each of the operational safeguards to be implemented and discuss the adoption of any additional safeguards proposed by the landowner/resident.

(viii) Routine liaison with local residents to ensure their satisfaction with all aspects of changed traffic conditions.

4B.4.4.2 Ongoing Management

The Proponent recognises the potential for traffic generated by the Project to damage the surfaces of the local roads, especially those that form part of the transport route. The Proponent currently has an agreement with Gunnedah Shire Council to contribute 90% of all road maintenance costs on Hoad Lane and Blue Vale Road to ensure the road surface and drainage control is maintained at an appropriate level. It is proposed that the Proponent would continue this arrangement as production from the Belmont Coal Project replaces that of the Whitehaven Coal Mine. In addition, it is proposed that the Proponent would manage the maintenance of the upgraded Shannon Harbour Road (excluding the intersection with Hoad Lane which would be covered by the existing agreement).

4B.4.5 Assessment of Impacts

4B.4.5.1 24 Hour vs Restricted Hours of Transportation

The Proponent proposes to transport coal between the Belmont Coal Project Site and Whitehaven CHPP 24 hours per day. The Proponent proposes to initially restrict the average night-time movements to approximately 50% of the daytime average. Following validation through monitoring that traffic noise criteria could be met, it is proposed to increase night time traffic movements to the same level as day time traffic. As noted in Section 4B.4.3.2, this would reduce the increase in hourly truck movements along Blue Vale Road. 24 hour coal transportation has several other advantages over the current restricted hours of operation.

(i) While average hourly truck movements have been noted in **Table 4B.15**, in reality there may be considerably more during the initial and final hours of the restricted transportation period to ensure ongoing supply to the Whitehaven CHPP (which operates 24 hours per day). Truck movements could be spread more evenly should 24 hour operations be approved, reducing the necessity for high numbers of truck movements in the 7:00am to 10:00am and 7:00pm to 10:00pm periods (when non-coal traffic is also likely to be at maximum level).

(ii) The proposed Project Site activities would be undertaken 24 hours per day and so to ensure operations are not constrained by stockpiled ROM and crushed coal, continued transportation of the mined and crushed coal would be preferable. As noted in point (i), restricting the transportation hours would be likely to result in increased truck movements during the 7:00am to 10:00am and 7:00pm to 10:00pm periods to reduce stockpile levels maintained on the Project Site following and prior to the cessation of daily transport.

(iii) 24 hour transportation operations would allow the total number of trucks operated by the haulage contractor to be reduced, as the number of truck movements is spread over a greater period. This would reduce operating costs for the contractor who has committed to purchasing a modern fleet of vehicles with reduced noise and emissions levels should 24 hour operations be approved. Further detail on the noise mitigation of these trucks is provided in Section 4B.5.4.

(iv) By restricting truck movements to the daytime period, associated daytime traffic noise levels would increase, especially during the 7:00am to 10:00am and 7:00pm to 10:00pm periods. While the noise levels would still be compliant with traffic noise criteria, the amenity of land owners adjacent to the transport route may be unnecessarily reduced.

The only real advantage of continuing the restricted hours of transportation would be removing coal trucks from the local road network during this period, the effects of which are considered as follows.

- **Noise**: Increased heavy vehicle traffic would increase night-time traffic noise levels. This issues is considered separately as part of a noise assessment for the Project (see Section 4B.5.5.6.1)**.**

- **Amenity**: All residences adjacent to the transport route are sufficiently set back such that vehicle lights would not have a detrimental effect on amenity. Noise related issues are discussed in Section 4B.5.5.6.1.

  In actual fact, the risk of negative impact(s) on local amenity would potentially be elevated by restricting the hours of transport operations. This would be a consequence of the increased number of truck movements during the initial and final hours of the restricted period (when non-coal traffic is likely to be at its greatest).

  Notably, with only one exception, land owners / residents adjacent to the transport route do not consider the transport of coal along Blue Vale Road to be a significant issues (see Section 3.2.2.1).

- **Road Safety**: Restricting the hours of transportation would be unlikely to have any effect on road safety. Firstly, the Proponent has established itself as a competent and responsible manager of its transport operations with no reported accident or incident during the almost 10 years of coal haulage from local operations. Secondly, traffic count data undertaken by Gunnedah Shire Council in February and March 2007 identified that between the hours of 10:00pm and 7:00am, hourly traffic movements rarely exceed 5. Therefore, the interaction between coal trucks and other vehicles during this period would be much less than during the daytime period when non-coal traffic is far greater.

- **Road Pavement Condition**: Restricting the hours of transportation would have no effect on road pavements conditions given the total number of truck movements would not change.

4B.4.5.2 Impact Assessment

In assessing the potential impact of the Project on local roads, traffic and road users, the following points were considered relevant.

- Shannon Harbour Road would only be open at the Hoad Lane end and therefore only used by mine-related traffic and local land owners.
- The public section of the transport route is already an established route for the transportation of coal produced at the Whitehaven and Tarrawonga Coal Mines. Road users on Blue Vale Road have experienced this type of traffic since the early 1990s.
- Coal transportation has operated on the Hoad Lane and Blue Vale Road section of the transport route without recorded accident or incident to date.
- Once operational, the bulk of all mine-related light vehicles would access the Project Site via Blue Vale Road, Hoad Lane and Shannon Harbour Road. A small proportion of personnel travelling to site would access the Site Facilities Area via Wean Road and a light vehicle entrance to the Project Site.

- The Proponent would continue it 90% contribution to road maintenance costs on Hoad Lane and Blue Vale Road while managing all road maintenance on the upgraded section of Hoad Lane.

Considering the above information, and the fact that the majority of the transport route would comprise either an upgraded road specifically designed for, and restricted predominantly to, coal transportation and public roads already serving as a coal haulage route, the impacts upon local traffic, local roads and road users are assessed as follows.

Local Roads: As all public roads to be incorporated into the transport route would be sealed, and an agreement ensuring these are maintained established between the Proponent and Gunnedah Shire Council, the impact on the ongoing structural integrity of local public roads would be managed and all roads would be maintained in a safe and stable condition at all times.

