



**Springvale
Mine Extension Project
Traffic Impact Assessment
July 2013**

prepared for

Springvale Coal Pty Ltd

prepared by

ARC Traffic + Transport

Contents

pg

pg

	Executive Summary	i			
			5	Potential Cumulative Traffic	40
	Introduction	1	5.1	APC Ventilation Facility Project	40
			5.2	APC Mine Extension Project	40
			5.3	Western Coal Services Project	40
			5.4	Neubeck Coal Mine Project	41
			5.5	Airly Coal Mine Project	41
			5.6	Coalpac Consolidation Project	41
			5.7	Annual Average Traffic Growth	42
			6	Cumulative Traffic Flows	43
			6.1	Pit Top Road Network	43
			6.2	NSF Road Network	45
			7	Future Road Network Operations	51
			7.1	Pit Top Road Network	51
			7.2	NSF Road Network	55
			8	Conclusions & Recommendations	58
			8.1	Pit Top	58
			8.2	NSF Road Network	59
			Appendix A	Traffic Surveys	
			Appendix B	RMS Crash Summary Data	
			Appendix C	Construction Traffic Schedule	
1	The Springvale Mine	4			
1.1	Location	4			
1.2	Operations	8			
1.3	Access	9			
1.4	Traffic Generation	11			
1.5	Parking	12			
2	Pit Top Road Network	14			
2.1	Key Roads	14			
2.2	Key Intersections	14			
2.3	Traffic Flows	15			
2.4	Road Network Operations	16			
2.5	Accident Data	21			
2.6	Contingency Coal Transport	21			
3	NSF Road Network	25			
3.1	Key Roads	25			
3.2	Key Intersection	26			
3.3	Traffic Flows	28			
3.4	Road Network Operations	31			
3.5	Accident Data	34			
4	Project Description	36			
4.1	Project Components	36			
4.2	Access	36			
4.3	Construction Traffic Generation	37			
4.4	Operational Traffic Generation	38			
4.5	Parking	39			

Executive Summary

The Springvale Mine Extension Project (the **Project**) provides for the continuation of mining at the Springvale Mine (**Springvale**) beyond September 2014 when the current Development Consent (**DA 11/92**) expires. The Project includes the continuance of existing operations at the Springvale Pit Top (the **Pit Top**) north of Wallerawang; the continuance of existing contingency provisions for the transport of coal by road to the nearby Wallerawang Power Station (**WPS**) and Mt Piper Power Station (**MPPS**); and the provision of new surface infrastructure on the Newnes Plateau within the Newnes State Forest (**NSF**).

ARC Traffic + Transport (**ARC**) has completed an independent assessment of the access and traffic implications of the Project. The conclusions and recommendations of that assessment are provided below.

Pit Top Road Network

Intersection Castlereagh Highway & Mine Access Road

The Project will not alter the characteristics of the existing Pit Top traffic generation. **No additional traffic would be generated by the Project to the local and sub-regional traffic network which provides access to the Pit Top via the intersection of Castlereagh Highway & Mine Access Road.**

While the Project would not generate additional traffic to the Castlereagh Highway, annual average traffic growth and other sub-regional traffic generating projects would increase traffic flows over existing levels through the life of the Project. Further to consideration of these factors, the intersection would continue to operate at a good level of service through a 10 year forecast horizon to 2024, with low average delays and significant spare capacity across the day.

Notwithstanding, continued Springvale traffic generation, annual average growth and other sub-regional traffic generating projects will over time generate total flows that would meet AustRoads warrants for an upgrade of the existing Castlereagh Highway to Mine Access Road right turn treatment. By 2017, these warrants would be met across extended morning and afternoon Springvale shift arrival periods on most weekdays.

Recommendation That the right turn treatment Castlereagh Highway to Mine Access Road be upgraded from the existing Auxiliary Right treatment to a Channelised Right treatment. The design and implementation of the upgrade would be finalised further to consultation with the RMS.

Castlereagh Highway Capacity

The Castlereagh Highway will continue to operate at a good level of service across the day and week, providing drivers with a stable traffic flow in which they are generally free to select their desired speed, and to manoeuvre within the traffic stream with relative ease. Castlereagh Highway flows would remain well below Roads & Maritime Service capacity targets through 2024.

Contingency Coal Transport

The contingency transport of coal via the public road network would not significantly impact the performance of the intersection of Castlereagh Highway & Mine Access Road through 2024, nor would it significantly impact the operation of the intersections along the contingency coal transport route between the Pit Top and the WPS and MPPS. These intersections will continue to operate with low average delays and significant spare capacity even in peak periods; and each provides appropriate basic geometry and sight distances to accommodate heavy vehicles.

Moreover, the regular maintenance of the existing overland coal conveyor system means that the potential for contingency coal road transport to be required is minimal.

Newnes State Forest Road Network

Access to the NSF Project Sites

During both the construction and operational phase of the Project, access into the NSF for heavy vehicles will be restricted to a route via Chifley Road and Old Bells Line of Road at Clarence. Light vehicles could utilise this route via Clarence or a route via State Gully Mine Road north of Lithgow. Primary access within the NSF for all vehicles will be via Glowworm Tunnel Road (Services Bore, Bore 9 and Bore 10) and Maiyingu Marragu Trail (Services Bore).

The Project provides for upgrades and extensions to existing access tracks to Bore 9 and Bore 10 from Glowworm Tunnel Road; and a short new access track to the Services Bore from Maiyingu Marragu Trail. It has been agreed with Forestry Corporation NSW (**FCNSW**) that an access track (5 m) and adjacent Infrastructure Corridor (5 m) will be provided to each NSF Project Site, with each Infrastructure Corridor to be remediated after installation, retaining a 5 m access track which would appropriately provide for the peak traffic demands of each NSF Project Site.

Recommendation That heavy vehicle trips to/from the NSF Project Sites during both construction and operation be undertaken during daylight hours, which would generally require them to occur between 6:00am and 6:00pm.

Construction Traffic Generation

During the construction phase of a NSF Project Site, up to 16 vehicle trips per day (vtpd) would be generated, averaging 8 heavy vtpd and 8 light vtpd.

For the construction of the Services Bore, an average of 8 heavy vtpd would be generated in Old Bells Line of Road, and an average of 8 light vtpd would be generated in State Mine Gully Road. A total of 16 vtpd would be then generated in Glowworm Tunnel Road and Maiyingu Marragu Trail to the Service Bore access track.

For the construction of Bore 9 and Bore 10, an average of 8 heavy vtpd would be generated in Old Bells Line of Road, and an average of 8 light vtpd would be generated in State Mine Gully Road. A total of 16 vtpd would then be generated in Glowworm Tunnel to the Bore 9 and Bore 10 access tracks.

Construction Traffic Impacts & Impact Mitigation

The traffic generated by the construction of the NSF Project Sites would not significantly impact the operation of the NSF road network or the NSF access intersections at Clarence and north Lithgow. This is a function of the low traffic generation potential of the construction phase of the Project and the available capacity within the NSF road network and at the NSF access intersections. This conclusion appropriately considers periods where NSF Project Site construction will coincide with other traffic generating projects within the NSF.

Construction vehicle access at each of the NSF Project Sites will be provided with consideration of sight distances, gradients and carriageway widths so as to ensure the safety of other NSF users, and all construction vehicle parking will be provided within NSF Project Site compounds.

Recommendation That a Construction Traffic Management Plan be prepared in consultation with FCNSW and Lithgow City Council and implemented for the duration of the construction phase at each NSF Project Site.

Operational Traffic Generation

During the operational phase of a NSF Project Site, up to 10 vehicle trips per week (vtpw) would be generated, generally comprising up to 6 heavy vtpd and 4 light vtpd.

For the operation of the Services Bore, an average of 6 heavy vtpw would be generated in Old Bells Line of Road, and an average of 4 light vtpw would be generated in State Mine Gully Road. A total of 10 vtpw would then be generated in Glowworm Tunnel Road and Maiyingu Marragu Trail to the Service Bore access track.

For the operation of Bore 9 and Bore 10, an average of 6 heavy vtpw would be generated in Old Bells Line of Road, and an average of 4 light vtpw would be generated in State Mine Gully Road. A total of 10 vtpw would then be generated in Glowworm Tunnel Road to the Bore 9 and Bore 10 access tracks.

Operational Traffic Impacts & Impact Mitigation

The traffic generated by the operation of the NSF Project Sites would not significantly impact the operation of the NSF road network or the NSF access intersections at Clarence and north Lithgow. This is a function of the very low traffic generation potential of the operational phase of the Project and the available capacity within the NSF road network and at the NSF access intersections. This conclusion appropriately considers periods where NSF Project Site operations will coincide with other traffic generating projects within the NSF.

All operational vehicle parking demands will be met within the NSF Project Site compounds.

Recommendation That an Operational Traffic Management Plan be prepared in consultation with FCNSW and Lithgow City Council and implemented for the duration of the operational phase at each NSF Project Site.

NSF Road Network Impact Mitigation

Further to the remediation proposals detailed in the Springvale Mine Extension Project Environmental Impact Statement (**Project EIS**) for each NSF Project Site, the potential exists for minor remedial works to be required within the NSF prior to or during the construction and/or operation of the NSF Project Sites as a result of wear caused by Project vehicles; by significantly adverse weather conditions within the NSF; or a combination of these or other factors.

Recommendation That any NSF road network remedial tasks arising from the construction or operation of the NSF Project Sites be appropriately managed in conjunction with FCNSW.

Following our assessment of the key issues associated with the Project, and with the application of the recommendations outlined above, ARC Traffic + Transport has concluded that the Project is supportable from an access and traffic perspective.

Introduction

i. Project Overview

The Springvale Mine (**Springvale**) is located northwest of Lithgow, NSW. Springvale Coal proposes a continuation of its mining operations at Springvale, under Part 4: Division 4.1 of the NSW Environmental Planning and Assessment Act 1979 (**EP&A Act**). Overall, the objective of the Springvale Mine Extension Project (the **Project**) is to obtain approval for the continuation of mining at Springvale beyond September 2014 when its Development Consent (**DA 11/92**) expires.

Specifically the Project will: -

- continue to extract up to 4.5 million tonnes per annum (**Mtpa**) of run of mine (**ROM**) coal from the Lithgow Seam underlying the Project Application Area;
- develop underground access headings and roadways from the current mining area to the east to allow access to the proposed mining areas;
- undertake secondary extraction by retreat longwall mining technique for the proposed longwalls LW416 to LW432 and LW501 to LW503;
- continue to use the existing ancillary surface facilities at the Springvale Pit Top (the **Pit Top**);
- continue to manage the handling of ROM coal through a crusher and screening plant at the Pit Top, and the subsequent loading of the coal onto the existing overland conveyor system for despatch to offsite locations;
- continue to operate and maintain the existing ancillary surface infrastructure for ventilation, electricity, water, materials supply, and communications at the Springvale pit top and on Newnes Plateau;
- install and operate two additional dewatering bore facilities (**Bore 9** and **Bore 10**) on Newnes Plateau and the associated power and pipeline infrastructure, and upgrade the existing and construct two new sections of access tracks to Bores 9 and 10 facilities;
- construct a downcast ventilation borehole at the Bore 10 facility location;
- establish a **Services Borehole** area;
- upgrade the existing Springvale Delta Water Transfer Scheme (**SDWTS**) comprising construction of new sections of the trenched pipelines to increase the water delivery capacity of SDWTS from the existing 30 ML/day to up to 50 ML/day;
- manage mine inflows using a combination of direct water transfer to the Wallerawang Power Station (**WPS**), via the SDWTS, and discharge through Angus Place Mine's licensed discharge point LDP001 and Springvale's LDP009;
- continue to undertake existing and initiate new environmental monitoring programs;
- continue to operate 24 hours per day seven days per week;
- continue to provide employment to a full time workforce of up to 310 persons;
- progressively rehabilitate disturbed areas at infrastructure sites no longer required for mining operations;

- undertake life-of-mine rehabilitation at the Springvale pit top and the Newnes Plateau infrastructure disturbance areas to create final landforms commensurate with the surrounding areas and the relevant zonings of the respective areas;
- transfer the operational management of coal processing and distribution infrastructure to the proposed Centennial Western Coal Services Project (**WCS Project**).

Full details of the Project are provided in the Springvale Mine Extension Project Environmental Impact Statement (**Project EIS**).

ii. Assessment Criteria & Methodology

ARC Traffic + Transport (**ARC**) has been commissioned by Springvale Coal to prepare this Traffic Impact Assessment (**TIA**) to appropriately and independently assess the access and traffic issues associated with the Project.

This TIA examines the existing Springvale operations (**Section 1**) and the road networks which provide for the Pit Top (**Section 2**) and for the proposed Project Sites within the Newnes State Forest (**NSF**) (**Section 3**). An assessment of the access and traffic characteristics of the Project (**Section 4**) is then paired with an assessment of cumulative traffic increases arising from the generation of other proposed sub-regional projects and annual average increases in traffic flows (**Section 5** and **Section 6**).

The operations of both the Pit Top and NSF road networks through a future design year 2024 (which provides an appropriate 10 year future flow forecast) are examined in **Section 7**, along with specific strategies by which potential impacts associated with the Project will be ameliorated.

This methodology specifically responds to the Director-General's Requirements (**DGRs**) reference SSD 5594 (6th November 2012), which provide the following in regard to traffic and transport: -

"Traffic & Transport – including:

- o *an assessment of potential traffic impacts on the capacity, efficiency and safety of the road network; and*
- o *a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network in the surrounding area over the life of the development"*

This TIA also references the traffic and transport guidelines and assessment criteria noted within the DGRs, and more broadly as appropriate to the specific Project characteristics. Key references include: -

- RTA Guide to Traffic Generating Developments (**RTA Guide**) and Road Design Guide (**RTA RDG**)
- AustRoads Rural Road Design Guide (**AustRoads RRDG**); Guide to Road Design Part 4A Unsignalised & Signalised Intersections (**AustRoads GRD4A**); Guide to Traffic Engineering Practice Part 2 Roadway Capacity (**AustRoads**

GTEP2); Guide to Traffic Engineering Practice Part 5 Intersections at Grade (**AustRoads GTEP5**); and AustRoads *Vehicle Classification System* (**AustRoads VCS**)

- Australian Road Research Board Unsealed Roads Manual (**ARRB URM**)
- *Forestry Act 2012*
- State Forests of NSW Forest Practices Code: Part 4 Forest Roads & Fire Trails (**FPC4**)

ARC has consulted with Forest Corporation NSW (**FCNSW**) in regard to general traffic operating conditions and permits within State Forests in NSW; and with the Roads & Maritime Services (**RMS**) in regard to accident data. ARC acknowledges the assistance provided by FCNSW and RMS officers.

1 The Springvale Mine

1.1 Location

Springvale is located northwest of Lithgow, NSW. The Project Application Area (**PAA**) is shown in **Figure 1.1.1**. The Pit Top, which is located off the Castlereagh Highway almost directly north of the WPS, along with the broader sub-regional road network which provides connectivity for the Pit Top, is shown in **Figure 1.1.2**.

The propose surface infrastructure sites within the NSF - collectively the **NSF Project Sites** - are shown in **Figure 1.1.3**. They include: -

- A Mine Services Borehole Compound (**Services Bore**) located north of Maiyingu Marragu Trail, north-west of the intersection with Glowworm Tunnel Road. Access to the Services Bore would be provided by a short new access track from Maiyingu Marragu Trail.
- A Dewatering Bore site (**Bore 9**) located approximately 5 km north of Glowworm Tunnel Road. Access to Bore 9 would be provided by the upgrade and extension of an existing NSF access track north from Glowworm Tunnel Road.
- A Dewatering Bore site (**Bore 10**) located south of Glowworm Tunnel Road approximately 3 km north-east of the intersection with Maiyingu Marragu Trail. Access to Bore 10 would be provided by the upgrade and extension of an existing NSF access track south from Glowworm Tunnel Road.
- New and recommissioned cabling corridors (**Infrastructure Corridors**) linking trenching pipelines from Bore 9 and Bore 10 to the existing Springvale Delta Water Transfer Scheme, and trenching power cables to the existing Springvale Substation 4 located within the NSF.