Local Traffic: The Project would result in an increase in traffic levels on roads surrounding the Project Site but, with the exception of the transport route, these increases would be associated predominantly with the movement of employees, contractors and visitors between the Project Site and Gunnedah. Whilst the change in the number of vehicles travelling on the non transport route local roads may be noticeable, particularly before and after shift changes, the absolute number of vehicles on the local roads would remain small.

There would be an increase in traffic levels on the public roads or intersections forming part of the transport route, particularly heavy vehicle traffic. As noted calculated in Section 4B.8.3.2, heavy vehicle traffic attributable to the transport of coal could increase by as much as 196 movements each day (to 468) with the proportion of Blue Vale Road heavy vehicle traffic attributable to the Project increasing from 81.7% to 89.2%. While the number of daily movements would increase, the proposed increase in transport hours would provide some mitigation against the increase in hourly truck movements, with the increase restricted to a maximum of 8 movements per hour, ie. from approximately 19 to 27.

When considering the adoption of the operational safeguards and ongoing management noted in Section 4B.8.4, the historic use of Blue Vale Road and Hoad Lane as part of an established coal haulage route, the lack of recorded accident or incident and the relatively minor increase in average hourly truck movements, it is assessed that the proposed volume of Project-related traffic would remain within the capacity of the local roads to be used and not increase the level of hazard to local road users.

Noise: Noise impacts associated with Project-related traffic are considered in Section 4B.5.5.6.1.

4B.5 NOISE AND VIBRATION

The noise and vibration assessment was undertaken by Spectrum Acoustics Pty Ltd (Spectrum, 2007). The full assessment is presented in Part 5 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.

4B.5.1 Introduction

Based on the environmental risk analysis undertaken for the Project (see Section 3.3 and **Table 3.5**), the potential environmental noise impacts requiring assessment and their unmitigated risk rating are as follows.

- Increased noise levels associated with the Project Site activities causing annoyance, distractions, ie. amenity impacts (moderate risk).
- Increased noise and/or vibration levels associated with the Project road and rail traffic causing annoyance, distractions, ie. amenity impacts (moderate risk).
- Maximum noise levels causing sleep disturbance (moderate risk).
- Increased noise levels associated with the Project leading to reduced production, ie. impacts on livestock (moderate risk).

In addition, the Director-General's requirements issued by Department of Planning require that the assessment of operational and traffic-related noise impacts refer to the *NSW Industrial Noise Policy*, *Environmental Criteria for Road Traffic Noise* and *Environmental Noise Control Manual* (Department of Environment and Climate Change).

The objectives of the *Industrial Noise Policy* relevant to the Project are to:

- establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses;
- use the criteria as the basis for deriving project-specific noise levels;
- promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects;
- outline a range of mitigation measures that could be used to minimise noise impacts;
- provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development; and

- carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the *Protection of the Environment Operations Act 1997* (POEO Act).

The following sub-sections assess the existing noise environment, environmental noise criteria, proposed operational safeguards and mitigation measures and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures.

4B.5.2 Existing Noise Climate

4B.5.2.1 Noise Sources

The existing sources of noise in the vicinity of the Project Site are typical of a rural environment with minor contributions from transport noise. The principal sources of noise that contribute to background noise levels around the Project Site and the northern section of the transport route include:

- farm equipment such as tractors and cultivators;
- insect noise such as cicadas, especially during spring and summer months;
- livestock and other farm and native animals;
- wind through vegetation; and
- through traffic on the local road network.

4B.5.2.2 Noise Measurements

In 2002, background noise levels were measured near the residences of the following residences surrounding the Project Site, namely:

- "Yarrari";
- "Yarrawonga"; and
- "Stratford".

In all cases, measured noise levels were very low, and often below the noise floor of the noise monitors, at approximately 24dB(A) (Spectrum, 2007). Rating Background Levels (RBLs), as defined in the *Industrial Noise Policy* (INP), were below 30dB(A) for day (7:00am-6:00pm), evening (6:00pm-10:00pm) and night (10:00pm-7:00am) periods at all locations. Therefore, in accordance with the INP, the RBL for the Project Site and surrounding residential receivers has been set at 30dB(A) for the purpose of determining noise criteria.

4B.5.3 Environmental Noise Criteria

4B.5.3.1 Introduction

The assessment of impacts of the Project upon the local noise climate (Section 4.8.5) has been undertaken by calculating likely noise levels during both the site establishment and operational stages of development and comparing those noise levels against the noise criteria established through reference to:

- relevant sections of the Environmental Noise Control Manual (ENCM) - for site construction activities (EPA, 1994);
- the Industrial Noise Policy (INP) - for site operational noise (EPA, 2000); and
- NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999).

Criteria relevant to assessing the likelihood of sleep disturbance are drawn from current EPA considerations which as yet are not fully documented.

For the purposes of defining relevant criteria, the DECC (EPA) nominate the following times relevant to daytime, evening, night-time periods, ie. for Monday to Saturday. For Sundays and public holidays, night-time extends from 10.00pm to 8.00am.

- Daytime – 7.00am to 6.00pm
- Evening – 6.00pm to 10.00pm
- Night-time – 10.00pm to 7.00am

4B.5.3.2 Site Establishment Noise Criteria

The Project would require a range of works during the site establishment phase, including tree clearing and topsoil removal, road construction, construction of the processing plant and installation of offices, amenities and services to the Project Site. It is anticipated that these activities would occur during the first 6 months of the life of the Project and as such the following criterion, as outlined in the ENCM, applies.

- Construction noise ($L_{A10\ (15\ min)}$) should be restricted to the RBL + 10dB(A) during daytime period only, ie. 40dB(A).

4B.5.3.3 Operational Noise Criteria

4B.5.3.3.1 Intrusiveness Criterion

The environmental noise criteria for the operation of the Project need to consider both the intrusiveness and amenity criteria. The "intrusiveness" criterion, which limits L_{Aeq} noise levels from industrial sources to the RBL + 5dB(A), needs to be considered when determining appropriate noise criteria for the Project. The "intrusiveness" criterion considers the relative increase in noise levels as a result of an industrial noise source and would cover all operations on the Project Site including mining, processing and on-site truck movements, including trucks transporting coal on the transport route.

4B.5.3.3.2 Amenity Criterion

The "amenity" criterion considers cumulative noise impacts in areas with competing industrial noise sources.

Considering there is no existing major noise generating industry in the vicinity of the Project Site, and that current and projected future traffic levels would be negligible, the "amenity" criterion need not be applied for this Project.

4B.5.3.3.3 Sleep Disturbance

In order to help protect against people waking from their sleep due to Project-related noise, the DECC recommends that $L_{A(1\ minute)}$ noise levels, effectively L_{Amax} noise levels, ie. maximum noise levels recorded over one minute, should not exceed the background level by more than 15dB(A) when measured/computed at a building facade. The L_{Amax} is the preferred descriptor given it is far more practical to measure an L_{Amax} noise level than an L_{A1} noise level. The "sleep disturbance" criterion is only applicable to night-time operations, ie. beyond 10:00pm.

4B.5.3.3.4 Traffic Noise Criteria

The NSW *Environmental Criteria for Road Traffic Noise* (ECRTN) (EPA, 1999) applies to noise generated by vehicle movements on public roads. Truck movements on the Project Site and private section of the transport route (on the "Brentry" and "Stratford" properties) would be subject to the $L_{eq(15\ minute)}$ criterion of 35dB(A) for total site noise emissions.

The criteria for Shannon Harbour Road (SR 93 - a public local road) is 55dB(A),$L_{eq(1hr)}$ for daytime periods (7:00am to 10:00pm) of peak vehicle movements and 50dB(A),$L_{eq(1hr)}$ for night-time periods (10:00pm to 7:00am) of peak vehicle movements.

The section of the transport route between Hoad Lane and Whitehaven CHPP is currently used by traffic generated by the Whitehaven and Tarrawonga Coal Mines as a coal haulage route. Daytime noise criteria of 60dB(A),$L_{eq(1hr)}$ is currently in force and applies to vehicles associated with all mining activities and therefore must not be exceeded by the addition of trucks from the Project. The introduction of coal transport at night, however, would be a new noise source and it is considered appropriate to use the local road criterion of 50dB(A) for night-time haulage only, ie. between 10:00pm and 7:00am.

Transportation of coal by road would occur 24 hours per day, Monday to Saturday and **Table 4B.16** summarises the traffic noise criteria for the various sections of the transport route.

Table 4B.16
Road Traffic Noise Criteria

Section of Transport Route	Nominated Noise Criteria – dB(A)		
	Day 7.00am to 10.00pm	**Evening 6.00pm to 10.00pm**	**Night 10.00pm to 7.00am**
Project Site, private land*	$L_{Aeq(15min)}35$	$L_{Aeq(15min)}35$	$L_{Aeq(15min)}35$
Shannon Harbour Road (local road criteria)	$L_{Aeq(1hr)}55$	$L_{Aeq(1hr)}55$	$L_{Aeq(1hr)}50$
Hoad Lane to the Whitehaven CHPP (collector road criteria)	$L_{Aeq(1hr)}60$	$L_{Aeq(1hr)}60$	$L_{Aeq(1hr)}50$
* Site noise criteria apply to emissions from all site noise sources.			
Modified after Spectrum (2007) – Table 3			

Notably, there are no non-project related residences within several hundred meters of Shannon Harbour Road. In contrast, there are several residences within 550m of Hoad Lane, Blue Vale Road or the Kamilaroi Highway, namely "Tralee" (Derelict), "Weroona", "Nalya" and "Brooklyn" (see **Table 4A.3**). For assessment purposes therefore, the relevant criteria therefore would be that for the Hoad Lane to Whitehaven CHPP section of the transport route.

4B.5.3.3.5 Rail Noise Criteria

The operation of the Project may result in additional train movements on the rail line between the Whitehaven CHPP and Rail Siding and the Port of Newcastle, depending on the period of overlap between the commencement of the Project and closure of the Whitehaven Coal Mine. With an increase in the number of train movements, there would be a corresponding increase in noise levels at residences along the rail line.

The Australian Rail Track Corporation (ARTC) operates the northwest branch railway of the Main Northern rail line under Environment Protection Licence (EPL) 3142. EPL 3142 does not contain environmental noise limits but states the objective of progressive reduction of noise levels from rail lines through Pollution Reduction Programs (PRPs).

Condition U1.1 of EPL 3142 provides the following goals to work towards in developing a PRP:

- $L_{eq, (15\ hour), day}$ - 65dB(A)
- $L_{eq, (9\ hour), night}$ - 60dB(A)
- $L_{max\ (24\ hour)}$ - 85dB(A)

These criteria would be considered for the assessment of cumulative train noise levels resultant from the operation of the Project and other local coal mines. The L_{max} criterion are considered to apply to pass-by levels of moving trains and not to horns, which must be sounded near crossings for safety purposes.

4B.5.3.3.6 Rail Vibration Criteria

Vibration criteria for this assessment were obtained from the DECC publication "Assessing Vibration: A Technical Guideline" (AVTG, 2006). Based on the assumption that train-induced ground vibrations are typically at frequencies greater than 10Hz, AVTG (2006) suggests the maximum allowable vibration velocity to ensure personal comfort levels are not exceeded is 2.82mm/s (Spectrum, 2007).

4B.5.3.3.7 Noise Criteria for the Proposed Belmont Coal Project

The adopted noise criteria for the Project are as follows.

Construction Noise ($L_{A10\ (15\ min)}$)	:	Given the RBL for all residences has been set as 30dB(A), the construction noise criteria for the Project would be **40dB(A)**.
Operational Noise ($L_{Aeq(15\ minute)}$)	:	The "intrusiveness" noise criterion for the proposed Project is **35dB(A)**.
Sleep Disturbance (L_{Amax})	:	Equal to the "intrusiveness" criterion plus 10dB(A), that is, **45dB(A)**.
Transport Route Traffic ($L_{Aeq(1hr)}$)	:	**60dB(A)** for daytime and evening traffic.
	:	**50dB(A)** for night-time traffic.
Rail Noise		
$L_{eq, (15\ hour), day}$	:	**65dB(A)** for cumulative daytime rail traffic.
$L_{eq, (9\ hour), night}$		**60dB(A)** for cumulative night-time rail traffic.
$L_{max\ (24\ hour)}$		**85dB(A)** for maximum pass-by noise levels.
Rail Vibration	:	**2.82mm/s** at the nearest residence.