Figure 1.1.1 Project Application Area

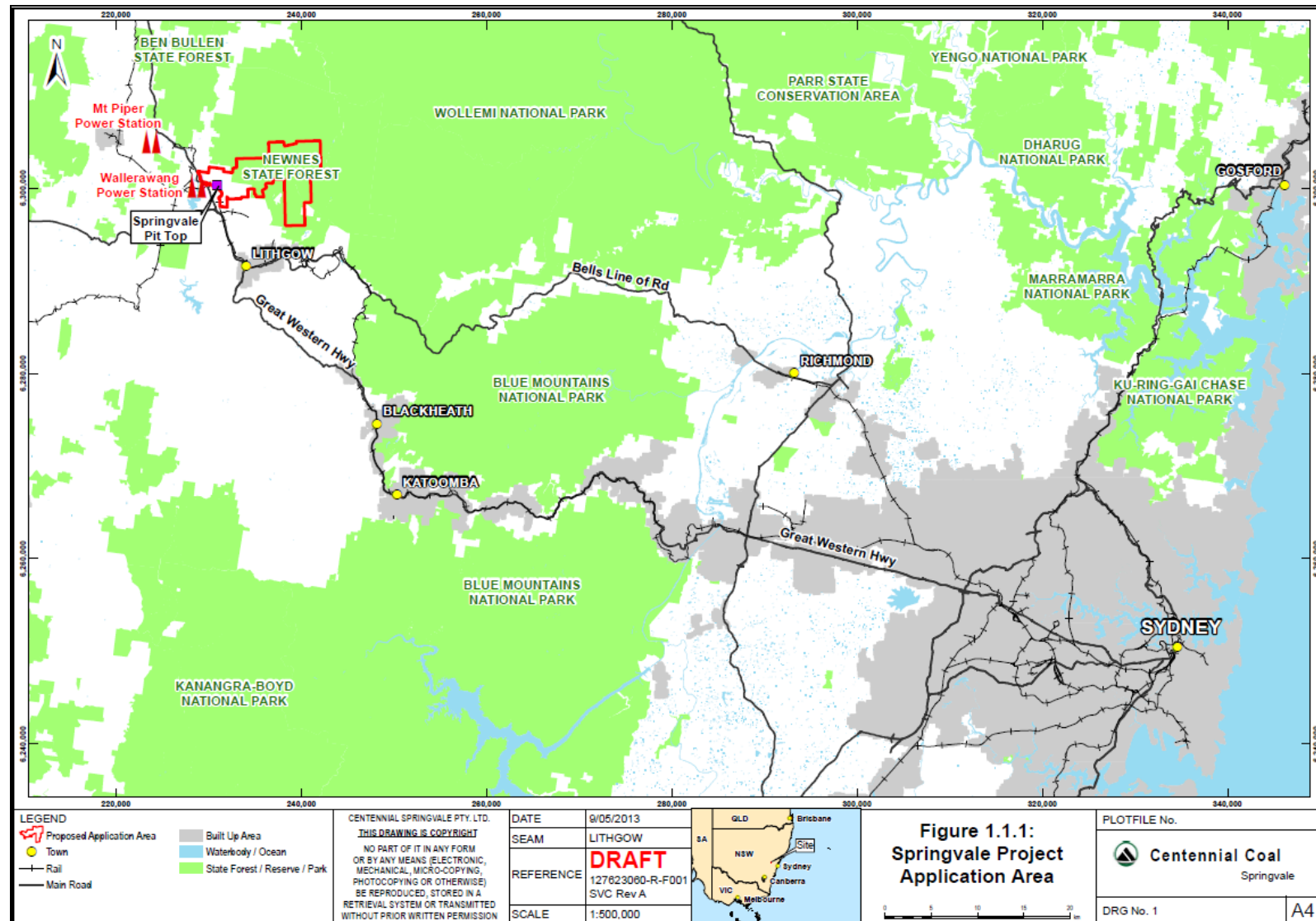


Figure 1.1.2 Pit Top Road Network

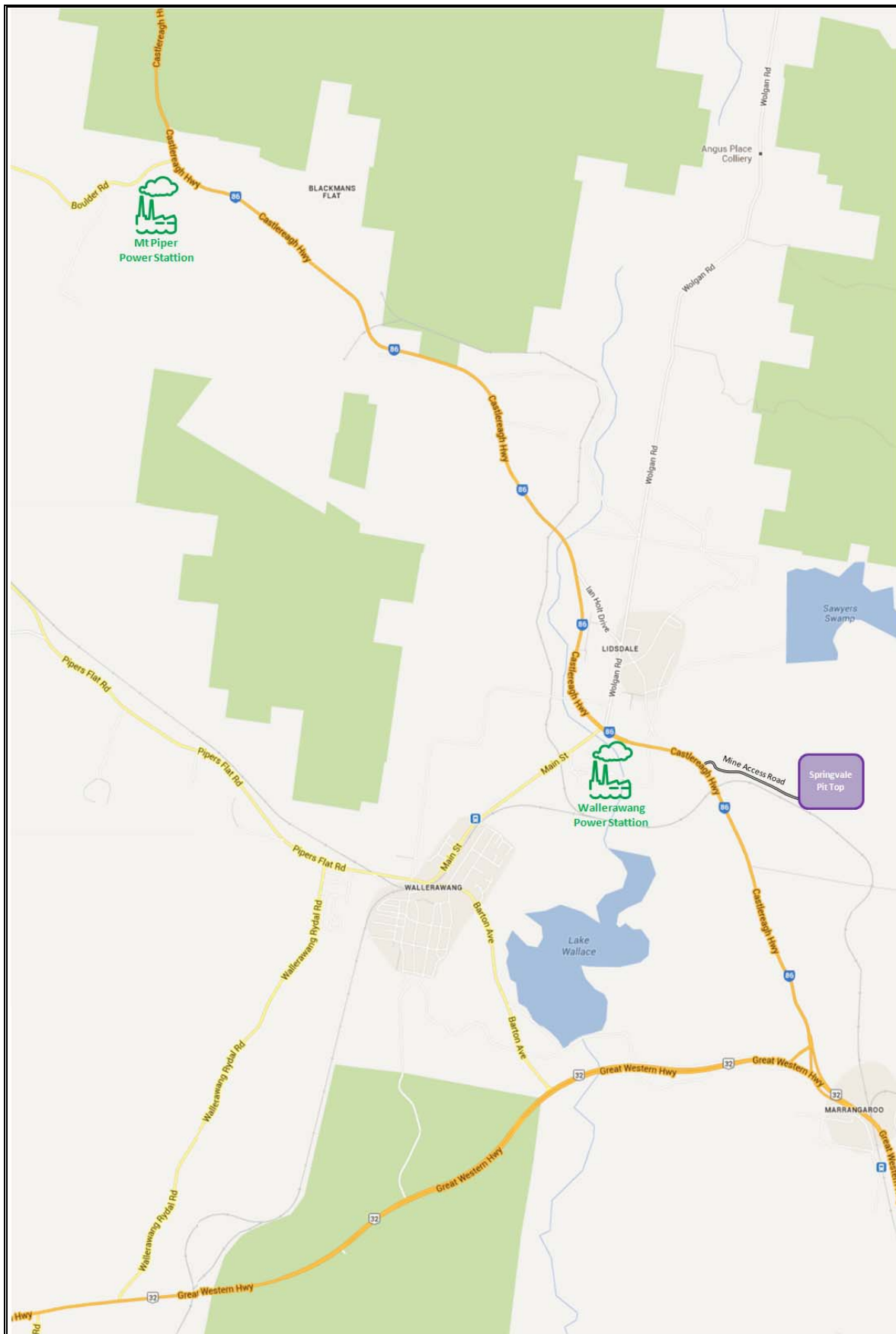
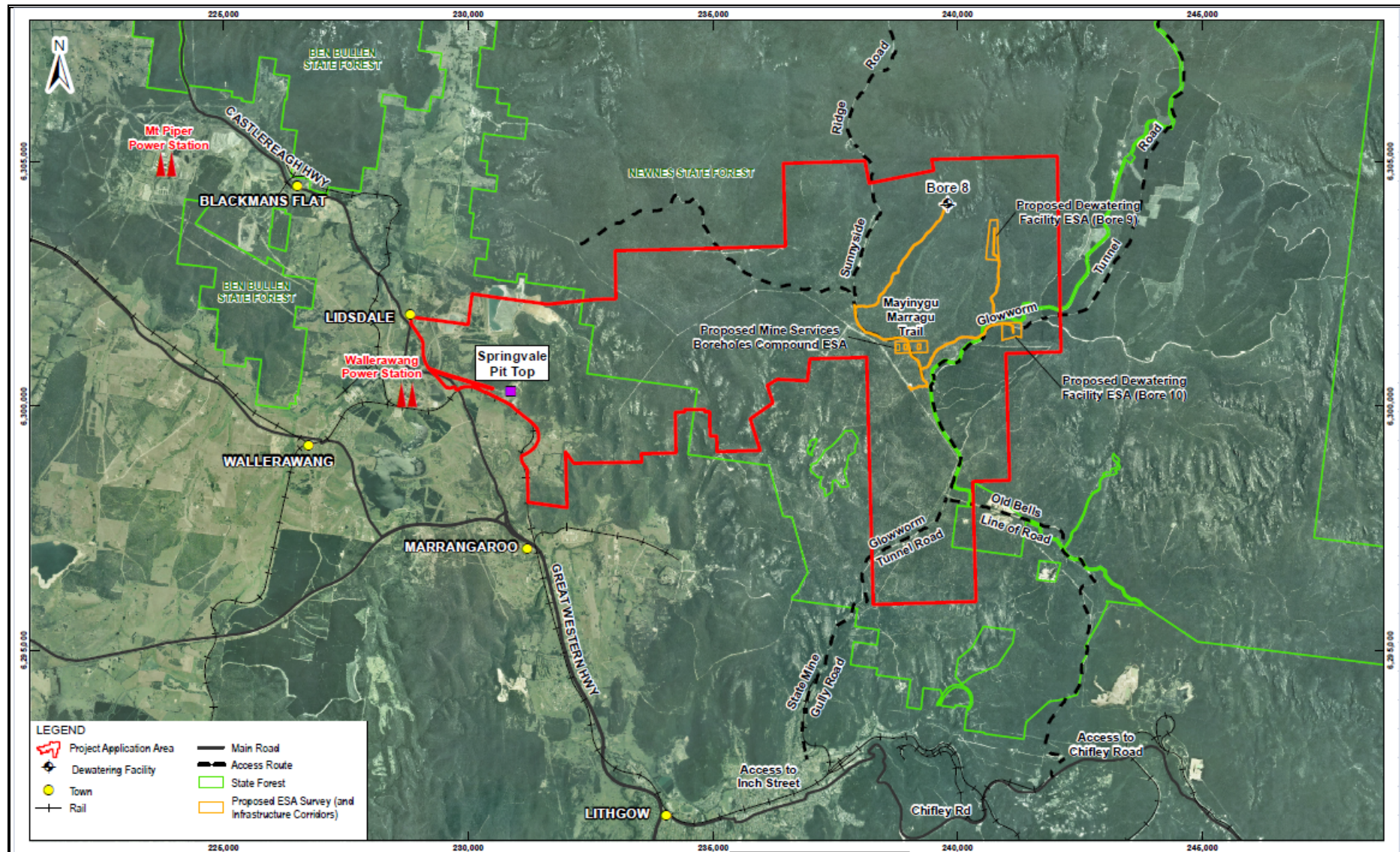


Figure 1.1.3 NSF Road Network and Project Sites



1.2 Operations

1.2.1 Background & Approvals

Springvale is an underground coal mine producing high quality thermal coal which is supplied to both domestic and international markets. Domestically, Springvale has established long term contracts with two local power stations, the WPS and MPPS; coal is distributed to these power stations via dedicated overland conveyors. Coal is also distributed via overland conveyors to the Springvale Coal Services facility (**SCS Facility**) at Blackmans Flat; from the SCS Facility, the international market is accessed via Centennial's Lidsdale Siding rail loading facility.

Notwithstanding, Schedule 2 Condition 7(b) of DA 11/92 states:

"The Applicant may transport up to 50,000 tpa of coal to local domestic market customers by road haulage."

The Project provides for the retention of this Condition, which essentially provides contingency for the transport of coal to the WPS and MPPS via the public road network in the event of the overland conveyor system being unavailable. It is our understanding that this existing contingency has not to date been acted upon by Springvale.

Springvale Coal recently (2013) submitted an application to modify existing DA 11/92, to allow for an increased annual capacity (to 4.5 Mtpa) and for a minor increase in Pit Top staff (7 additional staff per day, afternoon and night shift). The **Springvale MOD Project** application is currently before the DP&I for approval.

More generally, coal processing and distribution is currently managed by Springvale Coal Services, a separate Centennial business unit. Centennial has recently proposed the amalgamation of the existing coal processing and transport facilities, currently undertaken as part of the DA 11/92, into the consent of the proposed WCS Project. This would be an administrative transfer of the existing infrastructure between two of Centennial's business units. For this reason, transport [by overland conveyor] of ROM coal from the Pit Top to the WPS, MPPS and SCS Facility is not part of this Project.

The potential traffic generation to the public road network associated with the construction and operation of the WCS Project has been examined to account for potential future cumulative impacts (see **Section 5**).

1.2.2 Staff & Shifts

Springvale operates 24 hours a day, 7 days a week, and further to the Springvale MOD Project employs 310 full-time staff and up to 70 contract staff. Shifts and staffing levels are shown below in **Table 1.2.2**.

Table 1.2.2 Springvale Staff & Shifts 2013

Springvale Shifts & Staff Numbers	Weekday Shifts			Weekend Shifts	
	Day	Afternoon	Night	Day	Night
	6:00am - 4:00pm	2:00pm - 12:00pm	10:00pm - 8:00am	6:00am - 6:00pm	6:00pm - 6:00am
Mining	73	51	57	44	26
General	36	1	1	2	1
Contractor	14	12	8		
Total	123	64	66	46	27

With reference to **Table 1.2.2**, "General" (administration) staff have varying start times between 5:00 am and 8:00 am, and finishing times between 3:00 pm and 6:00 pm.

1.3 Access

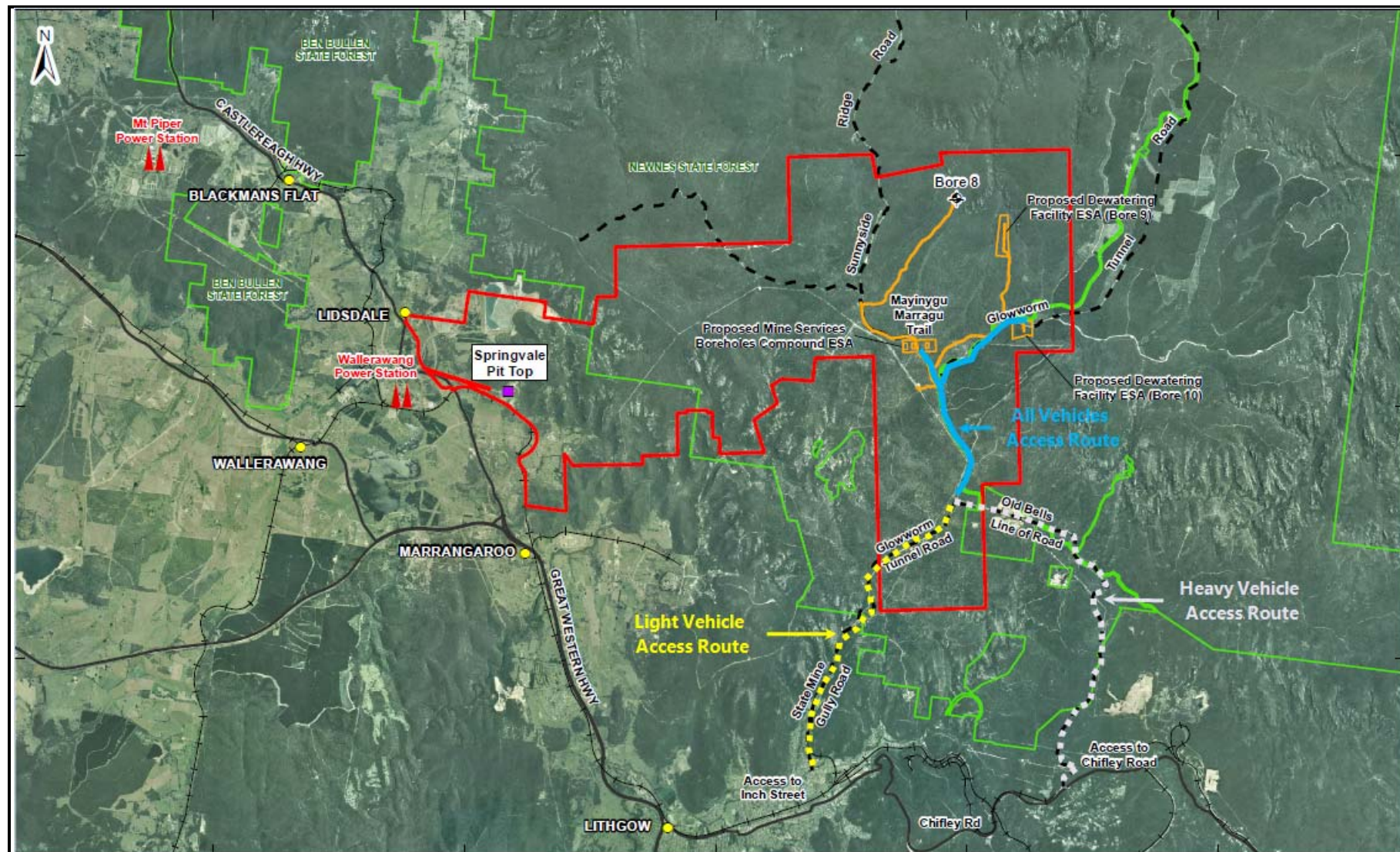
1.3.1 Pit Top Access

All staff and service vehicle access to the Pit Top is provided via Mine Access Road which intersects with the Castlereagh Highway at Wallerawang. From the Castlereagh Highway, access is readily available to the sub-regional and regional road network.

1.3.2 NSF Project Site Access

Access to the NSF Project Sites is available via two routes from the existing sub-regional network, which are shown in **Figure 1.3.2**. These access routes are currently used by Springvale Coal vehicles undertaking infrastructure maintenance and approved exploration activities within NSF, and are also used by a variety of other vehicles associated with logging and forestry management; by the adjacent Angus Place mine (**APC**) and other mining and exploration vehicles; and by recreational vehicles.

Figure 1.3.2 NSF Project Site Access Routes



1.3.2.1 Heavy Vehicle Access Route

Heavy vehicles are defined with reference to the AustRoads *Vehicle Classification System* (**AustRoads VCS**, provided in **Appendix A**) and include Class 3 – Class 12 vehicles. Heavy vehicles are/will be required to use the designated heavy vehicle route into the NSF (shown in **Figure 1.3.2**) via Old Bells Line of Road at Clarence, and then along a route including Glowworm Tunnel Road (Bore 9 and Bore 10) and Mayinygu Marragu Trail (Services Bore).

1.3.2.2 Light Vehicle Access Routes

Light vehicles are defined with reference to AustRoads VCS as Class 1 and Class 2 vehicles. The designated heavy vehicle access route via Old Bells Line of Road at Clarence is available to light vehicles, along with a route via State Mine Gully Road north of Lithgow (shown in **Figure 1.3.2**), and then also along Glowworm Tunnel Road (Bore 9 and Bore 10) and Mayinygu Marragu Trail (Services Bore).

1.4 Traffic Generation

1.4.1 Pit Top

The traffic generation of the Pit Top comprises mining staff trips along with office, visitor and [minor] service vehicle demands. Almost the entire staff complement drives to the Pit Top in private vehicles, and there is only a very minor level of car sharing. This is not surprising considering the nature and hours of the work; the location of the Pit Top; and the appropriate provision of parking at the Pit Top.

The Pit Top generates peak traffic flows over 1 – 2 hours periods prior to and following the shifts outlined in **Table 1.2.2**, and traffic flows during these periods generally mirror staff numbers. Broad peak periods include: -

- | | |
|----------------------|-----------------------------------|
| ➤ 5:00 – 6:30 am | Approximately 125 arrival trips |
| ➤ 7:30 – 9:00 am | Approximately 60 departure trips |
| ➤ 12:30 – 14:00 pm | Approximately 70 arrival trips |
| ➤ 15:30 – 17:00 pm | Approximately 125 departure trips |
| ➤ 20:30 – 22:00 pm | Approximately 60 arrival trips |
| ➤ 11:30 pm – 1:00 am | Approximately 70 departure trips |

An average of approximately 600 light vehicle trips per day (**vtpd**) are generated to/from the Pit Top.

This level of Pit Top staff trip generation – and the distribution of trips across the day - would not be affected by the Project.

In addition, the Pit Top generates a moderate heavy vehicle demand of some 100 heavy vtpd, which includes deliveries of equipment and light materials; maintenance vehicles; and occasionally machinery and the like. The majority of heavy vehicle trips are made by smaller heavy vehicles (Class 4 with reference to AustRoads VCS).

This level of Pit Top heavy vehicle trip generation would similarly be unaffected by the Project.

As noted in **Section 1.2.1**, DA 11/92 provides for contingency coal transport via the public road network. The current contingency plans provide for up to 3 heavy vehicles (likely Class 10 with reference to AustRoads VCS) carrying an average of 40 tonnes of coal per vehicle between the Pit Top and the local power stations. With vehicles looping to the nearer WPS (i.e. less travel time), it is estimated that up to 18 heavy vehicle trips per hour (**vtph**) could be generated.

Based on this maximum trip rate, the DA 11/92 contingency coal transport limit of 50,000 tonnes per annum could be transported in approximately 6 days if all coal were sent to WPS, 24 hours per day. If all coal were sent to MPPS, up to 12 heavy vtph could be generated (due to the longer travel distance) and the limit of 50,000 tonnes per annum achieved in approximately 10 days.

These contingency provisions – and the potential trip generation arising from their implementation - would be unchanged by the Project.

The broader operation of the road network which provides access to the Pit Top is examined in **Section 2**.

1.4.2 NSF Project Sites

The NSF Project Sites have over recent months seen minor activity associated with exploration and preliminary environmental studies for the Project, but generally comprises only a small number of vehicle trips per week. Most vehicles currently travelling to the NSF Project Sites are light vehicles.

The operation of the road network which provides access to the NSF Project Sites is examined in **Section 3**.

1.5 Parking

1.5.1 Pit Top

Parking which provides in full for the staff and heavy vehicle demands of the Pit Top is provided on-site; Springvale generates no off-site parking demand.

The primary staff parking area is located in the south-eastern section of the Pit Top and provides 203 parking spaces, comprising 149 covered spaces and 54 uncovered spaces. The current (post Springvale MOD Project) peak on-site

demand – which occurs during the change-over period between the Night Shift and Day Shift (between 6:00 am and 8:00 am) – is for some 189 parking spaces; as such the available parking provides spare capacity even during this peak demand period.

1.5.2 NSF Project Sites

Parking is currently provided within secure compounds at each of the existing Springvale surface infrastructure compounds within the NSF; the Project would provide compound parking at each of the NSF Project Sites.

2 Pit Top Road Network

The road network which provides access to the Pit Top is shown in **Figure 1.1.2** and is described in more detail below.

2.1 Key Roads

2.1.1 Castlereagh Highway

The Castlereagh Highway (State Highway 18, State Route 86) is a regional highway connecting the Great Western Highway at Marrangaroo to Mudgee and Gulgong and then further through north-west NSW. The Castlereagh Highway generally provides two traffic lanes and well designed at-grade and grade separated intersections appropriate to the through and turning traffic demands in this part of the regional network.

The Castlereagh Highway has a posted speed limit of 80 km/h through the section of the local network that includes the intersections with Wolgan Road and Main Road west of Mine Access Road, but otherwise is generally 100 km/h (with the transition located immediately west of Mine Access Road).

2.1.2 Great Western Highway

The Great Western Highway (State Highway 5, National Route 32) is a regional highway which intersects with the Castlereagh Highway at Marrangaroo. The Great Western Highway links to the east to Lithgow, Katoomba and then through to the broader Sydney metropolitan area (M4); and to the west to Bathurst.

2.1.3 Mine Access Road

Mine Access Road operates as a private access road linking the Pit Top with the Castlereagh Highway. Mine Access Road provides two wide traffic lanes and generates no flows other than those generated by the Pit Top.

2.2 Key Intersection

All access to the Pit Top is provided via the intersection of Castlereagh Highway & Mine Access Road. This intersection is the only location where the concentration of Springvale trip generation has potential for significant impact, and is therefore the key intersection for analysis in this TIA. Importantly, while the Project would not generate additional trips, annual average growth and other sub-regional traffic generating projects would over the life of the Project increase flows through the intersection, and specifically in the Castlereagh Highway.

With reference to AustRoads Guide to Traffic Engineering Practice Part 5 Intersections at Grade (AustRoads GTEP5), the intersection provides a Type B (or Auxiliary Right - **AUR**) right turn treatment for arrivals from the south, where a short section of the Castlereagh Highway is widened to provide 2 lanes such that a through (northbound) vehicle can pass a vehicle turning right into Mine Access Road.

The left turn from Castlereagh Highway to Mine Access Road is provided as a Channelised Left (**CHL**) turn treatment with a wide tapered splitter island, and then a Give Way intersection at Mine Access Road which provides priority to vehicles arriving from the immediate south (i.e. via the right turn from Castlereagh Highway).

A more detailed assessment of the intersection is provided in sections below.

2.3 Traffic Flows

In order to define traffic flows at the intersection of Castlereagh Highway & Mine Access Road, ARC commissioned a 24 hour intersection movement survey and the installation of automatic traffic counters (**ATCs**) in early 2013. The intersection survey was undertaken on Wednesday 20th February 2013, while ATCs were installed in the Castlereagh Highway (immediately south of Mine Access Road) and in Mine Access Road for a period of 7 days (20th – 26th February 2013).

The surveys were completed by Skyhigh Traffic Data (**Skyhigh**), and the full survey results are provided in **Appendix A**.

2.3.1 Castlereagh Highway Flows

The ATC reports an Average Daily Traffic (**ADT**) flow of 4,745 vtpd. The Average Weekday Traffic (**AWT**) flow is higher at 5,208 vtpd, while Friday 22nd February reported the highest daily flow at just under 6,000 vtpd.

Both the ADT and AWT report that heavy vehicles constitute approximately 14% of total flows; with reference to the AustRoads VCS, approximately 7% of total flows are Class 4 vehicles, and 7% are Class 5 - 11 vehicles (noting that Class 12 vehicles over 33m are not approved for travel on the Castlereagh Highway under RMS *Restricted Access Vehicle* regulations).

2.3.2 Mine Access Road

The ATC reports an ADT flow of 523 vtpd. The AWT flow is higher at 671 vtpd, while Wednesday 20th February reported the highest daily flow of 744 vtpd.

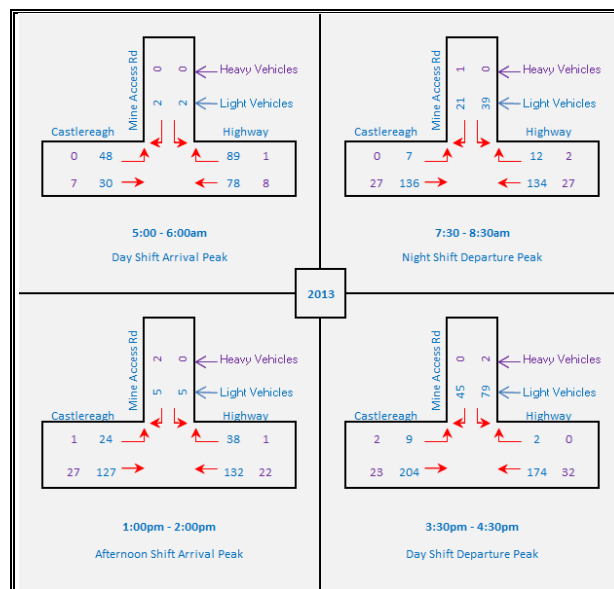
Both the ADT and AWT report that heavy vehicles constitute approximately 14% of total flows; with reference to the AustRoads VCS, approximately 12% of total flows are Class 4 vehicles, and 2% are Class 5 – 11 vehicles.