4B.5.4 Design and Operational Safeguards

The safeguards to limit the noise generated by the Project, and received at non-project related residences surrounding the Project Site, include a combination of:

- design features of the mine itself;
- the sequence of development;
- noise controls; and
- operational procedures to limit noise generation or attenuate the noise generated.

The nearest non-project related residences to the proposed mining activities of the Project Site are summarised in **Table 4B.17**.

Table 4B.17
Proximity of Non Project-related Residences

Property Name (and direction from the Project Site)	Closest distance to mining/processing activity (m)	
	Year 1	Year 7
"Costa Vale" (north)	3 060	4 030
"Surrey" (southeast)	4 320	3 480
"Carlton" (southeast)	5 690	4 900

Based on the distances of the nearest non-project related residences, Spectrum (2007) recommended the following noise controls, which the Proponent is committed to implementing.

Construction Noise Controls

- As far as practical, construction activities would be restricted to only one of the more noisy activities at a time eg. tree felling or topsoil stripping.
- If unavoidable, these noisier activities would only occur simultaneously after 9:00am when the affects of local temperature inversions are likely to be minimal.

Operational Noise Controls

- Topsoil and subsoil stripped in advance of mining activities would be placed a northern stockpile and eastern perimeter stockpile to provide an acoustic barrier between the open cut and nearest non-Project-related residence. For example, stripping of 1.5m of topsoil and subsoil, together with the construction of a 3m high subsoil stockpile would provide almost 5m of acoustic shielding between the open cut and nearest residence.

- When prevailing winds are from the northwest, south or southwest, ie. towards the nearest non-project related residence, in-pit overburden placement would be undertaken in preference to out-of-pit placement. Similarly, out-of-pit overburden placement would be preferentially undertaken when prevailing winds are from the east and northeast. In order to mitigate against possible exceedances of noise criteria at the closest residence to the north "Costa Vale" should out-of-pit placement of overburden to the Northern Emplacement be unavoidable, the Northern Emplacement would be constructed to maintain a 10m bund to the north. This 10m bund would be progressively elevated as the emplacement is constructed (during favourable wind conditions, ie. easterlies or westerlies) with activities restricted to behind this bund should inversion conditions be experienced.
- A Noise Management Protocol (NMP) would be prepared by the Proponent prior to the commencement of mining activities. The Protocol would incorporate details relating to controls (i) and (ii) and the measurement of prevailing weather conditions.

In order to mitigate against elevated noise levels generated by the Project-related traffic, the following noise controls would be implemented.

Transport Noise Controls and Operational Procedures

- All roads comprising the transport route would be sealed and regularly maintained under a contribution plan with Gunnedah Shire Council.
- Strict adherence to approved hours of coal transportation.
- Strict adherence to hours of operation, including transport activities would be enforced by Mine Management.
- All truck drivers would be instructed to avoid the use of engine compression brakes when approaching the Project Site entrance and intersections with Wean Road and Hoad Lane and to be mindful of noise when accelerating. The need to introduce restrictions upon the use of engine brakes at any other location along the transport route would be evaluated throughout the life of the Project.

In addition, should 24 hour transportation be approved, the haulage contractor for the two existing coal mines would be retained for the Belmont Coal Project and upgrade the existing fleet to a purpose built B-double fleet with the following noise mitigation features.

- All units are side tipping B-Double combinations, purpose-built for on road coal haulage.
- The prime mover specification including model, motor size, differential ratios and gearbox selection have all been specifically engineered to comply with emission and noise criteria.

- The trucks are speed limited (to 93km/hr) to maximise operational efficiency whilst optimising fuel economy, tyre wear and vehicle maintenance and minimising engine noise.
- The B-double trailer units are on airbag "road friendly suspension" (System Approval No. RF2108).
- All units are fitted with electronic management systems including GPS, enabling reporting on speed breaches.
- All units have the engine compression brakes (Jake brakes) disabled to reduce noise.

Other Noise Controls and Operational Procedures

In addition to the design and operational features of the Project, the Proponent would implement the following noise controls.

- Equipment with lower sound power levels would be used in preference to more noisy equipment.
- All equipment used on site would be regularly serviced to ensure the sound power levels remain at or below the levels used in the modelling to assess generated noise levels and compliance with the criteria.
- Mid-high frequency broadband reverse beepers would be fitted to mobile mining equipment, decreasing sound power levels by 2 dB(A) to 3dB(A).
- The on-site road network would be well maintained to limit body noise from empty trucks travelling on internal roads.

The Proponent would maintain dialogue with its neighbours and the local community to ensure any concerns regarding construction, operational or transport noise are addressed.

4B.5.5 Assessment of Impacts

4B.5.5.1 Method of Assessment

The assessment of potential noise impacts arising from activities within the Project Site was based on computer model predictions undertaken by Spectrum Acoustics for a range of operational scenarios throughout the life of the mine at the three closest non-project related residences ("Assessment Locations"). The assessment also considered the noise likely to be generated by product coal transportation between the Project Site and the Whitehaven CHPP and rail loading facility. The cumulative traffic noise impacts associated with the operation of both the proposed Belmont Coal Mine and the operational Tarrawonga and Whitehaven Coal Mines were also assessed.

Table 4B.18 presents a summary of the construction, operational, transport and cumulative impact scenarios modelled with a complete description of each presented in Spectrum (2007).

Table 4B.18
Noise Modelling Scenarios

Modelled Scenario	Description
1. Site Establishment	Including the following activities. - Tree clearing and topsoil removal the footprint of the northern emplacement. - Construction of the site entrance and site access road. - Construction of the off-site private section of the transport route. - Construction of the Site Facilities Area and coal handling and processing area.
2. Year 1 Mining	Open cut mining 20m below ground level in the centre of Block 1, overburden placement to the northern end of the western emplacement, on-site coal processing and product despatch. Overburden/coal haulage, blasthole drill and two scrapers are all working at natural ground level.
3. Year 3 Mining	Open cut mining 20m below ground level in the centre of Block 6, auger mining against western highwall, out-of-pit overburden placement to the southern end of the western emplacement and in-pit overburden emplacement to the completed northern section of the open cut, on-site coal processing and product despatch. Overburden/coal haulage, blasthole drill and two scrapers are all working at natural ground level.
4. Year 5 Mining	Mining approximately 200m south of the Year 3 scenario. Overburden placement to the northern emplacement as well as in-pit. The western emplacement has been completed by this stage. Overburden/coal haulage, blasthole drill and two scrapers are all working at natural ground level.
5. Year 7 Mining	Open cut mining 30m below ground level in the centre of Block 22, auger mining against western highwall, overburden placement in-pit to the completed central section of the open cut, on-site coal processing and product despatch. Coal haulage, blasthole drill and two scrapers are all working at natural ground level.
6. Sleep Disturbance	Mining operations modelling general impact of noise from mining and overburden placement activities, coal loading into empty trucks and dozer tracks. Sound power levels of modelled L_{Amax} noise sources. Note: Coal product trucks not operating.
7. Road Transportation	Three separate traffic noise scenarios were modelled (see Section 2.9.3.2). Scenario 1 considered a restriction of the hours of operation to between 7:00am and 10:00pm (as for the approved Tarrawonga and Whitehaven Coal Mines), Scenario 2 considered 24 hour transportation from the Belmont Coal Project with restriction placed on the volume of traffic despatched between 10:00pm and 7:00am, and Scenario 3 considered 24 hour transportation from the Belmont Coal Project without a constant volume of traffic despatched over the 24 hours. The model predicted cumulative noise levels associated with maximum hourly truck movements from the Belmont Coal Project and approved Tarrawonga and Whitehaven Coal Projects assessed over a 1 hour period ($L_{Aeq(1\ hour)}$).
8. Rail Transportation	Rail transportation has been modelled based on the cumulative number of trains despatched from the Whitehaven Rail Siding and bound for Port Newcastle.
Notes: Modelling was conducted for the following atmospheric conditions. - *Daytime lapse* – 20°C, 70% relative humidity (RH), no wind, -1°C/100m vertical temperature gradient (dry adiabatic lapse rate, DALR). - *Inversion* – 5°C, 70% R.H., +4°C/100m vertical temperature gradient. - *Wind* – 20°C, 70% R.H., 3m/s wind from NW.	
Source: Modified after Spectrum Acoustics (2007) – Section 5.2	

Figures 4B.15(a) and **4B.15(b)** presents the locations of noise generating activities for the four modelled scenarios, ie. Year 1, Year 3, Year 5 and Year 7 mining and associated activities.

The number and location of noise-generating activities is indicative of those used for the other scenarios. Project Site transport activities were modelled separately, with the results of this modelling incorporated into the final noise modelling predictions for each scenario.

Noise modelling was undertaken as an iterative process with many of the noise controls described in Section 4B.5.4 introduced as a result of early modelling predictions in order to achieve compliance with the nominated noise criteria. The results of the noise modelling and assessment of impacts on surrounding residents are presented as:

- site establishment noise impacts (Section 4B.5.5.3);
- operational noise impacts (Section 4B.5.5.4);
- sleep disturbance (Section 4B.5.5.5); and
- traffic noise and vibration impacts (focussing on the cumulative impacts associated with the concurrent operation of the Project with the Tarrawonga and Whitehaven Coal Mines (4B.5.5.6).

The assessment of impacts presents the predicted noise levels assuming the adoption of the various design and operational safeguards as described in Section 4B.4.4.

4B.5.5.2 Assessment Locations

Table 4B.19 identifies the three non-project related residences assessed in the modelling of project related site establishment and operational noise – namely "Costa Vale", "Surrey" and "Carlton". The residence on the "Brooklyn" property has been identified as the closest to the transport route (200m).

Table 4B.19
Predicted Noise Levels during Construction and Site Establishment

Assessment Location	Meteorological Condition				
	Lapse	SSW wind	NNW wind	Criterion	Differential
"Costa Vale"	<20	34	20	40	-6
"Surrey"	<20	20	36	40	-4
"Carlton"	<20	<20	31	40	-9
Source: Modified after Spectrum Acoustics (2007) – Table 7					

4B.5.5.3 Site Establishment

Table 4B.19 presents a summary of the predicted construction noise during the first 6 months of site activities. No exceedances of the construction noise criteria are predicted at any of the assessment locations for any modelled meteorological condition.

4B.5.5.4 Operational Noise

Table 4B.20 presents a summary of the predicted noise levels generated by the Project over the life of the mine assuming the adoption of all the design and operational controls. With the incorporation of the noise controls, all operational noise criteria would be met at all assessment locations. **Figure 4B.16** presents the noise contours predicted for Scenarios 2, 3, 4 and 5.

Table 4B.20
Predicted Operational Noise Levels - dB(A), $L_{eq(15min)}$

	Meteorological Condition							
Location*	Lapse	SSE wind	SSW wind	NNW wind	NNE wind	Inversion	Criterion	Differential
Scenario 2 - Year 1 Mining and associated activities								
"Costa Vale"	25	34	35	20	20	27	35	0
"Surrey"	22	21	22	30	29	33	35	-2
"Carlton"	<20	<20	<20	24	23	28	35	-7
Scenario 3 – Year 3 Mining and associated activities								
"Costa Vale"	24	32	33	<20	<20	26	35	-2
"Surrey"	23	20	23	30	28	34	35	-1
"Carlton"	<20	<20	<20	24	23	29	35	-6
Scenario 4 – Year 5 Mining and associated activities								
"Costa Vale"	23	33	33	23	23	31 [1]	35	-4 [1]
"Surrey"	<20	<20	<20	33	32	24	35	-2
"Carlton"	<20	<20	<20	26	24	20	35	-9
Scenario 5 – Year 7 Mining and associated activities								
"Costa Vale"	<20	24	24	<20	<20	<20	35	-11
"Surrey"	<20	<20	<20	30	28	31	35	-4
"Carlton"	<20	<20	<20	25	22	25	35	-10