2.3.3 Peak Hour Flows

When examining a high speed rural intersection it is appropriate to examine a suitable set of peak hour flows for design purposes, and particularly to account for the variation in flows such as is evident in daily flows reported by the ATC in the Castlereagh Highway.

ARC has based the assessment of the intersection of Castlereagh Highway & Mine Access Road on **design peak flows** during the Springvale morning and afternoon shift arrival and departure periods; these flows represent the peak surveyed flows taken from the available weekday (ATC) survey data factored with reference to the intersection survey. As such, the design peak flows represent flows that are higher than both the weekday surveyed flows (20th February 2013) and the weekday average flows (across the split-week 20th – 22nd and 25th – 26th February 2013), and are shown in **Figure 2.3.3**.

Figure 2.3.3 2013 Design Peak Flows Castlereagh Highway & Mine Access Road



Source: Skyhigh & ARC

2.4 Road Network Operations

2.4.1 Intersection Operations

SIDRA is an RMS approved micro-analytical traffic evaluation tool used to determine key performance measures of intersections operation. The key inputs in the SIDRA analysis include peak hour traffic flows and speed profiles; intersection geometry and control; and vehicle entry profiles (gap acceptance) appropriate to the intersection design. SIDRA then reports the following: -

➤ Level of Service

Level of Service (**LoS**) is a basic performance indicator assigned to an intersection based on average delay; at priority controlled intersections, the reported LoS is based on the worst approach delay. The RMS LoS criteria, which have been used in the assessment, are provided below: -

Level of Service (RMS)	Control delay per vehicle in seconds (d) (including geometric delay)		
	Signals and Roundabouts	Rating	Stop and Give Way / Yield Signs
A	$d < 14.5$	Good	$d < 14.5$
B	$14.5 < d < 28.5$	Good with acceptable delay	$14.5 < d < 28.5$
C	$28.5 < d < 42.5$	Satisfactory	$28.5 < d < 42.5$
D	$42.5 < d < 56.5$	Near capacity	$42.5 < d < 56.5$
E	$56.5 < d < 70.5$	At capacity	$56.5 < d < 70.5$
F	$70.5 < d$	Over capacity	$70.5 < d$

➤ Delay

Delay represents the difference between interrupted and uninterrupted travel times through an intersection, and is measured in seconds per vehicle in this assessment. Delays include queued vehicles accelerating and decelerating from/to the intersection stop, as well as general delays to all vehicles travelling through the intersection. With reference to the LoS criteria above, the average intersection delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

➤ Degree of Saturation

Degree of Saturation (**DoS**) is defined as the ratio of demand (arrival) flow to capacity. DoS above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). The capacity of the movement with the highest DoS is reported.

The intersection of Castlereagh Highway & Mine Access Road has been assessed using the design peak flows shown in **Figure 2.3.3**, and with reference to the existing geometry, vehicles speeds and controls at the intersection. Operations during a period of contingency coal transport (as per **Section 1.4.1**) have also been assessed.

The results of the SIDRA modelling are provided below in **Table 2.4.1**

Table 2.4.1 2013 Intersection Operations (Design Peak Flows)

Castlereagh Highway & Mine Access Road 2013	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Queue (m)	
	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport
5:00 - 6:00 am	A	B	<10	<10	12.8	18.3	0.07	0.01	1.8	1.8
7:30 - 8:30 am	A	B	<10	<10	14.1	15.1	0.10	0.10	1.7	3.0
13:00 - 14:00 pm	A	B	<10	<10	13.3	19.8	0.09	0.09	0.8	2.2
15:30 - 16:30 pm	A	B	<10	<10	13.3	14.9	0.14	0.17	4.0	5.4

With reference to **Table 2.4.1**, the intersection currently operates at a good LoS, with very moderate delays and significant available capacity, during the Springvale morning and afternoon shift arrival and departure periods. The intersection would also operate at a good LoS during periods of contingency coal transport, with the additional minor delay relating specifically to the additional gap acceptance time allocated to heavy vehicle turns from Mine Access Road.

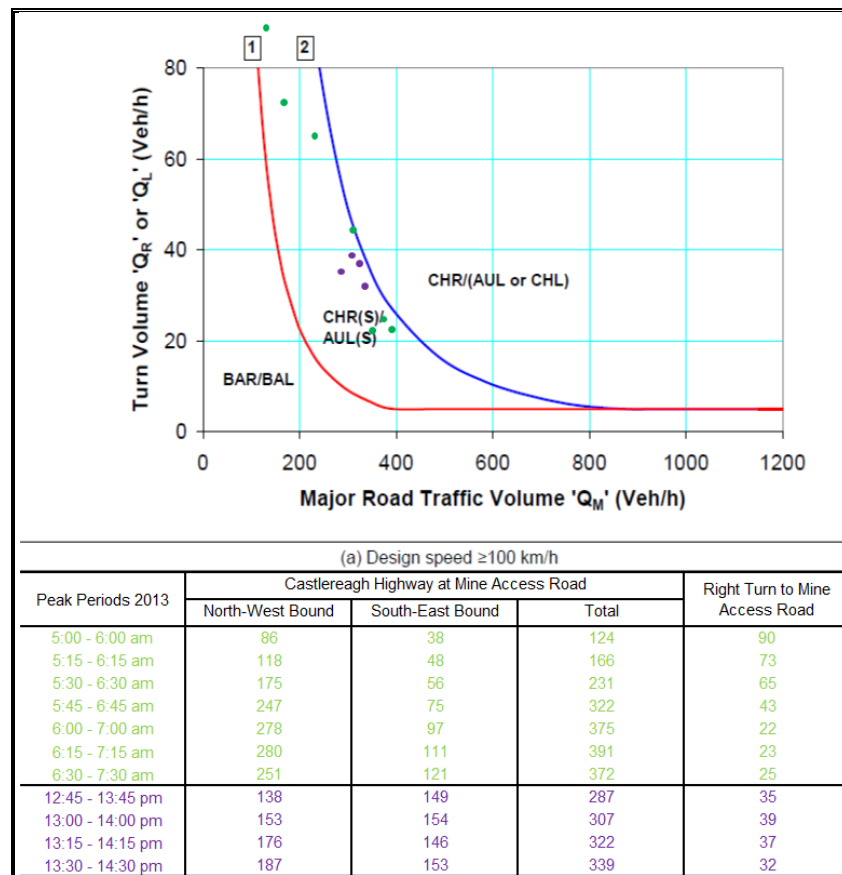
Outside of these peak arrival and departure periods, through flows in the Castlereagh Highway are at times higher but the turning demand to/from Mine Access Road is significantly lower. Sensitivity testing of peak periods across the day – including the hour 6:00 - 7:00 am during which many sub-regional mines generate day shift arrival peaks - reports very similar LoS and capacity conditions as those reported during the Springvale arrival and departure peaks outlined in **Table 2.4.1**.

2.4.2 Intersection Turn Warrants

The Type B/AUR turn treatment at the intersection of Castlereagh Highway & Mine Access Road and the warrants upon which the original design were likely based (AustRoads GTEP5) were superseded in 2009 by AustRoads Guide to Road Design Part 4A Unsignalised & Signalised Intersections (**AustRoads GRD4A**), which recommends the provision of Channelised Right (**CHR**) treatments over Type B/AUR treatments. A CHR treatment essentially provides a painted turn bay with tapers and appropriate markings, and is shown in AustRoads studies to provide benefits specifically with regard to rear-end crashes over AUR treatments. A CHR may have a full-length deceleration lane or it may have a reduced length deceleration lane in which case it is referred to as a CHR(Short) or **CHR(S)**.

Warrants for a CHR(S) and CHR treatments are provided in Section 4.8 of AustRoads GRD4A. Based on speeds at or above 100km/h (as have been surveyed in the Castlereagh Highway at Mine Access Road) and the design peak flows at the intersection over extended Springvale arrival periods (calculated as per **Figure 2.3.3**) ARC has reviewed current warrants for the right turn treatment Castlereagh Highway to Mine Access Road. The results of this warrants assessment are shown in **Figure 2.4.2**.

Figure 2.4.2 2013 Castlereagh Highway & Mine Access Road Turn Warrants



Note: The CHL provided for the left turn from Castlereagh Highway to Mine Access Road already provides what is essentially the highest level of turn treatment available with reference to either AustRoads GTEP5 or AustRoads GRD4A. Additionally, outside of the 5:00 am – 7:30 am (extended Springvale Day Shift arrival) and 12:45 pm – 14:30 pm (extended Springvale Afternoon Shift arrival) periods, the right turn demand from the Castlereagh Highway to Mine Access Road is negligible or, as during the Night Shift arrival period, through volumes in the Castlereagh Highway are minimal.

Reference to **Figure 2.4.2** indicates that based on design peak flows during the Springvale shift arrival periods, the intersection would currently warrant a CHR(S) turn treatment. This same conclusion can be made based on a warrants assessment using the [lower] weekday surveyed and weekday average flows at the intersection.

Importantly, this conclusion does not automatically trigger in and of itself an upgrade requirement; the cost associated with constantly upgrading intersections in accordance with revisions to standards and guidelines would be impractical, and the data shows that flows remain within the warrants for a CHR(S), which is essentially a revised AUR treatment. Any recommendation in regard to upgrading the intersection needs to reference the existing intersection profile/design; future traffic flows; and available information in regard to the operation and safety of the intersection.

An analysis of these issues with reference to future forecast flows at the intersection is provided in **Section 7.1.2**.

2.4.3 Castlereagh Highway Capacity

While the capacity of urban and rural roads is generally determined by the capacity of intersections (as per **Section 2.4.1** above) roads can also be assessed with reference to their general traffic carrying capacity. Table 4.5 of the RTA Guide to Traffic Generating Developments (**RTA Guide**) reproduced below provides a basic means by which to assess LoS for two-way, two-lane rural roads such as the Castlereagh Highway.

Table 2.4.3 RTA Guide (Table 4.5) Peak Hour Flow on Two-Lane Rural Roads

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

The LoS reported in Table 4.5 of the RTA Guide is based on conditions which are generally represented in the Castlereagh Highway in the sub-region, including: -

- A 60/40 directional split of traffic during peak periods;
- Level terrain with good overtaking opportunities; and
- Wide traffic lanes with good side clearances

With reference to the ATC traffic survey (**Appendix A**) the Castlereagh Highway immediately south-east of Mine Access Road reports a peak weekday average flow of 475 vtp, including a heavy vehicle component of 10%, in the hour 3:00 – 4:00 pm. This hour coincides with the end of Day Shift and start of Afternoon Shift activities at a number of sub-regional mines.

While a review of individual peak hours across the week of ATC data shows a small number of hours with marginally higher flows (up to a maximum 538 vtp in the same hour on Friday 22nd February), it is reasonable to conclude that the Castlereagh Highway adjacent to Mine Access Road generally operates at a LoS “B”, and has significant spare capacity within the RMS recommended operating performance standards (i.e. up to LoS “C” with reference to the RTA Guide).

2.5 Accident Data

The RMS has provided ARC with data in regard to accidents occurring in the road network adjacent to the Pit Top over the period 2007 – 2011. A crash plot indicating crash location and severity, and crash summary information, is provided in **Appendix B**.

Significantly, the intersection of Castlereagh Highway & Mine Access Road reports no crashes; in our opinion this is a function of the good design of the intersection – particularly with regard to sight distances - and the very moderate through and turning movements.

2.6 Contingency Coal Transport

2.6.1 Contingency Coal Transport Route

As discussed in sections above, the retention of existing DA 11/92 contingency road transport provisions within the Project would allow for up to 50,000 tonnes per annum of coal to be transported by the public road network to the WPS and MPPS. The routes between the Pit Top – where coal would be loaded – and the power stations are shown in **Figure 2.6.1**.

2.6.2 Key Intersections

Along with the intersection of Castlereagh Highway & Mine Access Road (as described in sections above) the intersections through which contingency coal transport would generate additional turning movements are detailed below.

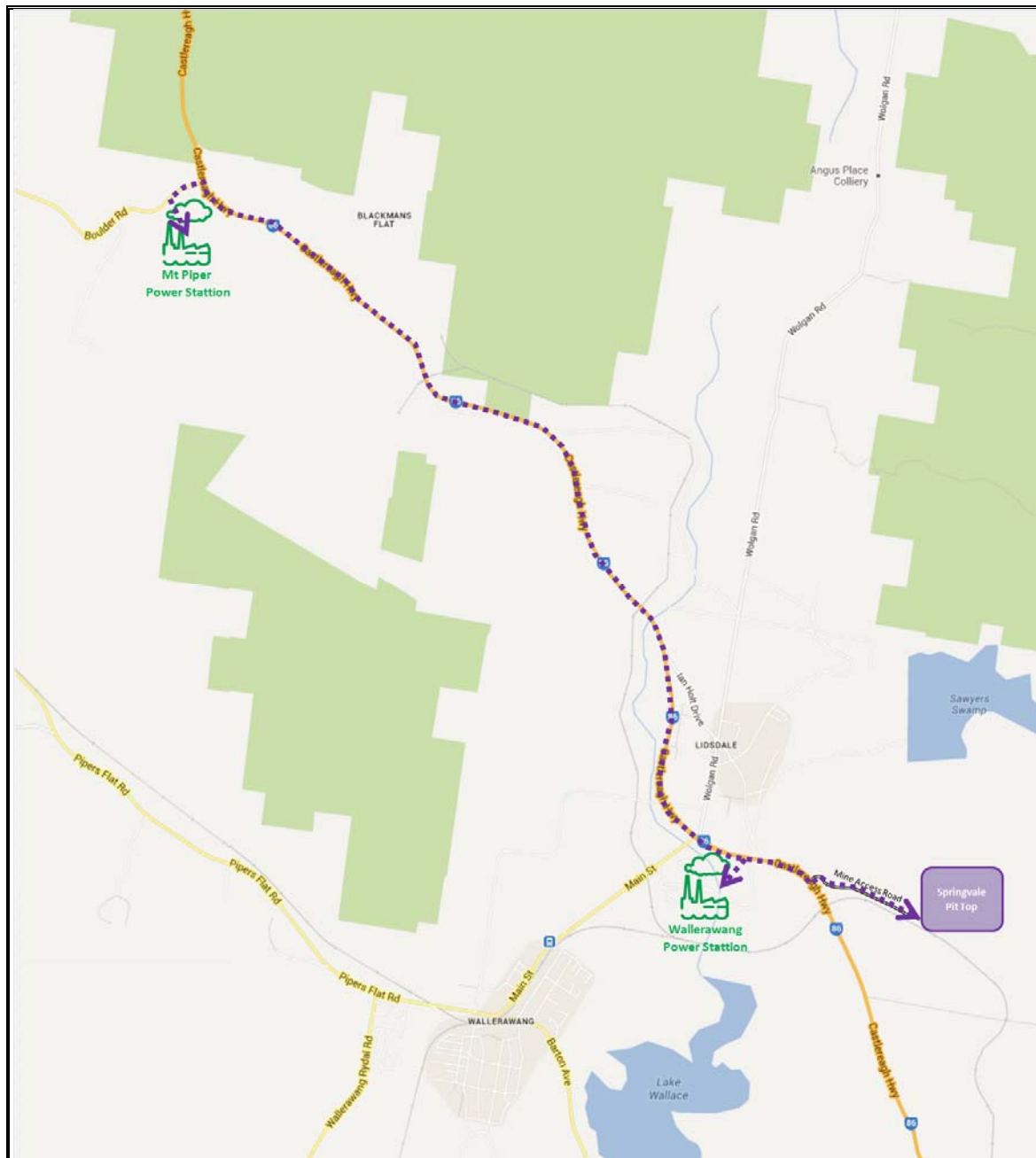
2.6.2.1 Castlereagh Highway & WPS Coal Access

This intersection is location immediately west of Mine Access Road, and provides for [what observations suggest are] very occasional vehicle movements to/from WPS, with the majority of WPS vehicle access provided to/from Main Street. All approaches are provided with Basic (with reference to AustRoads [GRD4A](#)) turn treatments.

2.6.2.2 Castlereagh Highway & Boulder Road

This intersection provides significant turning infrastructure including a CHL and CHR for the movements Castlereagh Highway to Boulder Road; and a continuous left turn slip lane Boulder Road to Castlereagh Highway. This infrastructure provides for the movement of [large] heavy vehicles transporting coal from a number of regional coal mines by public roads to Mt Piper.

Figure 2.6.1 Contingency Coal Transport Routes



2.6.2.3 Intersection Boulder Road & MPPS Coal Access

This intersection is located immediately west of the Castlereagh Highway (as opposed to the primary MPPS staff and service vehicle driveway further to the west in Boulder Road). All approaches are provided with Basic (with reference to GRD4A) turn treatments.

2.6.3 Peak Hour Flows

The most appropriate means by which to measure the impact of the contingency coal transport at these intersections is to assign the additional contingency coal heavy vehicle trips to the peak hour flows at each. ARC has sourced available data in relation to these peak hours, as outlined below. A summary of peak hour flows at each intersection is provided in **Figure 2.6.3**.

2.6.3.1 Castlereagh Highway & WPS Coal Access

The 2013 surveys in **Appendix A** show that peak hour flows are generated in the Castlereagh Highway (west of Mine Access Road and therefore through the intersection of WPS Coal Access) between 3:00 pm and 4:00 pm on a weekday. For turning movements, ARC has assigned 100 vtpm to/from the WPS (25 vtpm to each arrival movement and each departure movement) which based on all available information would represent a generation many times that of a peak hour to/from WPS.

2.6.3.2 Castlereagh Highway & Boulder Road

2010 surveys of the intersection of Castlereagh Highway & Boulder Road are reported in the Coalpac Consolidation Project Environmental Assessment Traffic & Transport Impact Assessment (Coalpac Project T&TIA) and identify a peak hour between 4:00 pm and 5:00 pm. To provide 2013 peak hour flows, ARC has factored the Castlereagh Highway flows by 2% per year (an annual average growth rate used in the Coalpac Project T&TIA).

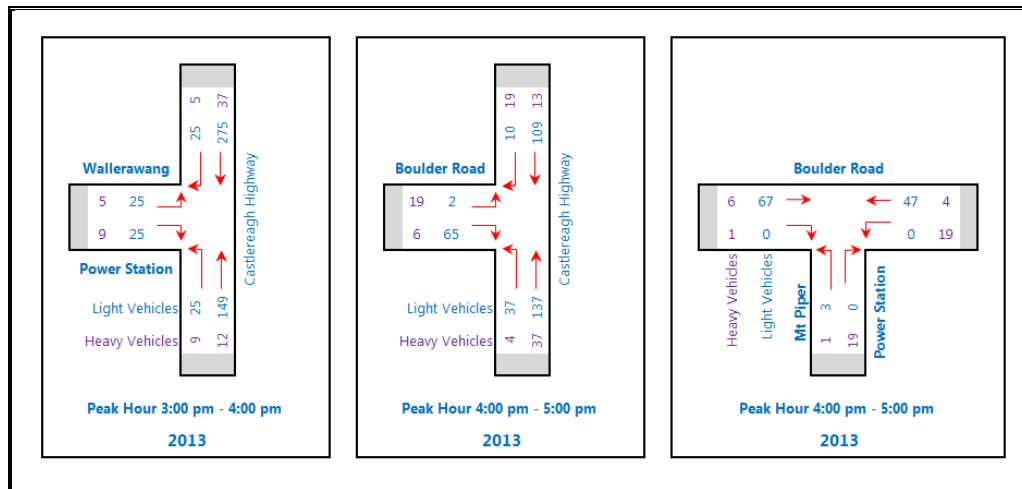
ARC notes that the Coalpac Consolidation Project Preferred Project Report (April 2013) forecasts relatively significant reductions in heavy vehicle movements – and specifically reductions in excess of what the contingency coal transport would add - at the intersection after 2016 (see **Section 5.6** below).

2.6.3.3 Boulder Road & MPPS Coal Access

As for the intersection of the Castlereagh Highway & Boulder Road, the 2010 traffic surveys reported in the Coalpac Project T&TIA also identify the hour 4:00 pm to 5:00 pm as the peak hour at the intersection of Boulder Road & MPPS Coal Access. There is no information to suggest any significant changes in these flows between 2010 and 2013.

ARC notes that the Coalpac Consolidation Project Preferred Project Report also forecasts relatively significant reductions in heavy vehicle movements at this intersection after 2016.

Figure 2.6.3 2013 Contingency Coal Transport Route Intersections



Source: ARC, Skyhigh and Coalpac Project T&TIA

2.6.4 Intersection Level of Service

The performance of the intersections through which contingency coal transport would generate additional trips have been examined using SIDRA. The result are provided below in **Table 2.6.4**.

Table 2.6.4 Contingency Coal Transport Route Intersections Level of Service

2013	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Queue (m)	
	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport
Castlereagh Highway & WPS	B	B	<10	<10	15.6	15.8	0.24	0.25	14.3	14.5
Castlereagh Highway & Boulder Road	B	B	<10	<10	18.9	19.0	0.11	0.12	3.0	4.1
Boulder Road & MPPS	B	B	<10	<10	178	17.8	0.05	0.06	3.1	4.2

As shown in **Table 2.3.4**, the additional generation of contingency coal transport heavy vehicle trips has little impact on the operation of the key intersections along the routes between the Pit Top and the power stations.

3 Newnes State Forest Road Network

The road network which provides access to the NSF Project Sites is shown in **Figure 1.1.3** and **Figure 1.3.2**, and is described in more detail below.