* See **Figure 4B.16**
Note 1: When modelled without the inclusion of a 10m acoustic bund wall beyond overburden emplacement activities within the northern emplacement, a 1dB(A) exceedance of criterion was predicted.
Source: Modified after Spectrum Acoustics (2007) – Tables 8 to 11

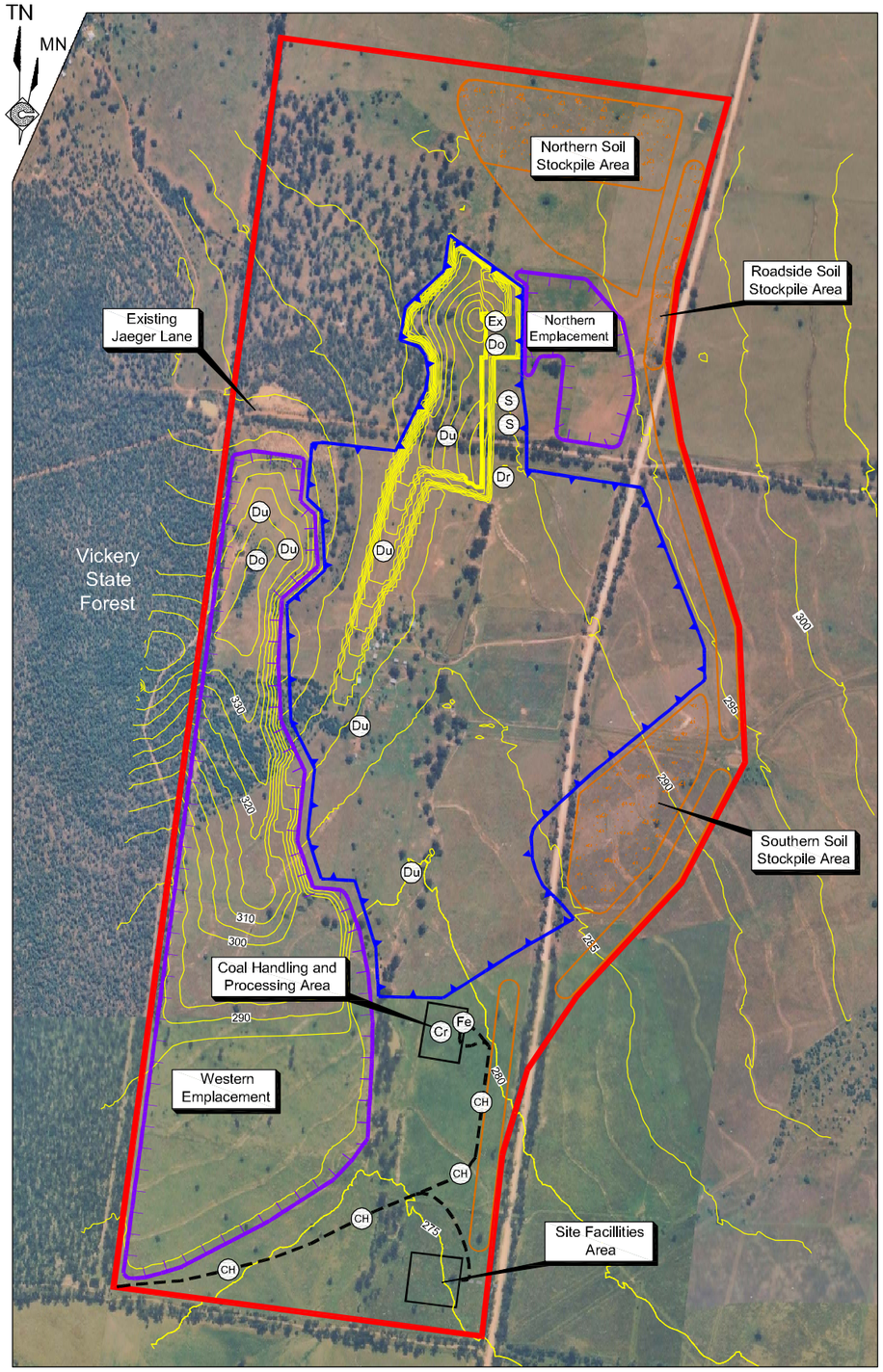
4B.5.5.5 Sleep Disturbance

The impact on sleep disturbance was assessed for Year 1, Year 5 and Year 7 mining and associated operations at each of the three assessment locations.