3.1 Key Roads

3.1.1 Chifley Road

Chifley Road (State Road 40) runs from Lithgow east (as Bells Line of Road) to North Richmond. Chifley Road/Bells Line of Road generally provides two lanes for two-way traffic, and has lower speed limits (60 km/h) through smaller urban areas but more broadly is posted at 80 km/h or 100 km/h. As discussed below, additional lanes are provided at key locations, including the intersection with Old Bells Line of Road & Petra Avenue.

3.1.2 Old Bells Line of Road

Old Bells Line of Road runs north and then north-west from an intersection with Chifley Road at Clarence. Old Bells Line of Road provides a gravel road of varying width (though generally minimum 5.5 m) suitable under most conditions for 2WD vehicles from Clarence through to the junction with Glowworm Tunnel Road. Old Bells Line of Road provides primary access for large logging vehicles, as well as a number of mining/forestry sites within the NSF, and as such is generally well maintained (graded).

3.1.3 Inch St/Atkinson Street

Inch Street is a local residential access road which links to Main Street south-west of the intersection with Atkinson Street. Inch Street provides two lanes for two-way traffic, and provides on-street parking for most of its length. While Inch Street provides significant spare traffic carrying capacity, it is not appropriate for the movement of concentrated heavy vehicle demands as a function of its geometry and residential nature; for this reason the existing heavy vehicle access restrictions in place for Springvale vehicles travelling to the NSF will be extended to Project heavy vehicles.

Atkinson Street – which is predominantly residential with some light industrial at its northern end - provides a two lane, two way sealed surface and become State Mine Gully Road north of the railway crossing.

3.1.4 State Mine Gully Road/Glowworm Tunnel Road

State Mine Gully Road then provides access into the NSF from the north of Lithgow, where as Glowworm Tunnel Road it intersects with Maiyingu Marragu Trail (formerly Blackfellows Hands Road) near the Bungleboori picnic area before continuing north-east.

State Mine Gully Road has a sealed surface that winds north for approximately 1.5 km from the railway crossing after which – as Glowworm Tunnel Road – it provides a gravel road of varying width, but generally of minimum 5.5 m; certainly it provides for two-way traffic in separate travel lanes, and sight distances along the route are good through to (and beyond) Bungleboori.

While undertaking a visit to the NSF in July 2011, ARC observed grading being undertaken on sections of Glowworm Tunnel Road near Bungleboori, providing a road surface suitable for 2WD vehicles; similar conditions were observed during 2013.

3.1.5 Mayinygu Marragu Trail

Mayinygu Marragu Trail intersects with Glowworm Tunnel Road near Bungleboori and then travels north-west; it provides a gravel carriageway width of approximately 4.0 m, though the quality of the gravel edge and verges can vary. Under adverse conditions, the 'formed' road can narrow as a result to a single wide lane in some locations, though our observations in 2013 showed a good quality surface for most of the section between Glowworm Tunnel Road and the proposed Services Bore access track location.

3.1.6 Access Tracks

Minor access tracks of varying width are located off Mayinygu Marragu Trail and Glowworm Tunnel Road; these are generally suitable only to 4WD and heavy vehicles. The Project would upgrade and extend existing access tracks to provide access to the NSF Project Sites; more details are provided in **Section 4.2.2**.

3.2 Key Intersections

3.2.1 Inch Street & Atkinson Street

Based on our observations, this priority access intersection operates at a good LoS as a function of good basic geometry, appropriate sight distances (to the low speed residential area) and – most importantly – very low traffic flows.

3.2.2 Lithgow Town Centre Intersections

Inch Street in turn provides a number of access paths to key roads in the Lithgow town centre, including Railway Parade and Main Street, and in turn Mort Street.

Based on our observations, the intersections providing access to Inch Street generally operate at a good LoS as a function of good basic geometry, appropriate control (including traffic signals and sign control); low vehicle speeds; and moderate traffic flows.

3.2.3 Chifley Road & Old Bells Line of Road & Petra Avenue

The intersection of Chifley Road & Old Bells Line of Road & Petra Avenue provides access to the Zig Zag Railway (currently closed) as well as Old Bells Line of Road itself. The southern approach to the intersection (Petra Avenue) provides access primarily to rural residential properties and some light industrial sites.

The intersection has significant infrastructure capacity, including a channelised left turn treatment from the west to Old Bells Line of Road; and channelised right turn treatments from the east to Old Bells Line of Road and from the west to Petra Avenue. The Old Bells Line of Road approach to the intersection is very wide (though unmarked and unsealed) which allows for the movement of heavy vehicles through the intersection.

This intersection will be used by Project vehicles including heavy vehicles, and is examined further in sections below.

3.2.4 NSF Intersections

There are a number of intersections within the NSF through which Project vehicles would travel, including: -

- Old Bells Line of Road & Glowworm Tunnel Road (all Project vehicles)
- Glowworm Tunnel Road & Maiyingu Marragu Trail (all Project vehicles)

With reference to the traffic volume data provided below in **Section 3.3**, and further to our observations within the NSF, the potential for two vehicles to arrive at any of these intersection with conflicting travel paths at the same time is relatively remote;. As importantly, appropriate sight distances are generally available between through and passing traffic at these intersections.

3.3 Traffic Flows

In 2011, ARC commissioned traffic surveys in key roads within the NSF and at the NSF access intersection of Chifley Road & Old Bells Line of Road & Petra Avenue. These are the same roads as those which will be used for access to the NSF Project Sites, and it is our opinion that there would be no significant difference between the flows surveyed in 2011 and current base flows.

Automatic traffic counters (**ATCs**) providing 24 hour counts by vehicle type over a period of 7 days were installed at the following locations: -

- Glowworm Tunnel Road south of Old Bells Line of Road
- Old Bells Line of Road east of Glowworm Tunnel Road
- Sunnyside Ridge Road north of Maiyingu Marragu Trail

The surveys were completed by Skyhigh Traffic Data; the survey period (June 2011) coincided with NSW school holidays and a period of clear sunny weather, providing in our opinion a relatively high demand period in the NSF and also at the Zig Zag Railway (which was operating at the time).

The survey data in full is provided in **Appendix A** and summarised below, while **Figure 3.3** provides a summary of surveyed flows and an estimate of turning movements based on ARC observations and a review of traffic generators within the NSF.

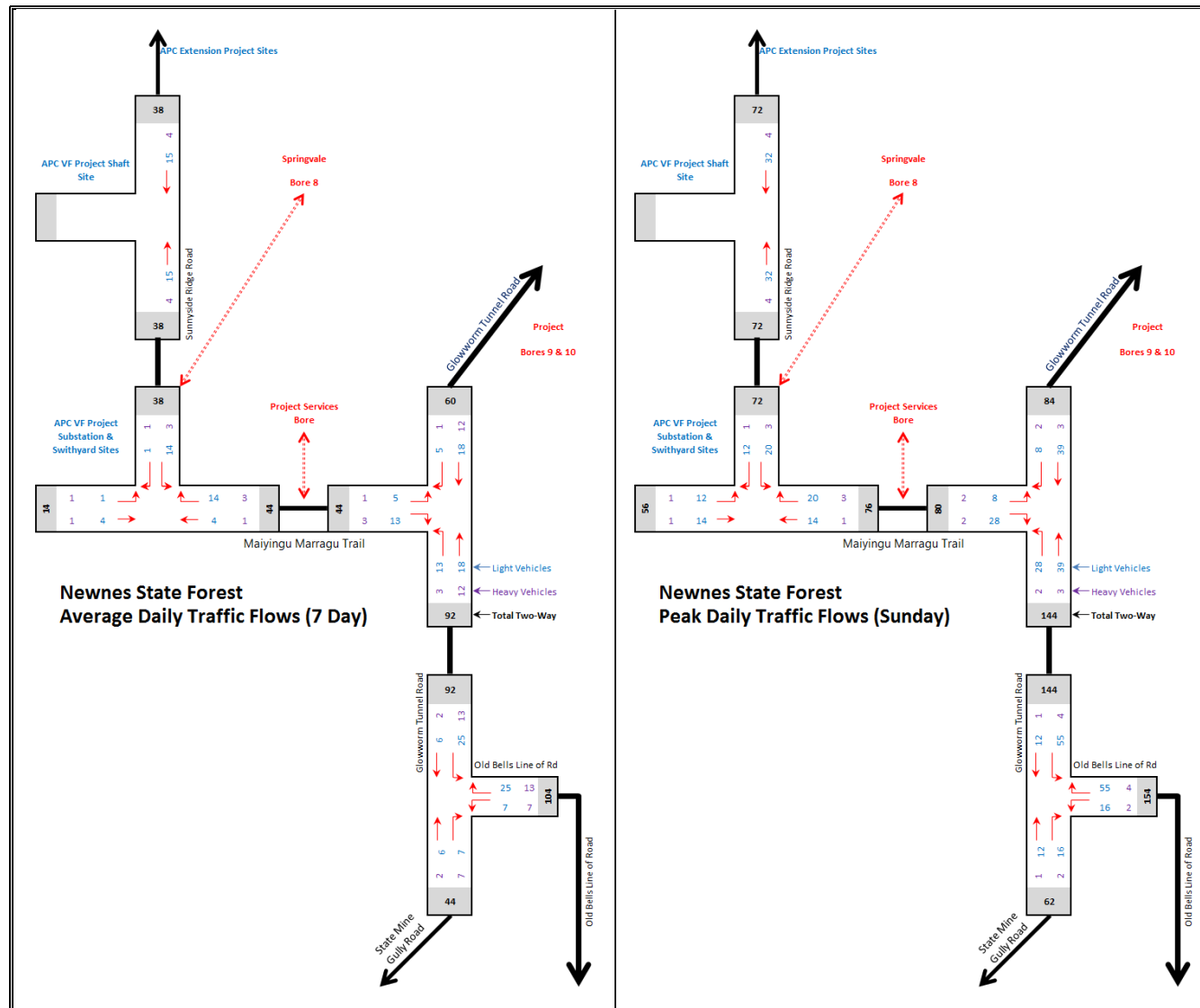
3.3.1 Glowworm Tunnel Road at Old Bells Line of Road

Glowworm Tunnel Road north of Old Bells Line of Road reported an average daily traffic (**ADT**) flow of 91 vtpd; the average weekday traffic (**AWT**) flow is lower at 75 vtpd, a result of a higher average weekend traffic (**AWE**) flow of 131 vtpd. The flow reported on the Sunday was the highest of the week at 144 vtpd, representing almost double the AWT. With reference to the AustRoads *Vehicle Classification System*, the majority of the flow comprises light vehicles (68%) and smaller heavy vehicles (28%); 4% of vehicles reported were combination heavy vehicles including logging vehicles.

3.3.2 Old Bells Line of Road east of Glowworm Tunnel Road

Old Bells Line of Road east of Glowworm Tunnel Road has an ADT flow of 104 vtpd; as for Glowworm Tunnel Road, the AWT flow is lower at 92 vtpd, a result of a higher AWE flow of 135 vtpd. The flow reported on the Sunday was the highest of the week at 154 vtpd. The survey reported a high number of combination heavy vehicles in Old Bells Line of Road (31%), with the remaining flow comprising 62% light vehicles and 7% smaller heavy vehicles.

Figure 3.3 NSF Road Network Average & Peak Daily Traffic Flows



3.3.3 Sunnyside Ridge Road

Sunnyside Ridge Road runs north from an intersection with Maiyingu Marragu Trail to the north-west of the proposed Service Bore. Sunnyside Ridge Road has an ADT of 39 vtpd; the AWT flow is lower at 32 vtpd, a result of a higher AWE flow of 57 vtpd. The flow reported on the Sunday was the highest of the week at 72 vtpd. The majority of the flow comprises light vehicles (79%), and the remainder larger heavy vehicles (12%) and smaller heavy vehicle (9%).

3.3.4 Chifley Road

Annual Average Daily Traffic (**AADT**) data for Chifley Road/Bells Line of Road is available from the RMS, summarised in the RTA report Mount Victoria to Lithgow Great Western Highway Upgrade Strategic Review of a Newnes Plateau Corridor 2008, and provided below in **Table 3.3.4**.

Table 3.3.4 Chifley Road/Bells Line of Road AADT

Location	Year						
	1989	1991	1993	1996	1999	2002	2005
Bell	3330		3150	3111	3068	3037	3145
Clarence				3301	3166	2979	2905

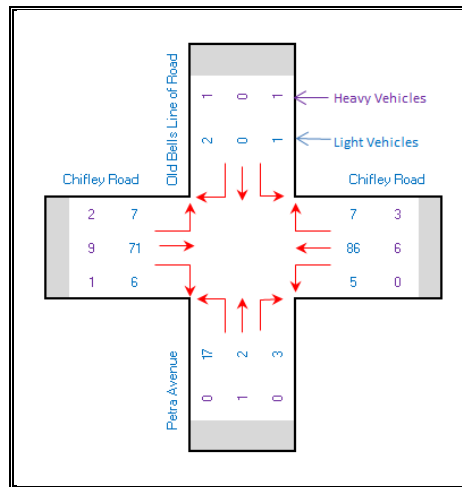
As shown in **Table 3.3.4**, growth rates in Chifley Road/Bells Line of Road are historically very low, with the AADT at Clarence trending down between 1996 and 2005.

The RMS also provides Hourly Traffic Volumes summaries based on average daily traffic flows for select locations, including Station 06.282 in Bells Line of Road at Bilpin. While the ADT at this location is significantly higher than at Clarence (and Bell), the data indicates the recreational peak nature of Bells Line of Road, with AWT representing approximately 87% of ADT, and AWE representing 130% of ADT. It is our opinion that a similar weekday/weekend flow distribution would be generated at Clarence, and – as discussed in sections above – is certainly the case along the NSF roads.

3.3.5 Intersection Peak Hour Flows

The results of the AM peak period survey at the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue in June 2011 are provided in **Appendix A**. The surveyed peak hour flows in Chifley Road have been factored by 2% per annum (in our opinion a worst case rate of annual average growth, particularly with reference to **Table 3.3.4** above) to provide 2013 flows for the peak hour 8:45 and 9:45 am, shown in **Figure 3.3.5**.

Figure 3.3.5 AM Peak Hour Chifley Road & Old Bells Line of Road & Petra Avenue



3.4 Road Network Operations

3.4.1 Intersection Level of Service

At the primary NSF access intersection of Chifley Road & Old Bells Line of Road & Petra Avenue, SIDRA modelling reports that the intersection operates at a LoS "B" in the AM peak hour, based on a 15.4 second maximum delay to the right turn movement from Chifley Road to Old Bells Line of Road. All other approaches operate at a LoS "A", and the average delay at the intersection for all movements is less than 5 seconds. The intersection operates with significant spare capacity (DoS 0.054).

ARC acknowledges that the potential exists for higher peaks to be generated at the intersection associated with peak holiday periods or special events within the NSF. However, the SIDRA analysis indicates that the intersection could accommodate significantly higher flows with little potential for impact, a conclusion reinforced in our opinion by the good safety (crash) record at the intersection as outlined in **Section 3.5**.

3.4.2 NSF Road Network Capacity

3.4.2.1 Capacity Guidelines

The key roads providing access to the NSF Project Sites are largely unsealed but well formed gravel roads, which have been developed over many years to serve general forestry operations, recreational access, and to provide for exploration and other mining related activities such as environmental monitoring and surface equipment access as provided for by the *Forestry Act 2012*.

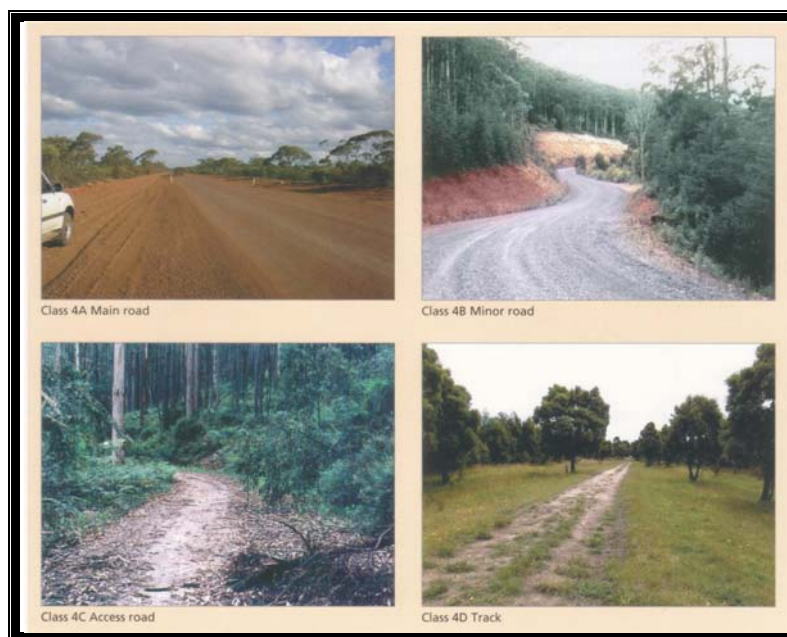
The design and operation of these types of road can be considered with reference to a number of guidelines, including the ARRB Unsealed Road Manual (**ARRB USM**) and State Forests of NSW Forestry Practice Code Part Four: Forest Road and Fire Trails (**FPC4**).

ARRB URM provides a general provides a classification system for unsealed roads, which is shown in **Table 3.4.2.1**, and illustrated in **Figure 3.4.2.1**.

Table 3.4.2.1 ARRB USM Unsealed Road Classification

Road class	Class type	Service function description	Road type description
4A	Main road > 150 ADT	This type of road is used for major movements between population centres and connection to adjacent areas. High traffic volumes occur and the road can carry large vehicles.	- All weather road predominantly two-lane and unsealed. Can be sealed if economically justified - Operating speed standard of 50–80 km/h according to terrain - Minimum carriageway width is 7 m
4B	Minor road 150–50 ADT	This type of road is used for connection between local centres of population and links to the primary network. Roads may or may not be sealed depending on the importance and function of the road.	- All weather two-lane road formed and gravelled or single-lane sealed road with gravel shoulders - Operating speed standard of 30–70 km/h according to terrain - Minimum carriageway width is 5.5 m.
4C	Access road 50–10 ADT	Provides access to low use areas or individual rural property sites and forest areas. Caters for low travel speed and a range of vehicles and may be seasonally closed.	- Substantially a single lane two-way generally dry-weather, formed (natural materials) track/road - Operating speeds standard of < 20–40 km/h according to terrain - Minimum carriageway width is 4 m - May be restricted to four-wheel drive vehicles
4D	Tracks < 10 ADT	Provides primarily for four-wheel drive vehicles. Mainly used for fire protection purposes, management access and limited recreational activities.	- Predominantly a single-lane two-way earth track (unformed) at or near the natural surface level - Predominantly not conforming to any geometric design standards - Minimum cleared width is 3 m

Figure 3.4.2.1 ARRB USM Road Unsealed Road Classification



Further (ARRB USM Section 4.6.2 and 4.6.3): -

“Unsealed roads in the majority of cases are either one-lane two-way roads or two-lane two way roads...For roads with low traffic volumes <150 vpd, AustRoads suggests that a single lane two-way operation is adequate as there is a low probability of vehicles meeting and the few passing manoeuvres can be undertaken at reduced speeds using the shoulders. Providing there is sufficient sight distance these manoeuvres can be performed without hazard and the overall loss in efficiency brought about by reduced speeds when vehicles cross will be small.”

The ARRB USM is the primary traffic reference provided in FPC4. While FPC4 does not prescribe traffic volume limits (an issue discussed and confirmed with FCNSW) the designated *Primary Access Road*, *Secondary Access Road* and *Feeder Road* described in Section 6 of FPC4 are generally equivalent to the Class 4A, 4B and 4C roads respectively as described in ARRB URM.

The FPC4 *Primary Access Road* has the following description: -

- 5.5 m – 7.3 m formation width
- All weather road, unsealed, two lanes

This generally describes Old Bells Line of Road, State Mine Gully Road and Glowworm Tunnel Road.

The FPC4 *Secondary Access Road* has the following description: -

- 4.2 m – 5.5 m formation width
- All weather road, unsealed, one lane

This generally describes Maiyingu Marragu Trail.

The FPC4 *Feeder Road* has the following description: -

- 3.7 – 4.2 m formation width
- All weather road, unsealed, one lane

This generally describes some of the existing access tracks which will be upgraded/extended to provide access to the NSF Project Sites.

3.4.2.2 Existing NSF Road Network Capacity

The primary NSF roads provide well in excess of a 3.5m single lane, for which a flow of 150 vtpd is generally designated as a target flow. In regard to traffic capacity, these roads – Glowworm Tunnel Road, Old Bells Line of Road and sections of Maiyingu Marragu Trail – provide more than appropriate formations to accommodate flows well beyond 150 vpd; indeed, these roads could accommodate many times this flow without significant *traffic capacity* impacts.

This conclusion is supported by the ARRB *Research Report ARR 367*, which examined logging movements in state forests and provides the following in regard to general road capacity: -

In the case of two-lane two-way roads the carrying capacity of such roads is well over 3,000 vpd....The carrying capacity of a single lane, two way road is <1,000 vpd and such a road is able to accommodate additional traffic caused by normal logging operations, particularly if suitable layover areas are provided. Road capacity is generally not an issue with low volume roads provided that adequate safety measures are implemented along the route and at intersections.

The NSF traffic surveys report flows during what might be expected to be a generally high period of generation (winter school holidays); however, it is the case that flows during warmer months could be higher, and that peak recreational events or the like might potentially generate even higher flows, particularly in key recreational access areas such as Glowworm Tunnel Road between Old Bells Line of Road and Bungleboori. Based on all available information, **it is the opinion of ARC that higher flows are at times already accommodated by the NSF road network without significant impact on either safety or general traffic efficiency.**

3.4.3 Chifley Road Capacity

Reference to Table 4.5 of the RTA Guide, and further to AustRoads Guide to Traffic Engineering Practice Part 2 Roadway Capacity (AustRoads GTEP2), indicates that Chifley Road would currently operate at a LoS "A" or at worst "B" through some of the mountainous sections of road east and west of Clarence. Moreover, existing flows represent only a minor percentage of available capacity.

3.5 Accident Data

The RMS has provided ARC with data in regard to accidents occurring within and adjacent to the NSF over the period 2006 – 2011. A crash plot indicating crash location and severity is provided in **Appendix B**.

A total of sixteen accidents are reported in the NSF during the period 2006 – 2011, including twelve injury crashes and four tow-away crashes; no fatalities are reported. Importantly, it was determined in eleven of the incidents that speeding (eight), alcohol (two) or fatigue (three) factored as a cause.

Eight of the crashes occurred in Old Bells Line of Road, including four just north of Chifley Road (though away from the intersection) and four spaced along the road. Three head-on accidents are reported, all occurring in fine dry conditions, while the other five crashes were run-off-road, occurring under both dry and wet conditions. Two injury crashes are reported for Glowworm Tunnel Road, both run-off in dry conditions, one in darkness and one during the day. A further crash is reported in Maiyingu Marragu Trail west of the Bungleboori picnic area (off road at bend, wet conditions), while the other reported crashes are scattered through the NSF road network and generally comprise run-off-road incidents.

Based on our observations in the NSF, and with reference to the RMS crash data, **it is certainly the case that inappropriate speed can lead to incidents on these roads**, either as a case of run-off-road (i.e. not slowing appropriately for a curve) or head-on (i.e. not taking due caution on narrower sections of road). We note that the posted (or at least police/RMS reported) speed limit for almost all of the recorded accidents was 80 km/h or 100 km/h, speed limits which have since October 2010 been revised to a maximum of 60 km/h along all State Forest roads specifically in response to speed related accidents.

No crashes are reported at the intersection of Bells Line of Road & Old Bells Line of Road & Petra Avenue over the 6 year reporting period. In our opinion, this reflects the good intersection geometry and turning infrastructure; good sight distances; and the very moderate traffic flows through the intersection.

4 **Project Description**

4.1 Project Components

The Project would provide for the continuation of mining operations at Springvale. Full details of the Project are provided in the Project EIS which this TIA accompanies, but from a traffic and transport perspective the components of the Project requiring specific assessment are limited to: -

- **The continued operation of the Pit Top, including the retention of contingency provisions for the transport of coal via the public road network to WPS and MPPS; and**
- **The construction and operation of the NSF Project Sites, including the Service Bore and two dewatering Bore Sites (Bore 9 and Bore 10) within the NSF.**

4.2 Access

4.2.1 Pit Top Access

Access to the Pit Tip is unchanged by the Project, with all access to remain via the intersection of Castlereagh Highway & Mine Access Road. Access between the Pit Tip and the WPS and MPPS for contingency coal transport would also be unchanged by the Project.

4.2.2 NSF Project Sites Access

As described in sections above, primary access to the NSF Project Sites will be along existing NSF roads and tracks, and specifically via Old Bells Line of Road for heavy vehicles and light vehicles, and via State Mine Gully Road for light vehicles only. Both roads then lead to Glowworm Tunnel Road which provides access to the intersection with Maiyingu Marragu Trail (for access to the Services Bore) and then continues north (for access to Bore 9 and Bore 10).

The Project proposes the following new sections of access track: -

- The Services Bore will require the construction of a short section of new track north from Maiyingu Marragu Trail. Based on an agreement with FCNSW, the access track will initially provide a width of 10 m to accommodate an access track (5 m) and an Infrastructure Corridor (5 m), before the Infrastructure Corridor is rehabilitated, retaining a 5 m access track as per a FPC4 *Secondary Access Road*.

- Bore 9 will require the construction of two short sections of new track, and the upgrade of an existing central section of track, north from Glowworm Tunnel Road. Based on an agreement with FCNSW, the access track will initially provide a width of 10 m to accommodate an access track (5 m) and an Infrastructure Corridor (5 m), before the Infrastructure Corridor is rehabilitated, retaining a 5 m access track as per a FPC4 *Secondary Access Road*.
- Bore 10 will require the upgrade of an existing section of track south from Glowworm Tunnel Road. Based on an agreement with FCNSW, the access track will initially provide a width of 10 m to accommodate an access track (5 m) and an Infrastructure Corridor (5 m), before the Infrastructure Corridor is rehabilitated, retaining a 5 m access track as per a FPC4 *Secondary Access Road*.

4.3 Construction Traffic Generation

4.3.1 Pit Top

The Project does not provide for new construction at the Pit Top.

4.3.2 NSF Project Sites

4.3.2.1 General Construction Proposals

The assessment of the impact of the construction phase of each NSF Project Site considers the following general Project proposals: -

- Construction work would take place 24 hours a day, 7 days a week, based on a two-shift structure (6:00 am – 6:00 pm, and 6:00 pm – 6:00 am).
- The majority of NSF Project Site construction staff would travel in groups (i.e. high vehicle occupancies) to/from off-site locations, which is made possible by the proposed shift structure. This method of travel has been used for past projects by Springvale Coal within the NSF, reducing vehicle movements to a minimum.
- The construction of the NSF Project Sites would be undertaken progressively as required; at this time, it is estimated that the NSF Project Sites would be operational from: -
 - o Services Borehole October 2014
 - o Bore 9 July 2016
 - o Bore 10 April 2018

- Construction of each NSF Project Site (including the access track and Infrastructure Corridor) is estimated to occur over approximately 6 months prior to each operational target date.

4.3.2.2 Peak Construction Traffic

Based on the general construction principles outlined above; the past construction of similar sites within the NSF by Springvale Coal; and with reference to the detailed Project Schedule (**Appendix C**); it is estimated that **the Project would generate up to 16 vtpd during the construction phase of each NSF Project Site**. On average this would comprise the generation of 8 light vtpd and 8 heavy vtpd.

4.3.2.3 Construction Traffic Trip Distribution

During the construction phase for each NSF Project Site, the following direction distribution would occur: -

- Up to 8 light vtpd along the available light vehicle routes via State Mine Gully Road or via the Old Bells Line of Road. Based on the proposed shift start and end times, few light vehicles would be generated to the NSF interface intersections during existing peak periods.
- Up to 8 heavy vtpd along the designated heavy vehicle route via Old Bells Line of Road. A small percentage of these trips could be generated through the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue during existing peak periods.

Recommendation It is the recommendation of ARC that all construction heavy vehicle trips to/from the NSF Project Sites be undertaken during daylight hours, which would generally require them to occur between 6:00am and 6:00pm.

4.4 Operational Traffic Generation

4.4.1 Pit Top

The Project does not provide for any changes to existing operational traffic generation at the Pit Top, nor for any changes to existing shift structures, employment levels or general trip distribution.

ARC notes that the Pit Top has not yet commenced generating traffic flows associated with the Modification Project. As detailed in the Modification Project TIA, the Modification Project provides for an additional 7 vtph to be generated prior to and following each of the Springvale mining shifts.

As detailed in **Section 1.4.1**, the contingency coal transport provisions could result in the generation of up to 18 heavy vtph between the Pit Top and WPS; or up to 12 heavy vtph between the Pit Top and MPPS.

4.4.2 NSF Project Sites

During the operational phase of the Project, **it is estimated that a total of less than 10 vtpw would be generated to/from the NSF Project Sites, with an expected peak of 4 vtpd.** These trips would comprise a mixture of light and heavy vehicle trips.

From an assessment perspective, the operational traffic generation of the NSF Project Sites is extremely minor; **it is the opinion of ARC that the operational traffic generation of the Project would have no significant impact on the operation of the NSF road network or on the NSF access intersections at Clarence and north Lithgow.**

Recommendation It is the recommendation of ARC that all operational heavy vehicle trips to/from the NSF Project Sites be undertaken during daylight hours, which would generally require them to occur between 6:00am and 6:00pm.

4.5 Project Site Parking

4.5.1 Pit Top

All Pit Top parking demands will continue to be provided within the Pit Top, which provides capacity in excess of the peak demands which occur during shift changeover periods.

4.5.2 NSF Project Sites

As for existing Springvale surface infrastructure sites within the NSF, parking for the NSF Project Sites (both during construction and operation) will be provided within secure compounds at each NSF Project Site.

It is acknowledged that during the earlier stages of the construction phase for each NSF Project Site, parking may need to be provided within the broader NSF Project Site Environmentally Sensitive Areas (as detailed in the Project EIS) for a short period until such time as each NSF Project Site compound was completed.

5 Potential Cumulative Traffic

To account for potential cumulative traffic impacts within the access networks providing for the Pit Top and for the NSF Project Sites, ARC has completed a desktop review of sub-regional projects which could generate traffic to these networks during the construction and/or operational phase of the Project.

5.1 APC VF Project

The Angus Place Colliery Ventilation Facility Project (**APC VF Project**) was approved by the DP&I in April 2013 and provides for the construction of new surface infrastructure within the NSF off Sunnyside Ridge Road, to the north-west of the NSF Project Sites. The APC VF Project construction phase recently commenced, and will at times coincide with the construction of the NSF Project Sites, as illustrated in the Project Schedule (**Appendix C**). Analysis which appropriately considers this cumulative impact potential is provided in **Section 6** and **Section 7**. The APC VF Project would not generate trips to the Pit Top road network.

5.2 Angus Place Mine Extension Project

Centennial Angus Place recently commenced investigations in regard to the construction and operation of dewatering bores and a downcast ventilation shaft within the NSF as part of a broader Angus Place Mine Extension Project (**APC Extension Project**). The APC Extension Project sites are located in the northern-western part of the NSF around Sunnyside Ridge Road, and are proposed to be constructed between late 2014 and 2030.

As part of a future APC Extension Project EIS submission, ARC has been commissioned to examine the traffic and transport issues associated with the APC Extension Project. ARC has determined that the APC Extension Project construction phase would at times coincide with the Project construction phase, as illustrated in the Project Schedule. Analysis which appropriately considers this cumulative impact potential is provided in **Section 6** and **Section 7**. The APC VF Project would not generate trips to the Pit Top road network.

5.3 Western Coal Services Project

The WCS Project would provide for an upgrade of the existing infrastructure within the SCS Facility to support ongoing coal operations in the sub-regional coal fields. The traffic issues associated with the WCS Project are detailed in the 2013 Western Coal Services Project Traffic Impact Assessment (**WCS Project TIA**), and include provisions for the creation of 3 additional permanent staff positions, and a construction program that will generate some 60 vtpm between 6:00 – 8:00 am and between 4:00 – 6:00 pm, for a 3 month period during a broader [lower generating] 18 month total construction period. Analysis which considers the WCS Project traffic generation to the Pit Top access network is provided in **Section 6** and **Section 7**. The WCS Project would not generate trips to the NSF road network.

5.4 Neubeck Coal Project

DGRs have been issued in regard to the Neubeck Coal Project (the **Neubeck Project**), which would provide for an open-cut mine north-east of the Mt Piper Power Station. The general issues associated with the Neubeck Project are outlined in the 2012 *Neubeck Coal Project Briefing Paper (Neubeck Project BP)*; from a traffic perspective, the Neubeck Project provides for the creation of up to 65 permanent staff positions. Analysis which considers the potential Neubeck Project traffic generation to the Pit Top road network is provided in **Section 6** and **Section 7**. The Neubeck Project would not generate trips to the NSF road network.

ARC acknowledges that the estimated shift structure used in this assessment may be different to that ultimately employed by the Neubeck Project further to an approval.

5.5 Airly Mine Extension Project

DGRs have been issued in regard to the Airly Mine Extension Project (**Airly Project**) north-east of Capertee. The general issues associated with the Airly Project are outlined in the 2012 *Airly Mine Extension Project Briefing Paper (Airly Project BP)*; from a traffic perspective, the Airly Project provides for the creation of up to 15 additional permanent staff positions and 20 contractor positions. Analysis which considers the potential Airly Project traffic generation to the Pit Top road network is provided in **Section 6** and **Section 7**. The Airly Project would not generate trips to the NSF road network.

ARC acknowledges that the estimated Shift structure used in this assessment may be different to that ultimately employed by the Airly Project further to an approval

5.6 Coalpac Consolidation Project

The Coalpac Consolidation Project (the **Coalpac Project**) – which is currently before the DP&I for assessment - would provide for an expansion of mining operations at the Cullen Valley and Invincible coal mines near Cullen Bullen. The **Coalpac Project T&TIA** reports provisions for: -

- A 15 – 18 month construction program, generating (at its peak) up to 60 AM arrival vtph (6:00 – 7:00 am) and 60 PM departure vtph (4:00 – 5:00 pm) departure to/from the south-east
- An Ultimate Operational period, generating: -
 - o 21 AM arrival vtph (6:00 – 7:00 am) and 9 AM departure vtph (6:00 – 7:00 am) to/from the south-west
 - o 9 PM arrival vtph (7:00 – 8:00 pm) and 21 PM departure vtph (7:00 – 8:00 pm) to/from the south-west

More recently, the 2013 Coalpac Consolidation Project Preferred Project Report indicates that while the Coalpac Project T&TIA estimates of construction and operational staff numbers are largely unchanged, it is now proposed to reduce existing heavy vehicle trips to/from the MPPS and to/from regional destinations. Analysis which considers the Coalpac Project traffic generation to the Pit Top road network is provided in **Section 6** and **Section 7**. The Coalpac Project would not generate trips to the NSF road network.

5.7 Annual [Average] Traffic Growth

5.7.1 Intersection Castlereagh Highway & Mine Access Road

In order to assess future traffic growth at the intersections of Castlereagh Highway & Mine Access Road, ARC has sourced information from the RMS for the permanent count station on the Castlereagh Highway at Lidsdale (Station 99.253).

While a full data set is not publicly available, in 2010 the [then] RTA provided additional yearly data and growth projections for the Lidsdale Count Station to Barnson Pty Ltd to assist in the preparation of the Pine Dale Coal Mine Yarraboldy Extension Traffic and Transportation Assessment (Pine Dale T&TA). Reference to Appendix 3 of the Pine Dale T&TA indicates a growth forecast of 1.7% per annum in the Castlereagh Highway adjacent to Springvale through the year 2020. ARC has adopted this growth rate for the assessment of future traffic flows in the Castlereagh Highway.

With reference to the review of sub-regional projects above, ARC notes that the Pine Dale T&TA does not forecast any traffic increases to the sub-regional network further to an approval.

5.7.2 NSF Road Network

There is no information to suggest that traffic flows in the NSF road network would increase significantly through the life of the Project. As acknowledged in earlier sections, traffic flows in the NSF may increase in the summer months (or due to specific events or the like), but there is no information to suggest consistent annual average increases.

5.7.3 Intersection Chifley Road & Old Bells Line of Road & Petra Avenue

In Chifley Road, very minor annual increases may occur over time, even though the available AADT data in **Table 3.3.4** show flows tending down through 2005. The significant capacity available at the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue, paired with Project construction phase traffic generated for the most part outside of peak periods, in our opinion suggests that annual growth would not have any significant impact on future performance in Chifley Road or at its intersection with Old Bells Line of Road & Petra Avenue. Notwithstanding, analysis of the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue that provides for an annual average growth rate of 2% is provided in **Section 6** and **Section 7**.

6 Cumulative Traffic Flows

6.1 Pit Top Road Network

6.1.1 Castlereagh Highway & Mine Access Road

By 2024, flows at the intersection of Castlereagh Highway & Mine Access Road could potentially include: -

➤ **Annual Average Growth in the Castlereagh Highway**

11 years (from 2014 Project commencement) compound growth at 1.7% per annum each way in the Castlereagh Highway.

➤ **Springvale Extension Project (emergency haulage provisions)**

Contingency coal transport via the public road network between the Springvale Pit Top and the local power stations could generate up to 9 heavy arrival vtpd and 9 heavy departure vtpd at the Pit Top.

➤ **Neubeck Project Operations**

It is estimated that of the 65 additional personnel provided for by the Neubeck Project, 25 could be assigned to both a Day Shift and an Afternoon Shift, and that 15 could be assigned to a Night Shift; and that 70% of trips could be generated to/from the south-east and therefore through the intersection. The potential exists for Neubeck Project mining shifts to coincide with Springvale shifts, and as such these trips could coincide with the Springvale peak periods.

ARC acknowledges that the estimated Shift structure used in this assessment may be different to that ultimately employed by the Neubeck Project further to an approval.

➤ **Airly Project Operations**

It is estimated that of the 35 additional personnel provided for by the Airly Project, 15 could be assigned to both a Day Shift and an Afternoon Shift, and that 5 could be assigned to a Night Shift, and that 70% of trips could be generated to/from the south-east and therefore through the intersection of Castlereagh Highway & Mine Access Road. The potential exists for Airly Project mining shifts to coincide with Springvale shifts, and as such these trips could coincide with the Springvale peak periods.

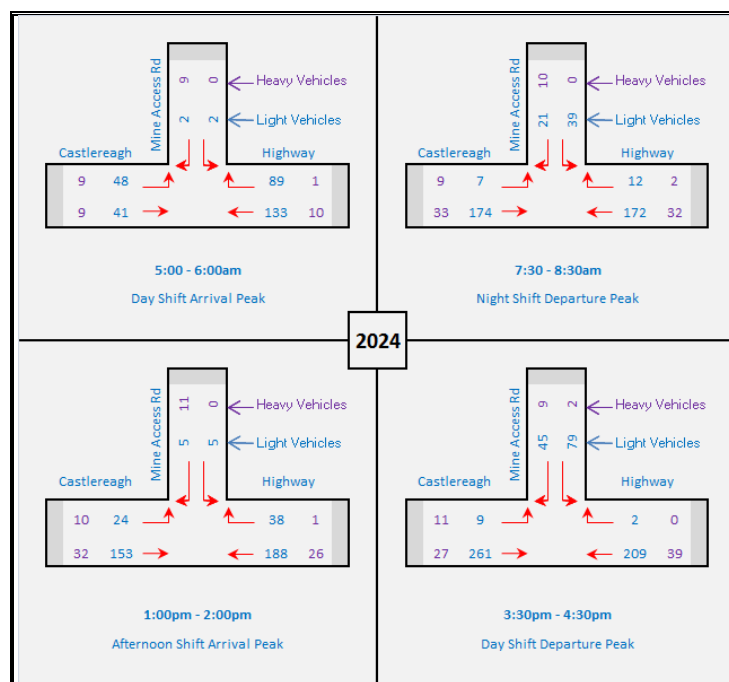
ARC acknowledges that the estimated Shift structure used in this assessment may be different to that ultimately employed by the Airly Project further to an approval.

➤ Coalpac Project Operations

The Coalpac Project TIA estimates an operational peak generation of 21 arrival vtp/h and 9 departure vtp/h between 6:00 - 7:00 am; and up to 8 heavy vtp/h each hour after 7:00 am, split between arriving and departing trips. In the morning Springvale shift peak period, the Coalpac Project could generate up to 10 arrival (north-west bound) vtp/h and 4 departure (south-east bound) vtp/h in the hour 5:00am – 6:00am, and up to 14 arrival vtp/h and 8 departure vtp/h in the hour 7:30 – 8:30 am.

The resulting flows for the year 2024 shown in **Figure 6.1.1** below.

Figure 6.1.1 2024 Design Peak Flows Castlereagh Highway & Mine Access Road



ARC notes that in some interim years (between 2014 and 2024) traffic flows may spike temporarily as a result of sub-regional project construction periods (for example the WCS Project and Coalpac Project) but that such spikes would be short term and are likely to occur in the near future (before annual average growth becomes a more significant – an relatively certain – generator).

In this regard, the Springvale MOD TIA assessed a 2014 scenario including peak construction traffic associated with the WCS Project and Coalpac Project, along with the Neubeck Project and Airly Project operational traffic and 2 years of annual average growth in the Castlereagh Highway, and determined that LoS would remain at “A” with significant spare capacity through 2014; and at LoS “B” through 2014 under contingency coal transport conditions.

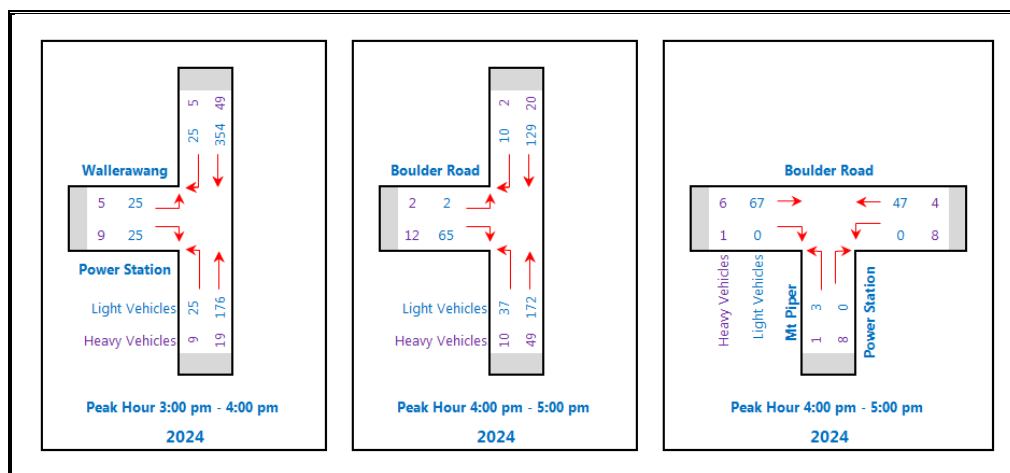
6.1.2 Contingency Coal Transport Intersections

With reference to **Section 5**, peak flows through the intersections which would provide access for contingency coal transport could at times include: -

- Contingency coal transport flows
- Annual Average Growth (Castlereagh Highway)
- Neubeck Project, Airly Project and Coalpac Project Operational flows (Castlereagh Highway)

Turning movements to and from the WPS, MPPS, and Boulder Road would not be affected by annual average growth, and as noted in **Section 5.6** the Coalpac Project is now estimated to reduce heavy vehicle turning movements to and from both Boulder Road and MPPS. Taking these factors into account, the 2024 peak hour flows at the intersections along the contingency coal transport route are provided in **Figure 6.1.2** below.