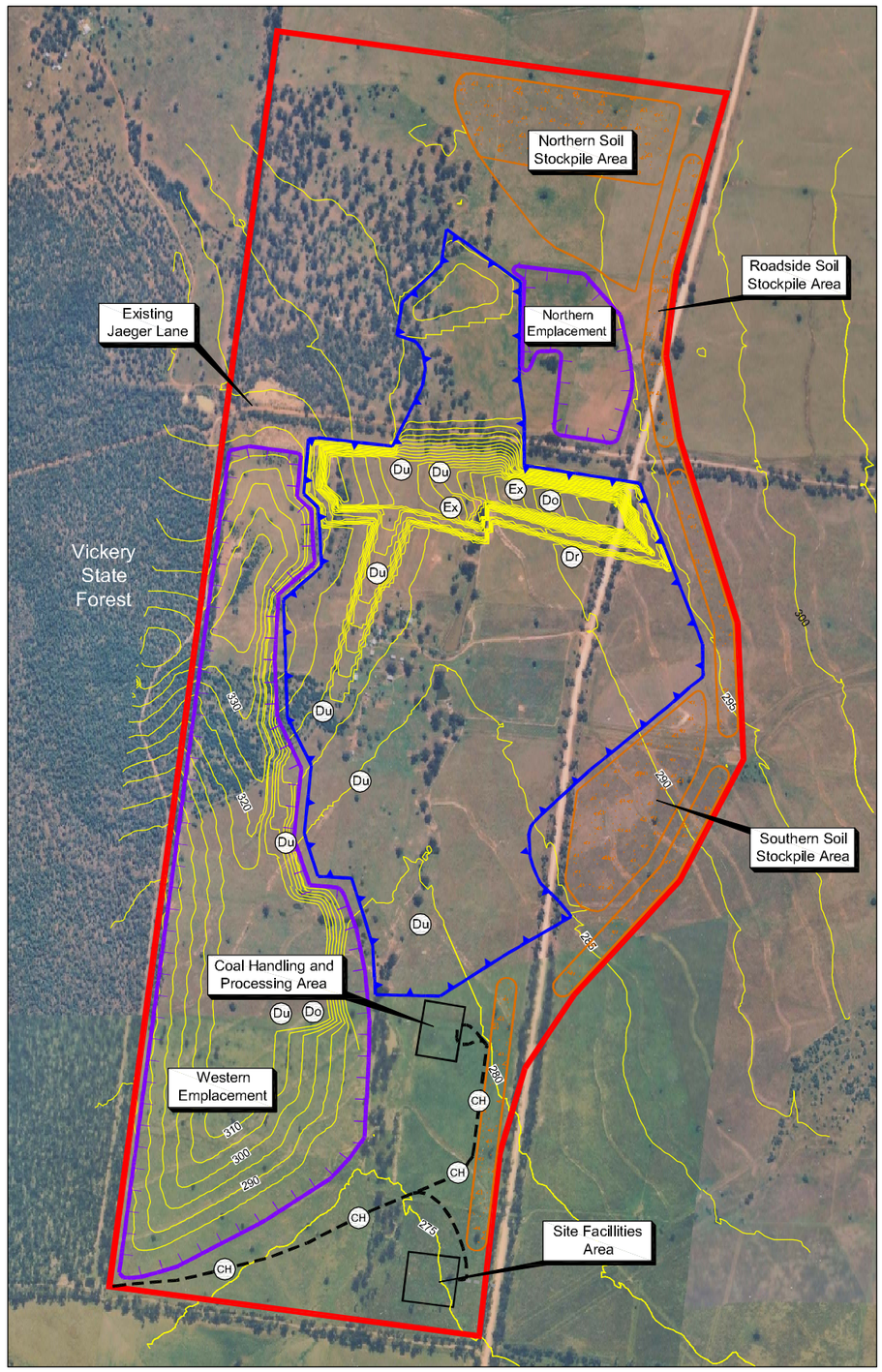
Tables 4B.21, 4B.22 and **4B.23** present the predicted L_{max} noise levels for the identified scenarios.

For both Year 1 and Year 7 mining scenarios, maximum noise levels (dB(A),L_{max}) predicted to be received at the three assessment locations are well below the sleep disturbance criteria of 45dB(A).