Figure 6.1.2 2024 Intersection Flows, Contingency Coal Transport Route



6.2 NSF Road Network

6.2.1 NSF Roads

With reference to **Section 5** – and the detailed Project Schedule provided in **Appendix C** – the future total flows along the key roads providing access to the NSF Project Sites will [at various times] comprise: -

- **State Gully Mine Road**
 - o Existing flows
 - o Project flows
 - o APC VF Project flows and APC Extension Project flows

- **Glowworm Tunnel Road between Old Bells Line of Road & Maiyingu Marragu Trail**
 - Existing flows
 - Project flows
 - APC VF Project flows and APC Extension Project flows

- **Glowworm Tunnel Road north of Maiyingu Marragu Trail**
 - Existing flows
 - Project flows (Bore 9 & Bore 10)

- **Maiyingu Marragu Trail west of Glowworm Tunnel Road**
 - Existing flows
 - Project flows (Services Bore)
 - APC VF Project flows and APC Extension Project flows

- **Intersection Bells Line of Road & Old Bells Line of Road & Petra Avenue**
 - Existing flows
 - Project flows
 - APC VF Project flows and APC Extension Project flows

The peak cumulative traffic generation to the NSF during the Project construction phase will occur for a period of approximately 4 weeks in October 2014.

During this period, the potential exists for the Project (Services Bore construction) to be generating a peak construction flow of 16 vtpd at the same time as the APC VF Project (Shaft Site construction) is generating a peak flow of 32 vtpd - a total of 48 vtpd.

The flows associated with this peak cumulative generation period in October 2014, and the total future flow estimates for October 2014 on the key NSF roads, are shown in **Figure 6.2.1.1** and **Figure 6.2.1.2**.

Figure 6.2.1.1

Project & APC VF Project Construction Traffic Generation to NSF Road Network, October 2014

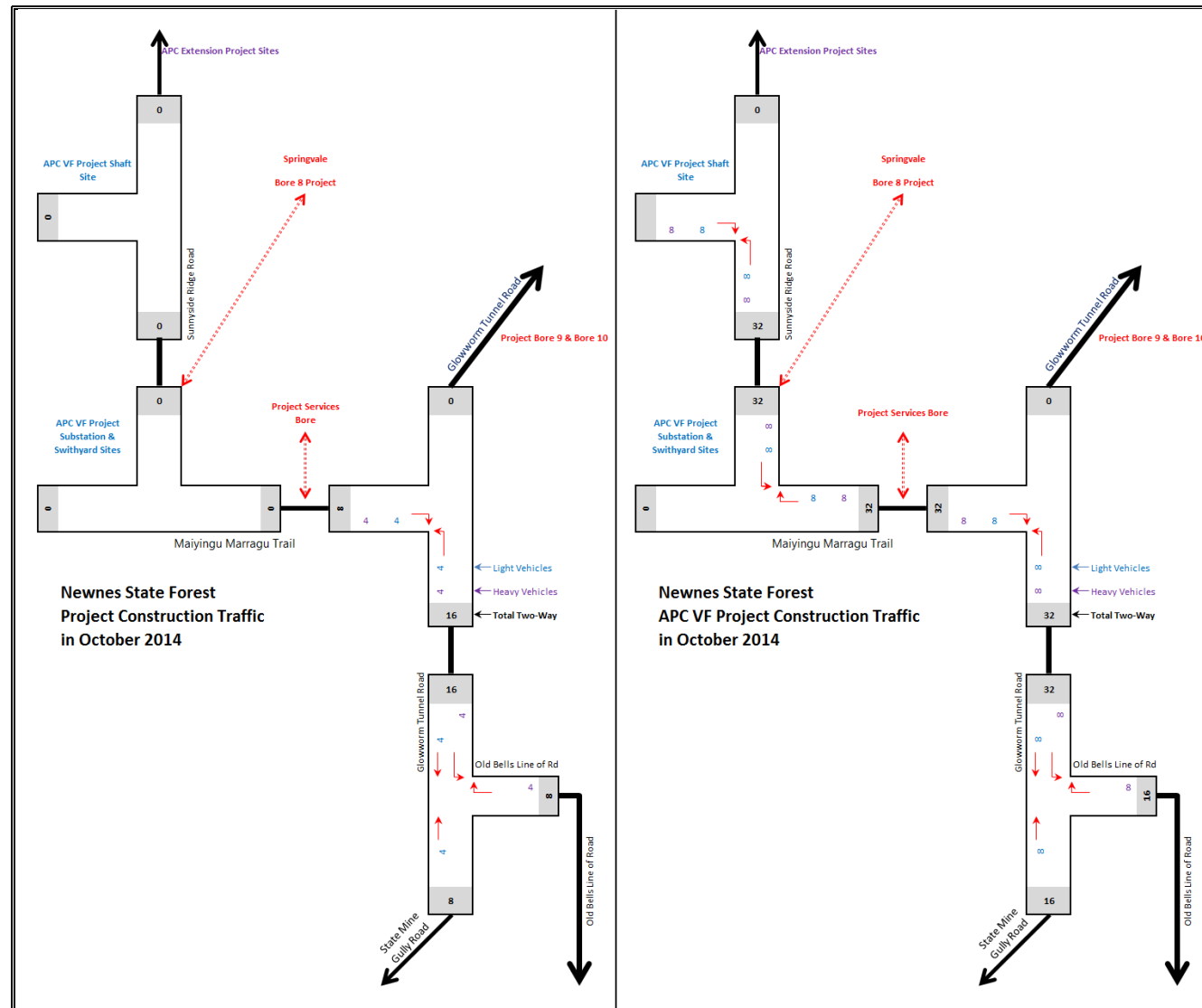
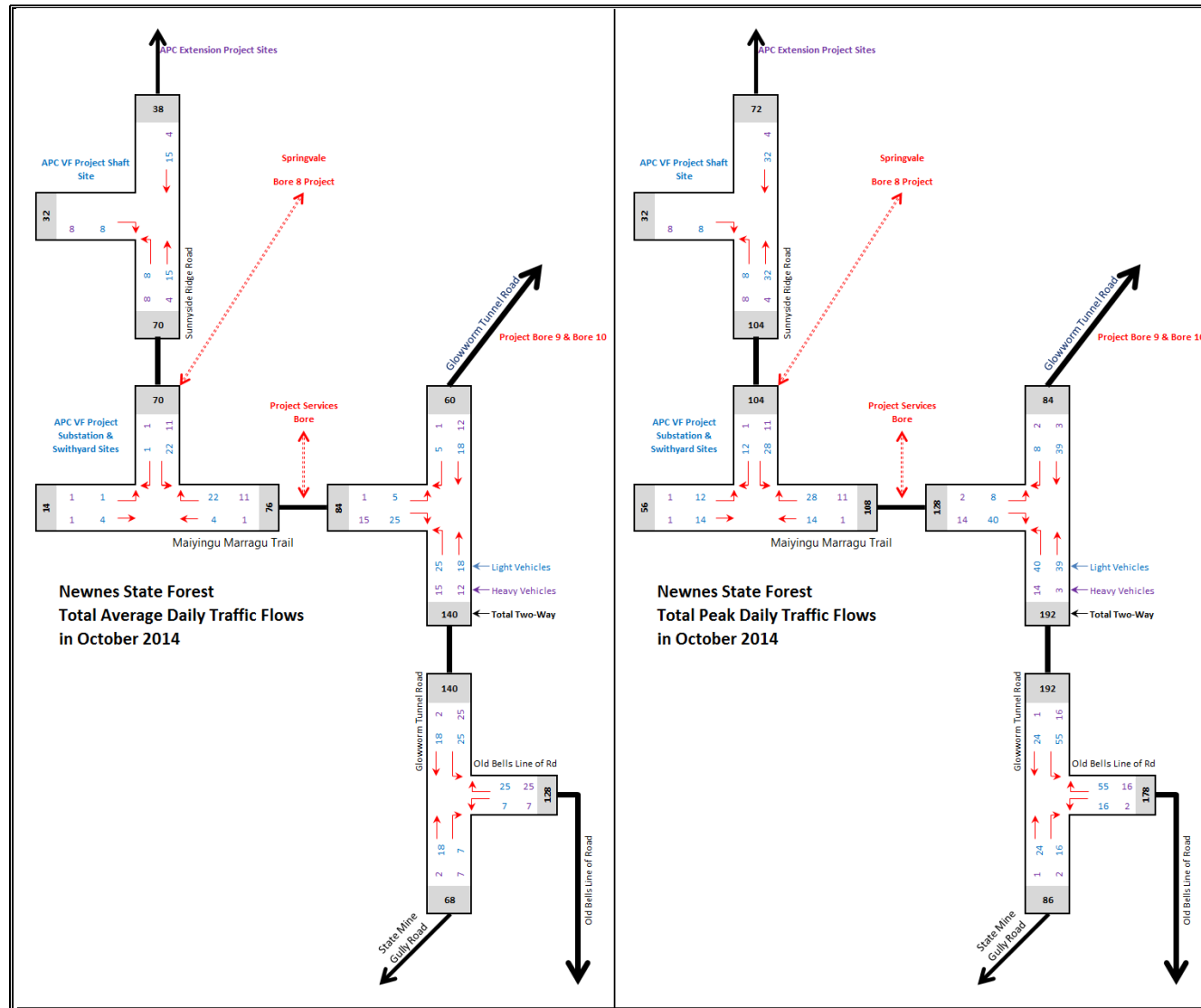


Figure 6.2.1.2 Total Average Day & Peak Day NSF Road Network Flows October 2014



At other times during the Project construction phase, the cumulative traffic generation of the Project and other NSF projects would be lower than this peak generation of 48 vtpd. In summary: -

- Between December 2014 and March 2015, the Project (Services Bore construction); the APC VF Project (Shaft Site construction); and the APC Extension Project (Bore 1 construction) would generate a cumulative construction traffic generation of 44 vtpd, comprising 16 Project vtpd; 12 APC VF Project vtpd; and 16 APC Extension Project vtpd.
- Between February 2016 and July 2016, the Project (Bore 9 construction) and the APC Extension Project (Bore 2 construction) would generate a cumulative construction traffic generation of 32 vtpd, comprising 16 Project vtpd and 16 APC Extension Project vtpd.
- Between October 2017 and January 2018, the Project (Bore 10 construction) and the APC Extension Project (Bore 3 construction) would generate a cumulative construction traffic generation of 32 vtpd, comprising 16 Project vtpd and 16 APC Extension Project vtpd.
- Outside of these periods of cumulative construction traffic generation, the Project would alone generate up to 16 vtpd to the NSF road network.

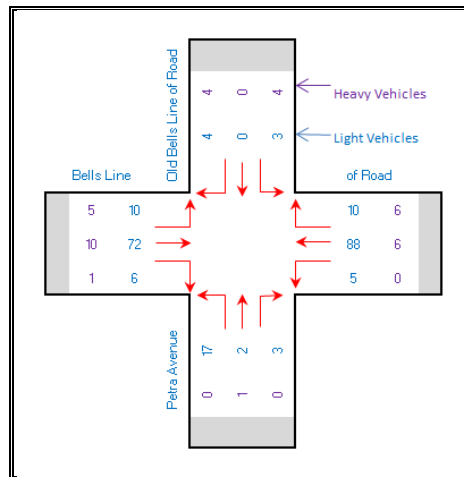
6.2.2 Intersection Chifley Road & Old Bells Line of Road & Petra Avenue

As discussed above, the peak cumulative traffic generation to the NSF during the Project construction phase will occur for a period of approximately 4 weeks in October 2014, where the Project and the APC VF Project cumulatively generate 48 vtpd to the NSF road network.

As a worst case for assessment, 50% of this total generation has been assigned to the surveyed AM peak hour at the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue, a total of 24 vtpd comprising 12 light vtpd and 12 heavy vtpd. These trips have been assigned with reference to the surveyed distribution of trips at the intersection, while the flows in Chifley Road have been increased by an 2% to account for annual average growth to 2014.

The resulting October 2014 total flows are shown in **Figure 6.2.2**.

Figure 6.2.2 2014 Peak Flows Chifley Road & Old Bells Line of Road & Petra Avenue



7 Future Road Network Operations

7.1 Pit Top Road Network

7.1.1 Intersection Operations

The future performance of the intersection of Castlereagh Highway & Mine Access Road has been examined using SIDRA. The results of the analysis – based on the 2024 design peak flows in **Figure 6.1.1** – are provided in **Table 7.1.1** below.

Table 7.1.1 2024 Castlereagh Highway & Mine Access Road Level of Service

Castlereagh Highway & Mine Access Road 2024	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Queue (m)	
	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport	Ave	Plus Coal Transport
5:00 - 6:00 am	A	B	<10	<10	12.8	20.1	0.08	0.08	1.8	1.8
7:30 - 8:30 am	A	B	<10	<10	14.4	15.1	0.13	0.13	2	3.5
13:00 - 14:00 pm	A	B	<10	<10	14.4	23.1	0.13	0.13	0.9	2.7
15:30 - 16:30 pm	A	B	<10	<10	13.6	14.9	0.17	0.20	4.6	6.1

With reference to **Table 7.1.1**, it is clear that the intersection of Castlereagh Highway & Mine Access Road will operate at a good LoS during the Springvale shift arrival and departure periods through 2024, with low average delays and significant spare capacity. This would also be the case during periods of contingency coal transport.

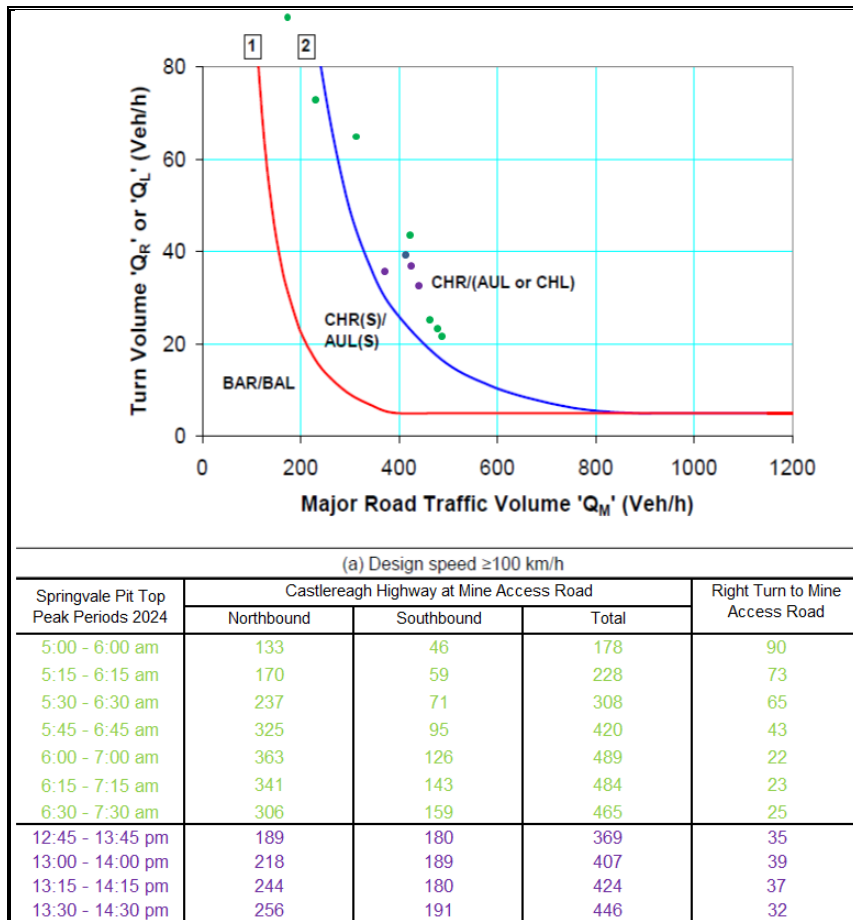
In summary, the Project would have no significant impact on the existing good LoS at the intersection of Castlereagh Highway & Mine Access Road, even during periods of contingency road transport, through 2024.

7.1.2 Intersection Turn Warrants

2024 warrants for the right turn movement from Castlereagh Highway to Mine Access Road have been assessed, again based on design peak flows during the broad morning and afternoon Springvale shift arrival periods.

The results of this assessment are provided in **Figure 7.1.2** below.

Figure 7.1.2 2024 Castlereagh Highway & Mine Access Road Turn Warrants



Figures 7.1.2 indicates that in 2024 there would be extended periods through the morning (5:30 to 7:30 am) and afternoon (12:45 to 14:30 pm) Springvale shift arrival periods where the warrants for a CHR turn treatment for the movement Castlereagh Highway to Mine Access Road are met. This would be the case on most weekdays.

Importantly, this same conclusion can be made based on an assessment of the [lower] weekday surveyed and weekday average flows at the intersection during these periods, i.e. even using lower surveyed and average flows, extended periods through the morning and afternoon Springvale shift arrival periods display cumulative traffic flows that warrant a CHR turn treatment.

Further to sensitivity testing, ARC has determined that annual average growth and the operational generation of sub-regional projects would combine with existing Springvale right turn flows to consistently meet warrants through the Springvale morning and afternoon arrival peak periods by approximately 2017.

Notwithstanding the good LoS at the intersection and good crash record, it is the opinion of ARC that an upgrade is warranted at the intersection by 2017 to safely and efficiently accommodate Pit Top and sub-regional flows traffic flow peaks that would exist on most weekdays through the extended life of Springvale.

Recommendation: That a CHR turn treatment be provided for the movement Castlereagh Highway to Mine Access Road so as to provide an appropriate level of safety and efficiency at the intersection through the extended life of Springvale. The design and implementation of the CHR would be subject to consultation with the RMS.

7.1.3 Castlereagh Highway Capacity

With reference to the design peak hour flows in **Figure 6.1.1** – and the broader potential for sub-regional projects to generate trips to the Castlereagh Highway across the day – by 2024 the potential exists for a small number of hours each week to report total flows which exceed the LoS “B” flow limit in the Castlereagh Highway. These peak hours would primarily coincide with the sub-regional mining afternoon change over period (broadly 2:00 – 4:00 pm).

Notwithstanding, even during these periods the Castlereagh Highway flows would remain well below the RMS capacity target of LoS “C” through 2024; and outside of these hours – i.e. for the majority of the day and week - Castlereagh Highway flows would remain within LoS “B” limits.

7.1.4 Contingency Coal Transport

With the proposed public road haulage capacity retained at 50,000 tonnes per annum (as for DA 11/92) the use of a fleet of 3 heavy vehicles would see this capacity limit reached in approximately 6 days (24 hours/day haulage) if all vehicles were travelling to/from WPS; and in approximately 10 days (24 hours/day haulage) if all vehicles were travelling to/from MPPS. In reality, coal haulage trips would likely be shared between the power stations, resulting in capacity being reached within approximately 8 days.

As such, the potential additional heavy vehicles flows generated to/from the Pit Top and to/from the sub-regional intersections along the contingency transport route during these periods would be very short term. This alone in our opinion suggests that these contingency periods would have little impact on sub-regional intersections.

Notwithstanding, the results of SIDRA analysis using the peak hour flows in **Figure 6.1.2** are provided below in **Table 7.1.4**.

Table 7.1.4 Contingency Coal Transport Intersections Level of Service

2024	Level of Service		Average Delay (s)		Worst Delay (s)		Degree of Saturation		95% Queue (m)	
	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport	Peak Hour	Plus Coal Transport
Castlereagh Highway & WPS	B	B	<10	<10	15.7	15.8	0.26	0.26	15.5	15.8
Castlereagh Highway & Boulder Road	B	B	<10	<10	14.9	16.1	0.14	0.14	3.2	4.4
Boulder Road & MPPS	B	B	<10	<10	16.5	17.5	0.04	0.04	2.4	2.4

The SIDRA analysis confirms that the key intersections along the contingency coal transport route would all be largely unaffected by the additional heavy vehicle trips, with each retaining good LoS ("B") through 2024.

Finally, with reference to a TIA currently being prepared by ARC for the assessment of the Angus Place Mine Extension Project, the intersections of Castlereagh Highway with Wolgan Road and Main Road have also been assessed (through 2024) to ascertain any potential impacts arriving from the Springvale contingency coal transport provisions. SIDRA analysis indicates that these intersections south of Lidsdale would operate at a LoS "B" through 2024 with or without the additional heavy vehicle generation of the contingency coal transport provisions.

In summary, the contingency transport of coal between the Pit Top and the WPS and MPPS would be very short term, and have no significant impact on the operation of key intersections along the contingency transport routes.

7.1.5 Impact Mitigation

The Project does not provide for any changes to the existing (post-Springvale MOD Project) generation of traffic to and from the Pit Top, and the assessment above confirms that Pit Top traffic generation will be accommodated by the local and sub-regional network without significant impact.

Notwithstanding, the assessment has determined that warrants for an upgrade of the right turn treatment Castlereagh Highway to Mine Access Road will be met consistently during Springvale arrival peaks by approximately 2017. The provision of an upgrade to the existing right turn treatment would appropriately maximise the safety and efficiency of the intersection through 2024.

More broadly, potential impacts will continue to be mitigated through the transportation of coal via the overland conveyor network; and by providing parking capacity which accommodates the unchanged peak staff demand at the Pit Top.

The Project does not provide for any changes to the existing DA 11/92 provisions for contingency coal transport via the public road network, and the assessment in sections above confirms the potential contingency trip generation traffic generation could be accommodated by the local and sub-regional network without any significant impacts.

More broadly, the use of heavy vehicles that conform with current RMS *Restricted Access Vehicle* limits in the Castlereagh Highway; the use of existing designated access routes between the Pit Top and the WPS and MPPS; the low annual limit transport limit; and the regular maintenance of the existing overland conveyor system means that the potential for contingency coal transport to be required is minimal, but that in such circumstances potential impacts will be minor.

7.2 NSF Road Network

7.2.1 NSF Access Intersections

Further to consideration of the maximum additional traffic generation of the Project to the key sub-regional NSF access intersections at Clarence and in north Lithgow, **it is the conclusion of ARC that the Project would have no significant impact on the the NSF access intersections, nor on local and sub-regional roads in Lithgow and Clarence.** This conclusion is based on the following: -

- The traffic generated by the Project – and specifically the peak generation which would occur during the construction phase for each NSF Project Site – is in and of itself minor; with reference to all available information, this additional traffic generation (8 light vtpd) would have no impact on the operation of the local roads and intersections within and north of Lithgow providing access to State Mine Gully Road.
- With reference to **Figure 6.2.2**, ARC has as a worst case loaded 50% of daily cumulative peak flows (October 2014) to the single AM peak hour at the intersection of Chifley Road & Old Bells Line of Road & Petra Avenue. The results of this assignment are virtually unchanged from the existing conditions, with LoS remaining at LoS “B” (based on a worst movement average delay of 15.9 seconds) and DoS 0.056.
- Traffic increases in Chifley Road would be temporary and have no significant impact on existing capacity and LoS in Chifley Road.

7.2.2 NSF Road Network Capacity

Further to consideration of the maximum additional traffic generation of the Project, and accounting for the cumulative traffic flows arising with other projects within the NSF - **it is the conclusion of ARC that the NSF road network would not be significantly impacted by the Project.** This conclusion is based on the following: -

- All NSF Project Site access tracks will be designed in accordance with the agreement with FCNSW, and would appropriately accommodate the peak generation of each NSF Project Site.
- The traffic generation associated with the Project – and specifically the peak generation which would occur during the construction phase (16 vtpd) – is in and of itself very minor.
- With reference **Figure 6.2.1.2**, during the highest period of cumulative traffic generation – October 2014 - average daily flows would not exceed 150 vtpd on any of the key NSF roads.

- With reference **Figure 6.2.1.2**, during the highest period of cumulative traffic generation – October 2014 - peak daily [Sunday] flows would exceed 150 vehicle trips per day in Old Bells Line of Road east of Glowworm Tunnel Road (178 vtpd); and in Glowworm Tunnel Road between Old Bells Line of Road and Maiyingu Marragu Trail (192 vtpd). These sections of road are perhaps the widest and best prepared within the NSF, and provide well for two-way traffic, such that even these cumulative peak flows would represent only a minor percentage of the actual traffic carrying capacity of these sections of the NSF road network.
- Once operational, it is estimated that the NSF Project Sites would generate no more than 10 vtpw, which would have no impact on the NSF road network.

Notwithstanding these conclusions in regard to general traffic capacity, it is acknowledged that the unsealed NSF road network may require additional remediation works/general maintenance so as to appropriately provide for the traffic generated by the Project, particularly during the construction phase for each NSF Project Site. Springvale Coal has throughout its past works in the NSF complied fully with the requirements of the *Forestry Act 2012* (and the previous *Forestry Act 1916*) and FPC4, and has committed to continue to provide such compliance through the Project, as outlined below.

7.2.3 Impact Mitigation

7.2.3.1 NSF Access Intersections

ARC has not identified any specific impacts relating to the generation of Project traffic through the NSF access intersections at Clarence or through the north of Lithgow. The impact mitigation measures provided in general for these intersections - including **the designation of the heavy vehicle route to the NSF Project Sites via Old Bells Line of Road at Clarence** and the generally low traffic generation of the Project – will allow these intersections to continue to operate at a good LoS through the Project.

7.2.3.2 Forestry Act 2012

The provisions of the *Forestry Act 2012* have been applied to all aspects of the construction and operation of the NSF Project Sites. Detailed environmental protection measures, rehabilitation plans and bushfire plans will also be developed and implemented consistent with those used during previous mining and associated activities undertaken by Centennial, as detailed in other sections of the Project EIS.

7.2.3.3 Construction Traffic Management Plan

Recommendation It is the recommendation of ARC that a Construction Traffic Management Plan (**CTMP**) be prepared in consultation with FCNSW and implemented for the duration of the construction phase at each NSF Project Site. The CTMP would include:

- o Details of the induction process to be undertaken by all Angus Place staff and contractors working at NSF Project Sites.
- o Designated access routes for heavy vehicles.
- o Defined hours of construction, including general construction hours on-site and any restrictions applying to heavy vehicle operating hours.
- o Strict speed limits for all Project vehicles in line with FCNSW 60 km/h limits in the NSF.
- o Strict adherence to the safety, signage and general access requirements as outlined in the RTA Traffic Control at Worksites guidelines for each of the NSF Project Sites.
- o Clear guidelines in regard to the movement of all Project vehicles in and following adverse weather conditions.
- o A Code of Conduct for all contractors and staff detailing traffic routes, behavioural requirements and speed limits.

7.2.3.4 Operational Traffic Management Plan

Recommendation It is the recommendation of ARC that a Traffic Management Plan (**TMP**) be prepared in consultation with FCNSW and implemented for the duration of the operational phase at each NSF Project Site. The TMP would include:

- o Details of the induction process to be undertaken by all Angus Place staff and contractors working at NSF Project Sites.
- o Designated access routes for heavy vehicles.
- o Defined hours of construction, including general construction hours on-site and any restrictions applying to heavy vehicle operating hours.
- o Strict speed limits for all Project vehicles in line with FCNSW 60 km/h limits in the NSF.
- o Clear guidelines in regard to the movement of all Project vehicles in and following adverse weather conditions.
- o A Code of Conduct for all contractors and staff detailing traffic routes, behavioural requirements and speed limits.

7.2.3.5 NSF Road Network Maintenance

Recommendation It is the recommendation of ARC that any NSF road network remedial tasks arising from the construction or operation of the NSF Project Sites be appropriately managed in conjunction with FCNSW.

8 Conclusions & Recommendations

8.1 Pit Top Road Network

8.1.1 Intersection Castlereagh Highway & Mine Access Road

The Project will not alter the characteristics of the existing Pit Top traffic generation. **No additional traffic would be generated by the Project to the local and sub-regional traffic network which provides access to the Pit Top via the intersection of Castlereagh Highway & Mine Access Road.**

While the Project would not generate additional traffic to the Castlereagh Highway, annual average traffic growth and other sub-regional traffic generating projects would increase traffic flows over existing levels through the life of the Project. Further to consideration of these factors, the intersection would continue to operate at a good level of service through an appropriate 10 year forecast horizon to 2024, with low average delays and significant spare capacity across the day.

Notwithstanding, continued Springvale traffic generation, annual average growth and other sub-regional traffic generating projects will over time generate total flows that would meet AustRoads warrants for an upgrade of the existing Castlereagh Highway to Mine Access Road right turn treatment. By 2017, these warrants would be met across extended morning and afternoon Springvale shift arrival periods on most weekdays.

Recommendation That the right turn treatment Castlereagh Highway to Mine Access Road be upgraded from the existing Auxiliary Right treatment to a Channelised Right treatment. The design and implementation of the upgrade would be finalised further to consultation with the RMS.

8.1.2 Castlereagh Highway Capacity

The Castlereagh Highway will continue to operate at a good level of service across the day and week, providing drivers with a stable traffic flow in which they are generally free to select their desired speed, and to manoeuvre within the traffic stream with relative ease. Castlereagh Highway flows would remain well below RMS capacity targets through 2024.

8.1.3 Contingency Coal Transport

The contingency transport of coal via the public road network would not significantly impact the performance of the intersection of Castlereagh Highway & Mine Access Road through 2024, nor would it significantly impact the operation of the intersections along the contingency coal transport route between the Pit Top and the WPS and MPPS.

These intersections will continue to operate with low average delays and significant spare capacity even in peak periods; and each provides appropriate basic geometry and sight distances to accommodate heavy vehicles. Moreover, the regular maintenance of the existing overland coal conveyor system means that the potential for contingency coal transport to be required is minimal.

8.2 NSF Road Network

8.2.1 Access to the NSF Project Sites

During both the construction and operational phase of the Project, access into the NSF for heavy vehicles will be restricted to a route via Chifley Road and Old Bells Line of Road at Clarence. Light vehicles could utilise this route via Clarence or a route via State Gully Mine Road north of Lithgow. Primary access within the NSF for all vehicles will be via Glowworm Tunnel Road (Services Bore, Bore 9 and Bore 10) and Maiyingu Marragu Trail (Services Bore).

The Project provides for upgrades and extensions to existing access tracks to Bore 9 and Bore 10 from Glowworm Tunnel Road; and a short new access track to the Services Bore from Maiyingu Marragu Trail. It has been agreed with FCNSW that an access track (5 m) and adjacent Infrastructure Corridor (5 m) will be provided to each NSF Project Site, with each Infrastructure Corridor to be remediated after installation, retaining a 5 m access track which would appropriately provide for the peak traffic demands of each NSF Project Site.

Recommendation That heavy vehicle trips to/from the NSF Project Sites during both construction and operation be undertaken during daylight hours, which would generally require them to occur between 6:00am and 6:00pm.

8.2.2. Construction Traffic Generation

During the construction phase of a NSF Project Site, up to 16 vtpd would be generated, averaging 8 heavy vtpd and 8 light vtpd.

For the construction of the Services Bore, an average of 8 heavy vtpd would be generated in Old Bells Line of Road, and an average of 8 light vtpd would be generated in State Mine Gully Road. A total of 16 vtpd would be then generated in Glowworm Tunnel Road and Maiyingu Marragu Trail to the Service Bore access track.

For the construction of Bore 9 and Bore 10, an average of 8 heavy vtpd would be generated in Old Bells Line of Road, and an average of 8 light vtpd would be generated in State Mine Gully Road. A total of 16 vtpd would then be generated in Glowworm Tunnel to the Bore 9 and Bore 10 access tracks.

8.2.3 Construction Traffic Impacts & Impact Mitigation

The traffic generated by the construction of the NSF Project Sites would not significantly impact the operation of the NSF road network or the NSF access intersections at Clarence and north Lithgow. This is a function of the low traffic generation potential of the construction phase of the Project and the available capacity within the NSF road network and at the NSF access intersections at Clarence and north Lithgow. This conclusion appropriately considers periods where NSF Project Site construction will coincide with other traffic generating projects within the NSF.

Construction vehicle access at each of the NSF Project Sites will be provided with consideration of sight distances, gradients and carriageway widths so as to ensure the safety of other NSF users, and all construction vehicle parking will be provided within NSF Project Site compounds.

Recommendation That a Construction Traffic Management Plan be prepared in consultation with FCNSW and Lithgow City Council and implemented for the duration of the construction phase at each NSF Project Site.

8.2.4 Operational Traffic Generation

During the operational phase of a NSF Project Site, up to 10 vtpw would be generated, generally comprising up to 6 heavy vtpd and 4 light vtpd.

For the operation of the Services Bore, an average of 6 heavy vtpw would be generated in Old Bells Line of Road, and an average of 4 light vtpw would be generated in State Mine Gully Road. A total of 10 vtpw would then be generated in Glowworm Tunnel Road and Maiyingu Marragu Trail to the Service Bore access track.

For the operation of Bore 9 and Bore 10, an average of 6 heavy vtpw would be generated in Old Bells Line of Road, and an average of 4 light vtpw would be generated in State Mine Gully Road. A total of 10 vtpw would then be generated in Glowworm Tunnel Road to the Bore 9 and Bore 10 access tracks.

8.2.5 Operational Traffic Impacts & Impact Mitigation

The traffic generated by the operation of the NSF Project Sites would not significantly impact the operation of the NSF road network or the NSF access intersections at Clarence and north Lithgow. This is a function of the very low traffic generation potential of the operational phase of the Project and the available capacity within the NSF road network and at the NSF access intersections at Clarence and north Lithgow. This conclusion appropriately considers periods where NSF Project Site operations will coincide with other traffic generating projects within the NSF.

All operational vehicle parking demands will be met within the NSF Project Site compounds.

Recommendation That an Operational Traffic Management Plan be prepared in consultation with FCNSW and Lithgow City Council and implemented for the duration of the operational phase at each NSF Project Site.

8.2.6 NSF Road Network Impact Mitigation

Further to the remediation proposals detailed in the Project EIS for each NSF Project Site, the potential exists for minor remedial works to be required within the NSF prior to or during the construction and/or operation of the NSF Project Sites as a result of wear caused by Project vehicles; by significantly adverse weather conditions within the NSF; or a combination of these or other factors.

Recommendation That any NSF road network remedial tasks arising from the construction or operation of the NSF Project Sites be appropriately managed in conjunction with FCNSW.



Springvale

Mine Extension Project

Traffic Impact Assessment

Appendix A Traffic Surveys

Table A1.1	Castlereagh Highway ADT
Table A1.2	Castlereagh Highway Classification
Table A2.1	Mine Access Road ADT
Table A2.2	Mine Access Road Classification
Table A3.1	Intersection Survey Castlereagh Highway & Mine Access Road
Table A4.1	Old Bells Line of Road ADT
Table A4.2	Old Bells Line of Road Classification
Table A5.1	Glowworm Tunnel Road ADT
Table A5.2	Glowworm Tunnel Road Classification
Table A6.1	Sunnyside Ridge Road ADT
Table A6.2	Sunnyside Ridge Road Classification
Table A7.1	Intersection Chifley Road & Old Bells Line of Road & Petra Avenue
Figure A8	AustRoads Vehicles Classification System

Source: *Skyhigh Traffic Surveys & AustRoads*

Table A1.1 Castlereagh Highway ADT

Job No	N1001								
Client	ARC								
Road	Castlereagh Hwy - 1.5km south of Main St							Average Weekday	5,208
Location	Springvale							7 Day Average	4,745
Site No.	1								
Start Date	20-Feb-13								
Description	Volume Summary								
Direction	Combined								
Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	25-Feb	26-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb		
AM Peak	378	387	374	384	368	309	331		
PM Peak	486	444	460	489	538	286	343		
0:00	16	71	54	52	55	26	24	50	43
1:00	11	19	20	18	26	16	13	19	18
2:00	22	10	11	18	11	22	8	14	15
3:00	21	15	22	19	19	13	12	19	17
4:00	43	29	32	26	28	27	13	32	28
5:00	184	202	175	185	141	70	57	177	145
6:00	378	387	374	384	368	148	70	378	301
7:00	274	269	306	289	333	148	78	294	242
8:00	302	334	354	350	342	196	131	336	287
9:00	287	250	256	283	327	232	184	281	260
10:00	285	252	279	319	313	281	233	290	280
11:00	301	259	278	300	312	309	331	290	299
12:00	317	249	266	276	367	286	337	295	300
13:00	362	345	325	328	412	274	334	354	340
14:00	323	323	308	381	423	220	343	352	332
15:00	486	444	460	448	538	210	320	475	415
16:00	399	422	457	489	457	202	324	445	393
17:00	323	334	327	316	451	201	315	350	324
18:00	259	176	209	244	335	157	238	245	231
19:00	144	164	122	167	245	124	167	168	162
20:00	78	90	72	103	186	57	91	106	97
21:00	100	103	109	134	161	58	84	121	107
22:00	65	73	76	72	74	56	58	72	68
23:00	41	36	46	46	52	37	41	44	43
Total	5021	4856	4938	5247	5976	3370	3806	5208	4745

Table A1.2 Castlereagh Highway Classification

Road		Castlereagh Hwy - 1.5km south of Main St										M'Cycle & P'Cycle		0%			
Location		Springvale										Cars		86%			
Site No.		1										LGV		7%			
Start Date		20-Feb-13										OGV1 & PSV		2%			
Day		Weekday Ave.										OGV2		5%			
Description														Class Summary			

	NB						SB						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	10	0	0	2	12	0	28	7	1	1	38	0	38	7	1	3	50
1:00	0	6	0	0	5	12	0	5	1	0	1	7	0	11	1	0	6	19
2:00	0	5	0	0	3	8	0	5	1	0	1	7	0	9	1	0	4	14
3:00	0	7	1	0	4	13	0	5	1	0	1	6	0	12	2	0	5	19
4:00	0	16	2	0	2	20	0	9	0	0	2	12	0	25	2	0	4	32
5:00	1	137	3	1	5	146	0	24	5	1	2	31	1	160	8	1	7	177
6:00	2	270	11	2	7	292	0	69	6	5	6	86	2	338	17	7	14	378
7:00	0	150	13	5	12	180	0	93	14	2	5	115	0	243	26	7	17	294
8:00	1	125	11	3	8	147	0	156	20	5	8	189	1	281	30	8	17	336
9:00	0	102	7	4	7	121	0	129	18	4	8	160	1	231	25	8	15	281
10:00	1	112	10	5	7	135	0	129	15	3	7	155	1	241	25	9	14	290
11:00	1	125	8	3	5	143	0	117	18	5	8	147	1	242	25	8	13	290
12:00	1	128	5	2	6	142	0	127	14	4	9	153	1	254	19	6	15	295
13:00	1	172	5	3	6	187	0	135	21	4	7	167	1	307	26	8	12	354
14:00	1	155	8	3	6	173	1	150	19	2	6	178	1	305	27	5	12	352
15:00	1	149	5	2	5	162	1	275	28	1	8	314	2	424	33	3	13	475
16:00	1	163	4	3	12	183	0	227	25	3	7	262	1	391	29	6	18	445
17:00	1	155	4	1	7	168	0	152	19	3	8	182	1	307	23	4	16	350
18:00	1	117	2	0	6	126	0	100	12	2	5	119	1	217	14	2	10	245
19:00	0	82	1	0	3	86	0	67	6	2	7	82	0	149	7	2	10	168
20:00	0	56	1	0	3	60	0	41	3	0	2	46	0	97	4	0	4	106
21:00	0	77	1	0	3	81	0	33	4	1	3	41	0	110	5	1	5	121
22:00	0	42	1	0	3	46	0	22	2	0	2	26	0	64	3	0	5	72
23:00	0	16	1	0	3	19	0	21	1	1	1	25	0	37	2	1	4	44
Total	13	2376	103	39	129	2659	3	2119	259	50	117	2548	16	4496	362	89	245	5208

Combined Directions

5000

4500

4000

3500

3000

2500

2000

1500

1000

500

0

4496

M'Cycle & P'Cycle

Cars

LGV

OGV1 & PSV

OGV2

Vehicle Type

Table A2.1 Mine Access Road ADT

Job No	N1001								
Client	ARC								
Road	Private access Rd - to / from Mine							Average Weekday	671
Location	Springvale							7 Day Average	523
Site No.	2								
Start Date	20-Feb-13								
Description	Volume Summary								
Direction	Combined								
Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	25-Feb	26-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb		
AM Peak	123	120	117	131	74	43	40		
PM Peak	95	96	101	104	45	30	31		
0:00	0	41	40	41	38	0	0	32	23
1:00	0	0	1	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	2	1	0	5	2	2	3	2	2
4:00	5	6	8	5	9	4	3	7	6
5:00	123	120	117	131	74	43	40	113	93
6:00	42	28	42	26	31	21	14	34	29
7:00	18	28	32	22	39	1	3	28	20
8:00	18	73	63	63	56	8	1	55	40
9:00	19	25	28	18	25	2	2	23	17
10:00	20	19	20	23	31	2	0	23	16
11:00	23	30	33	35	17	1	0	28	20
12:00	18	28	19	23	21	4	0	22	16
13:00	61	72	63	54	45	10	0	59	44
14:00	21	25	29	25	37	10	6	27	22
15:00	56	54	59	42	23	4	3	47	34
16:00	95	96	101	104	23	2	4	84	61
17:00	18	25	19	15	43	30	17	24	24
18:00	12	13	12	9	33	18	31	16	18
19:00	5	7	4	7	9	4	0	6	5
20:00	3	7	4	7	2	0	2	5	4
21:00	44	40	45	44	0	0	7	35	26
22:00	1	1	5	2	0	1	1	2	2
23:00	3	3	0	4	0	0	1	2	2
Total	607	742	744	705	558	167	138	671	523

Table A2.2 Mine Access Road Classification

Road		Private access Rd - to / from Mine											M'Cycle & P'Cycle		0%	
Location		Springvale											Cars		86%	
Site No.		2											LGV		12%	
Start Date		20-Feb-13											OGV1 & PSV		1%	
Day		Weekday Ave.											OGV2		1%	
Description Class Summary																

	NB (exiting mine)						SB (entering mine)						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	26	5	0	0	32	0	0	0	0	0	0	0	27	5	0	0	32
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	1	0	0	0	1	0	1	0	0	0	1	0	2	0	0	0	2
4:00	0	1	0	0	0	1	0	6	0	0	0	6	0	6	0	0	0	7
5:00	0	2	0	0	0	2	0	104	7	0	0	111	0	106	7	0	0	113
6:00	0	6	1	0	0	8	0	22	3	0	1	26	0	28	4	0	1	34
7:00	0	5	2	0	1	8	0	16	3	1	0	20	0	21	5	1	1	28
8:00	0	36	6	1	0	43	0	7	4	1	0	12	0	43	10	1	1	55
9:00	0	9	2	1	0	12	0	8	2	1	0	11	0	17	4	1	1	23
10:00	0	8	3	0	0	11	0	7	3	1	0	11	0	15	6	1	0	23
11:00	0	10	3	1	0	14	0	10	3	0	0	14	0	20	5	2	1	28
12:00	0	7	2	0	0	10	0	9	2	0	1	12	0	16	5	0	1	22
13:00	0	12	3	0	1	16	0	39	4	1	0	43	0	51	7	1	1	59
14:00	0	16	3	0	0	19	0	7	2	0	0	9	0	23	4	1	0	27
15:00	0	37	4	0	0	41	0	5	1	0	0	6	0	42	5	0	0	47
16:00	0	73	6	0	0	79	0	4	1	0	0	5	0	77	7	0	0	84
17:00	0	14	2	0	0	16	0	8	1	0	0	8	0	22	2	0	0	24
18:00	0	14	1	0	0	14	0	1	0	0	0	2	0	15	1	0	0	16
19:00	0	4	1	0	0	5	0	2	0	0	0	2	0	6	1	0	0	6
20:00	0	1	1	0	0	2	0	3	0	0	0	3	0	4	1	0	0	5
21:00	0	1	0	0	0	1	0	31	2	0	0	33	0	33	2	0	0	35
22:00	0	1	0	0	0	1	0	1	0	0	0	1	0	2	0	0	0	2
23:00	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2
Total	0	285	42	5	3	336	0	291	37	4	3	336	0	576	80	9	6	671