\\SERVER\RWC\584\58401\CAD\584Base_4B.15A Noise Sources.DWG



SCENARIO 2: YEAR 1 MINING



SCENARIO 3: YEAR 3 MINING

SCALE 1:15 000

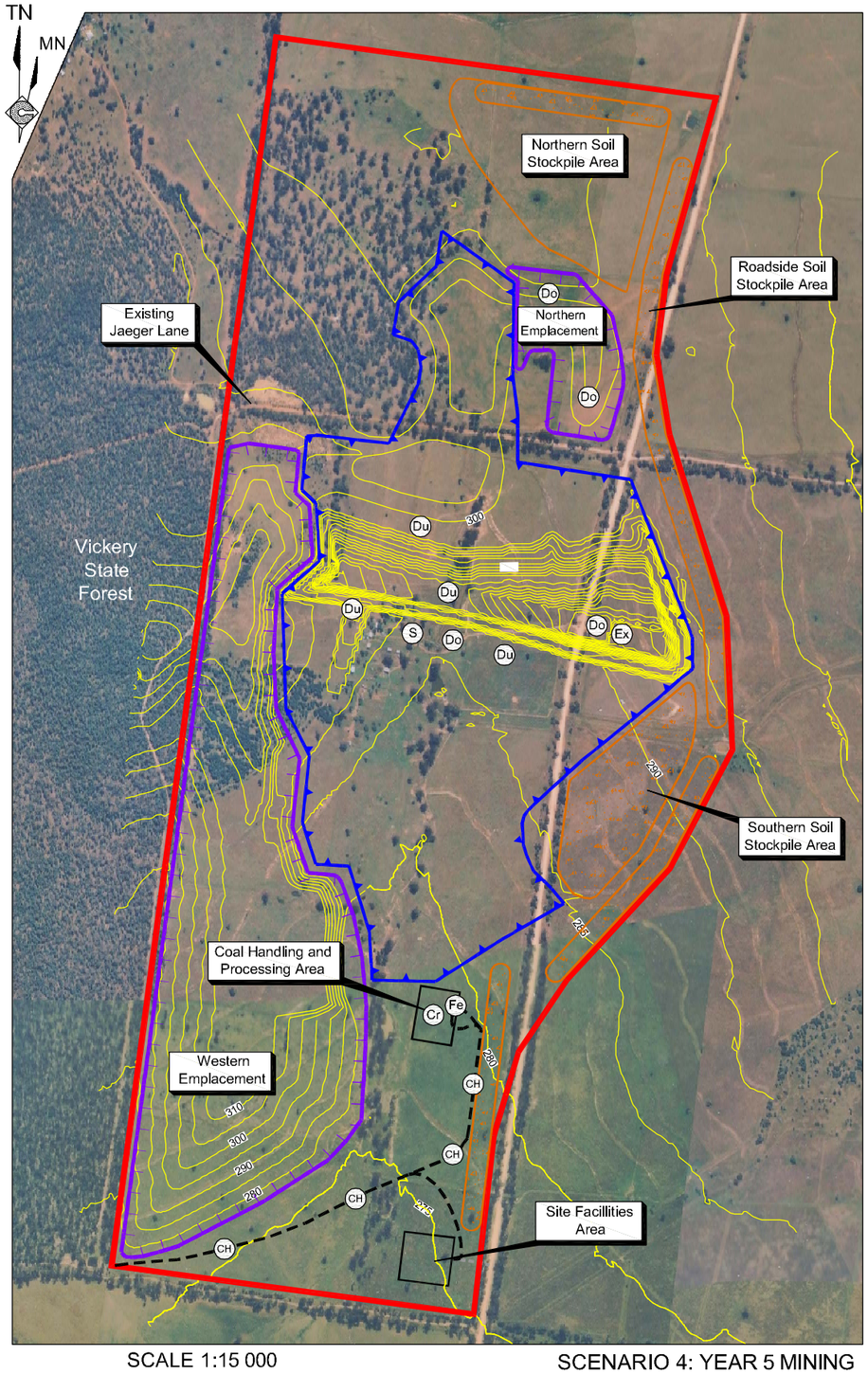
250 0 250 500 750 m

Source: Spectrum Acoustics (2007) - Figures 7 & 8

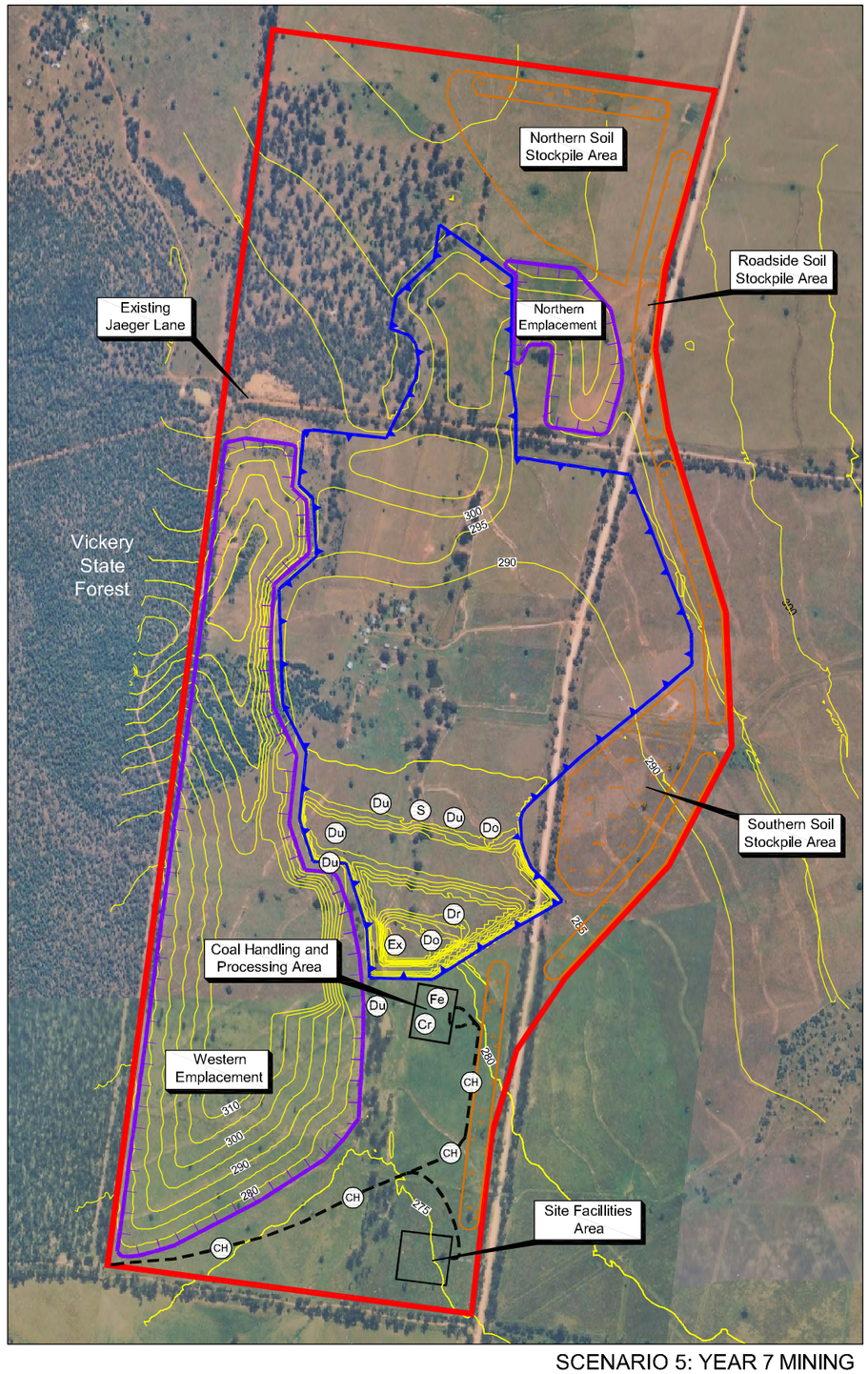
REFERENCE
- Project Site Boundary
- Limit of Open Cut Mining
- Limit of Out-of-Pit Overburden Emplacement
- Site Access Road
- Contour (m AHD)(Interval = 5m)
- Dr Drill
- Ex Excavator
- Do Dozer
- Du Dump Truck
- CH Coal Haulage Truck
- S Scraper
- Fe Front-end Loader
- Cr Crushing Plant

Figure 4B.15a
NOISE SOURCES FOR SELECTED SCENARIOS YEARS 1 AND 3

\\SERVER\RWC\584\58401\CAD\584Base_4B.15B Noise Sources.DWG



SCENARIO 4: YEAR 5 MINING



SCENARIO 5: YEAR 7 MINING

REFERENCE
- Project Site Boundary
- Limit of Open Cut Mining
- Limit of Out-of-Pit Overburden Emplacement
- Site Access Road
- Contour (m AHD)(Interval = 5m)
- Dr Drill
- Ex Excavator
- Do Dozer
- Du Dump Truck
- CH Coal Haulage Truck
- S Scraper
- Fe Front-end Loader
- Cr Crushing Plant

SCALE 1:15 000

250 0 250 500 750 m

Source: Spectrum Acoustics (2007) - Figures 9 & 10

Figure 4B.15b
NOISE SOURCES FOR SELECTED SCENARIOS YEARS 5 AND 7