Combined Directions

Vehicles

700

600

500

400

300

200

100

0

0

576

80

9

6

M'Cycle & P'Cycle

Cars

LGV

OGV1 & PSV

OGV2

Vehicle Type

Table A3.1 Intersection Castlereagh Highway & Mine Access Road AM

Approach		Castlereagh Highway WB						Mine Access Road						Castlereagh Highway EB						Key Flows				
Direction		Through			Right			Left			Right			Left			Through			Intersection Total	Right to Springvale	Right from Springvale	Springvale Total	Through Flow Total
Time Period		Cars	Heavy	Total	Cars	Heavy	Total	Cars	Heavy	Total	Cars	Heavy	Total	Cars	Heavy	Total	Cars	Heavy	Total					
0:00 to 1:00	to 1:00	8	3	11	0	0	0	27	0	27	12	0	12	1	0	1	17	0	17	68	0	12	40	28
0:15 to 1:15	to 1:15	9	4	13	0	0	0	7	0	7	2	0	2	1	0	1	16	0	16	39	0	2	10	29
0:30 to 1:30	to 1:30	9	3	12	0	0	0	2	0	2	2	0	2	1	0	1	9	0	9	26	0	2	5	21
0:45 to 1:45	to 1:45	7	5	12	0	0	0	0	0	0	2	0	2	0	0	0	6	1	7	21	0	2	2	19
1:00 to 2:00	to 2:00	9	5	14	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5	19	0	0	0	19
1:15 to 2:15	to 2:15	4	6	10	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6	16	0	0	0	16
1:30 to 2:30	to 2:30	4	7	11	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	16	0	0	0	16
1:45 to 2:45	to 2:45	3	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	12	0	0	0	12
2:00 to 3:00	to 3:00	2	4	6	0	0	0	0	0	0	0	0	0	0	0	0	1	5	6	12	0	0	0	12
2:15 to 3:15	to 3:15	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	11	0	0	0	11
2:30 to 3:30	to 3:30	5	5	10	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	14	0	0	0	14
2:45 to 3:45	to 3:45	7	4	11	0	0	0	0	0	0	0	0	0	0	0	0	3	4	7	18	0	0	0	18
3:00 to 4:00	to 4:00	7	9	16	1	0	1	0	0	0	0	0	0	0	0	0	2	3	5	22	1	0	1	21
3:15 to 4:15	to 4:15	7	9	16	1	0	1	0	0	0	0	0	0	0	0	0	1	3	4	21	1	0	1	20
3:30 to 4:30	to 4:30	6	7	13	1	0	1	0	0	0	1	0	1	0	0	0	3	4	7	22	1	1	2	20
3:45 to 4:45	to 4:45	4	8	12	1	0	1	0	0	0	1	0	1	0	0	0	6	2	8	22	1	1	2	20
4:00 to 5:00	to 5:00	11	3	14	4	1	5	0	0	0	1	0	1	4	0	4	12	2	14	38	5	1	10	28
4:15 to 5:15	to 5:15	15	2	17	17	1	18	0	0	0	1	0	1	8	0	8	15	3	18	62	18	1	27	35
4:30 to 5:30	to 5:30	23	4	27	27	1	28	0	0	0	0	0	0	18	0	18	16	4	20	93	28	0	46	47
4:45 to 5:45	to 5:45	44	4	48	52	1	53	0	0	0	0	0	0	31	0	31	21	5	26	158	53	0	84	74
5:00 to 6:00	to 6:00	99	7	106	76	1	77	0	0	0	0	0	0	42	0	42	25	6	31	226	77	0	119	107
5:15 to 6:15	to 6:15	95	10	105	64	1	65	0	0	0	0	0	0	39	1	40	34	7	41	251	65	0	105	146
5:30 to 6:30	to 6:30	143	15	158	60	1	61	3	0	3	0	2	2	30	1	31	44	6	50	305	61	2	97	208
5:45 to 6:45	to 6:45	209	18	227	41	1	42	3	0	3	1	2	3	20	2	22	55	14	69	366	42	3	70	296
6:00 to 7:00	to 7:00	238	21	259	20	2	22	3	0	3	2	3	5	7	2	9	77	16	93	391	22	5	39	352
6:15 to 7:15	to 7:15	240	25	265	21	2	23	5	0	5	2	3	5	8	1	9	91	17	108	415	23	5	42	373
6:30 to 7:30	to 7:30	220	22	242	22	3	25	2	0	2	3	1	4	7	1	8	102	17	119	400	25	4	39	361
6:45 to 7:45	to 7:45	168	24	192	22	4	26	2	0	2	2	1	3	6	0	6	106	14	120	349	26	3	37	312
7:00 to 8:00	to 8:00	143	26	169	16	2	18	3	0	3	4	0	4	5	0	5	107	16	123	322	18	4	30	292
7:15 to 8:15	to 8:15	145	26	171	15	2	17	23	0	23	14	1	15	6	0	6	115	23	138	370	17	15	61	309
7:30 to 8:30	to 8:30	125	25	150	10	2	12	11	0	11	17	1	18	6	0	6	136	27	163	380	12	18	67	313
7:45 to 8:45	to 8:45	111	26	137	4	2	6	12	0	12	20	2	22	4	0	4	152	23	175	376	6	22	64	312
8:00 to 9:00	to 9:00	100	24	124	4	3	7	31	0	31	18	2	20	5	0	5	147	28	175	362	7	20	63	299
8:15 to 9:15	to 9:15	79	18	97	3	4	7	9	1	10	8	1	9	4	0	4	138	22	160	287	7	9	30	257
8:30 to 9:30	to 9:30	86	18	104	2	4	6	2	2	4	4	2	6	5	0	5	118	29	147	272	6	6	21	251
8:45 to 9:45	to 9:45	84	16	100	4	3	7	1	4	5	2	2	4	7	0	7	116	34	150	273	7	4	23	250
9:00 to 10:00	to 10:00	86	17	103	4	2	6	2	4	6	5	2	7	6	0	6	115	28	143	271	6	7	25	246
9:15 to 10:15	to 10:15	100	18	118	4	2	6	3	3	6	5	2	7	5	0	5	120	31	151	293	6	7	24	269
9:30 to 10:30	to 10:30	105	25	130	4	1	5	2	2	4	6	2	8	4	0	4	127	22	149	300	5	8	21	279
9:45 to 10:45	to 10:45	106	26	134	3	1	4	3	0	3	7	1	8	3	0	3	118	21	139	291	4	8	18	273
10:00 to 11:00	to 11:00	98	25	123	2	2	4	5	0	5	6	1	7	4	0	4	130	20	150	293	4	7	20	273
10:15 to 11:15	to 11:15	91	24	115	7	1	8	5	1	6	7	2	9	3	0	3	130	21	151	292	8	9	26	266
10:30 to 11:30	to 11:30	88	17	105	8	1	9	7	1	8	6	1	7	5	0	5	116	20	136	270	9	7	29	241
10:45 to 11:45	to 11:45	100	15	115	10	1	11	10	1	11	4	1	5	6	0	6	119	22	141	289	11	5	33	256
11:00 to 12:00	to 12:00	98	15	113	12	0	12	10	1	11	3	1	4	6	0	6	106	22	128	274	12	4	33	241
11:15 to 12:15	to 12:15	104	18	122	7	0	7	10	0	10	4	0	4	7	0	7	102	21	123	273	7	4	28	245
11:30 to 12:30	to 12:30	93	20	113	6	1	7	9	0	9	5	0	5	8	0	8	108	21	129	271	7	5	29	242
11:45 to 12:45	to 12:45	90	20	110	4	1	5	6	0	6	5	0	5	6	0	6	112	22	134	266	5	5	22	244
12:00 to 13:00	to 13:00	96	20	116	5	1	6	3	1	4	4	0	4	5	0	5	113	23	136	271	6	4	19	252
12:15 to 13:15	to 13:15	90	17	107	9	1	10	2	1	3	3	0	3	10	0	10	114	29	143	276	10	3	26	250
12:30 to 13:30	to 13:30	100	16	116	15	0	15	2	1	3	2	0	2	12	1	13	120	31	151	300	15	2	33	267
12:45 to 13:45	to 13:45	102	14	116	10	1	11	2	1	3	3	1	4	19	1	20	115	25	140	314	31	4	58	256
13:00 to 14:00	to 14:00	116	19	135	11	1	12	1	0	1	1	4	20	1	21	118	25	143	338	32	4	60	278	
13:15 to 14:15	to 14:15	135	21	156	28	1	29	5	1	6	4	1	5	17	1	18	116	12	128	342	29	5	58	284
13:30 to 14:30	to 14:30	145	21	166	21	3	24	5	1	6	5	1	6	12	0	12	118	10	128	340	24	6	48	292
13:45 to 14:45	to 14:45	132	20	152	5	2	7	11	2	13	5	1	6	6	0	6	112	13	125	329	7	6	32	297
14:00 to 15:00	to 15:00	141	16	157	1	2	3	14	2	16	6	1	7	4	0	4	133	12	145	332	3	7	30	302
14:15 to 15:15	to 15:15	121	15	136	0	2	2	12	1	13	6	1	7	5	0	5	171	20						

Table A4.1 Old Bells Line of Road ADT

Job No	N649							Average Weekday927 Day Average104	
Client	ARC								
Road	Old Bells Line of Road (east of Glowworm Tunnel Rd)								
Location	Lithgow								
Site No.	3								
Start Date	15-Jul-11								
Description	Volume Summary								
Direction	Combined								
Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	18-Jul	19-Jul	20-Jul	21-Jul	15-Jul	16-Jul	17-Jul		
AM Peak	11	9	8	15	16	16	24		
PM Peak	11	7	9	14	15	16	27		
0:00	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	2	9	2	8	6	0	0	5	4
5:00	9	5	8	9	14	0	1	9	7
6:00	2	0	4	7	6	1	0	4	3
7:00	2	5	5	6	5	2	1	5	4
8:00	11	8	6	15	11	16	9	10	11
9:00	4	3	6	14	16	5	14	9	9
10:00	7	6	4	5	13	8	24	7	10
11:00	8	3	6	10	9	7	13	7	8
12:00	11	7	9	14	15	5	15	11	11
13:00	4	5	9	14	9	13	13	8	10
14:00	2	2	1	10	9	16	19	5	8
15:00	4	1	4	8	5	16	27	4	9
16:00	3	1	3	1	3	12	8	2	4
17:00	2	2	0	3	2	12	9	2	4
18:00	0	0	1	0	0	1	1	0	0
19:00	0	0	0	0	6	2	0	1	1
20:00	0	0	0	0	2	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	7	0	0	1	1
23:00	0	0	0	0	1	0	0	0	0
Total	71	57	68	124	139	116	154	92	104
7-19	58	43	54	100	97	113	153	70	88
6-22	60	43	58	107	111	116	153	76	93
6-24	60	43	58	107	119	116	153	77	94
0-24	71	57	68	124	139	116	154	92	104

Table A4.2 Old Bells Line of Road Classification

Road	Old Bells Line of Road (east of Glowworm Tunnel)										M'Cycle & P'Cycle		6%					
Location	Lithgow										Cars		56%					
Site No.	3										LGV		8%					
Start Date	15-Jul-11										OGV1 & PSV		7%					
Day	7 Day Ave.										OGV2		24%					
Description Class Summary																		
	EB						WB						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	1	1	2	0	1	0	0	1	2	0	1	0	1	2	4
5:00	0	0	1	1	2	4	0	1	0	0	2	3	0	1	1	1	4	7
6:00	0	0	0	0	0	1	0	0	0	0	2	2	0	0	0	0	2	3
7:00	0	1	1	0	1	3	0	0	0	0	1	1	0	1	1	0	1	4
8:00	1	4	1	2	1	8	0	1	0	0	1	3	1	5	1	2	2	11
9:00	0	2	0	0	2	5	0	2	0	0	2	4	1	4	0	0	3	9
10:00	0	5	0	0	0	6	0	2	0	0	1	3	1	7	0	0	1	10
11:00	1	3	1	1	1	6	0	1	0	0	0	2	1	4	1	1	1	8
12:00	1	2	1	1	1	6	0	2	0	0	2	5	1	4	1	1	3	11
13:00	0	3	0	0	1	5	1	2	0	0	2	4	1	5	0	0	2	10
14:00	0	2	0	0	0	3	0	5	0	0	1	6	0	7	0	0	1	8
15:00	0	2	0	0	0	2	0	6	0	0	0	8	0	8	1	0	0	9
16:00	0	1	0	0	0	1	0	2	1	0	0	3	0	3	1	0	0	4
17:00	0	0	0	0	0	0	0	3	0	0	0	4	0	4	0	0	0	4
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4	28	6	7	10	54	2	30	2	1	15	50	6	58	8	7	25	104

Combined Directions

Vehicles

70

60

50

40

30

20

10

0

M'Cycle & P'Cycle

Cars

LGV

OGV1 & PSV

OGV2

6

58

8

7

25

Vehicle Type

Table A5.1 Glowworm Tunnel Road ADT

Job No	N649								
Client	ARC								
Road	Glowworm Tunnel Rd (north of Old Bells Line of Rd)							Average Weekday	75
Location	Lithgow							7 Day Average	91
Site No.	2								
Start Date	15-Jul-11								
Description	Volume Summary								
Direction	Combined								
Time	Day of Week							Ave W'day	7 Day Ave
	Mon 18-Jul	Tue 19-Jul	Wed 20-Jul	Thu 21-Jul	Fri 15-Jul	Sat 16-Jul	Sun 17-Jul		
AM Peak	8	10	8	9	10	10	27		
PM Peak	11	14	9	12	15	30	21		
0:00	1	0	0	0	0	4	0	0	1
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	2	0	0	0
3:00	3	2	3	7	1	1	0	3	2
4:00	2	2	2	0	3	0	2	2	2
5:00	1	0	0	1	5	2	1	1	1
6:00	0	0	0	0	2	0	0	0	0
7:00	1	5	4	9	5	0	2	5	4
8:00	4	7	8	6	5	5	5	6	6
9:00	2	3	3	2	6	3	5	3	3
10:00	2	10	5	1	7	5	13	5	6
11:00	8	7	1	0	10	10	27	5	9
12:00	4	3	3	4	3	30	21	3	10
13:00	6	6	9	8	11	10	13	8	9
14:00	3	14	3	7	8	8	10	7	8
15:00	11	7	8	12	6	8	12	9	9
16:00	4	4	9	10	15	23	11	8	11
17:00	1	7	0	8	2	6	11	4	5
18:00	1	1	3	2	3	1	8	2	3
19:00	0	1	1	0	1	0	0	1	0
20:00	0	0	0	0	0	0	0	0	0
21:00	3	0	0	0	0	0	3	1	1
22:00	1	0	0	0	0	0	0	0	0
23:00	0	0	0	0	8	0	0	2	1
Total	58	79	62	77	101	118	144	75	91
7-19	47	74	56	69	81	109	138	65	82
6-22	50	75	57	69	84	109	141	67	84
6-24	51	75	57	69	92	109	141	69	85
0-24	58	79	62	77	101	118	144	75	91

Table A5.2 Glowworm Tunnel Road Classification

Road	Glowworm Tunnel Rd (north of Old Bells Line)										M'Cycle & P'Cycle		4%
Location	Lithgow										Cars		64%
Site No.	2										LGV		28%
Start Date	15-Jul-11										OGV1 & PSV		2%
Day	7 Day Ave.										OGV2		2%
Description Class Summary													

	NB						SB						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	1	1	0	0	2	0	0	0	0	0	0	0	1	1	0	0	2
4:00	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
5:00	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	3	0	0	4	0	0	0	0	0	0	0	0	3	0	0	4
8:00	0	1	4	0	0	5	0	1	0	0	0	1	0	2	4	0	0	6
9:00	0	0	2	0	0	3	0	1	0	0	0	1	0	1	2	0	0	3
10:00	0	2	3	0	0	5	0	1	0	0	0	1	0	3	3	0	0	6
11:00	0	3	2	0	0	5	0	3	0	0	0	4	0	6	2	0	0	9
12:00	1	2	3	0	0	6	0	3	0	0	0	4	1	6	3	0	0	10
13:00	0	1	2	0	0	3	0	5	0	0	0	6	1	6	2	0	0	9
14:00	0	1	1	0	0	3	0	5	0	0	0	5	0	6	1	0	0	8
15:00	0	1	1	0	0	2	0	6	0	0	0	7	0	7	1	0	0	9
16:00	0	3	0	0	0	4	1	6	0	0	0	7	1	9	0	0	0	11
17:00	0	0	1	0	0	1	0	4	0	0	0	4	0	4	1	0	0	5
18:00	0	1	0	0	0	1	0	2	0	0	0	2	0	3	0	0	0	3
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1
Total	2	16	25	1	2	46	2	42	0	0	0	45	4	58	26	2	2	91

Combined Directions

Vehicles

70

60

50

40

30

20

10

0

M'Cycle & P'Cycle

Cars

LGV

OGV1 & PSV

OGV2

4

58

26

2

2

Vehicle Type

Table A6.1 Sunnyside Ridge Road ADT

Job No	N649								
Client	ARC								
Road	Sunnyside Ridge Rd							Average Weekday	32
Location	Lithgow							7 Day Average	39
Site No.	1								
Start Date	15-Jul-11								
Description	Volume Summary								
Direction	Combined								
Time	Day of Week							Ave W'day	7 Day Ave
	Mon 18-Jul	Tue 19-Jul	Wed 20-Jul	Thu 21-Jul	Fri 15-Jul	Sat 16-Jul	Sun 17-Jul		
AM Peak	7	7	7	6	4	3	19		
PM Peak	5	4	6	7	3	16	12		
0:00	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0
7:00	0	3	3	2	1	1	0	2	1
8:00	1	4	2	6	3	3	0	3	3
9:00	7	3	7	1	1	1	1	4	3
10:00	3	3	4	2	2	0	19	3	5
11:00	1	7	1	1	4	3	16	3	5
12:00	4	2	4	1	3	2	0	3	2
13:00	2	1	5	6	0	1	12	3	4
14:00	1	3	3	7	1	12	8	3	5
15:00	1	4	6	6	1	1	9	4	4
16:00	5	1	4	1	1	16	4	2	5
17:00	0	2	0	2	0	2	3	1	1
18:00	0	0	3	3	0	0	0	1	1
19:00	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	3	0	0	1	0
21:00	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0
Total	25	33	42	38	20	42	72	32	39
7-19	25	33	42	38	17	42	72	31	38
6-22	25	33	42	38	20	42	72	32	39
6-24	25	33	42	38	20	42	72	32	39
0-24	25	33	42	38	20	42	72	32	39

Table A6.2 Sunnyside Ridge Road Classification

Road	Sunnyside Ridge Rd	M'Cycle & P'Cycle	15%
Location	Lithgow	Cars	64%
Site No.	1	LGV	9%
Start Date	15-Jul-11	OGV1 & PSV	9%
Day	7 Day Ave.	OGV2	3%
Description Class Summary			

	NB						SB						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1
8:00	0	2	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	3
9:00	0	1	0	0	0	2	0	1	0	0	0	1	0	2	0	0	0	3
10:00	2	1	0	0	0	3	1	1	0	0	0	2	2	1	0	1	0	5
11:00	0	2	0	0	0	2	2	1	0	0	0	3	2	3	0	0	0	5
12:00	0	1	0	0	0	2	0	0	0	0	0	1	0	1	1	0	0	2
13:00	0	1	0	0	0	2	0	2	0	0	0	2	0	3	0	0	0	4
14:00	0	1	0	0	0	3	0	2	0	0	0	2	1	3	0	1	0	5
15:00	0	1	0	0	0	1	0	2	0	0	0	3	0	3	0	1	0	4
16:00	0	0	0	0	0	1	0	4	0	0	0	4	0	4	0	0	0	5
17:00	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	11	3	2	0	19	3	14	1	1	1	20	6	25	3	3	1	39

Combined Directions

Vehicles

30

25

20

15

10

5

0

M'Cycle & P'Cycle

Cars

LGV

OGV1 & PSV

OGV2

6

25

3

3

1

Vehicle Type

Table A7.1 Chifley Road & Old Bells Line of Road & Petra Avenue

Approach	Petra Ave									Chifley Road Westbound									Old Bells Line of Road									Chifley Road Eastbound								
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)		
Time Period	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total			
7:00 to 7:15	0	0	0	0	0	0	0	0	0	1	0	1	7	2	9	0	0	0	0	1	1	0	0	0	0	0	0	4	1	5	13	2	15	1	0	1
7:15 to 7:30	6	0	6	0	0	0	1	0	1	1	0	1	9	0	9	0	0	0	0	0	0	0	0	0	0	0	1	1	2	11	3	14	0	0	0	
7:30 to 7:45	6	0	6	0	0	0	3	0	3	0	0	0	15	2	17	0	1	1	0	1	1	0	0	0	0	0	1	1	9	1	10	1	0	1		
7:45 to 8:00	2	0	2	0	0	0	1	0	1	0	0	0	21	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	11	1	0	1	
8:00 to 8:15	4	0	4	1	0	1	3	0	3	0	1	1	17	2	19	0	0	0	1	0	1	0	0	0	1	1	2	1	1	2	11	4	15	3	0	3
8:15 to 8:30	2	0	2	0	0	0	1	0	1	1	0	1	18	3	21	0	1	1	0	0	0	0	0	0	1	1	2	0	2	2	14	0	14	2	0	2
8:30 to 8:45	6	0	6	0	0	0	0	0	0	0	0	0	20	4	24	0	0	0	0	0	0	1	0	1	0	1	1	0	1	1	15	0	15	0	1	1
8:45 to 9:00	6	0	6	1	1	2	1	0	1	1	0	1	27	1	28	2	1	3	0	1	1	0	0	0	0	0	3	1	4	21	3	24	1	0	1	
9:00 to 9:15	5	0	5	0	0	0	1	0	1	2	0	2	24	4	28	4	0	4	1	0	1	0	0	0	0	0	1	0	1	12	1	13	0	0	0	
9:15 to 9:30	3	0	3	0	0	0	0	0	0	1	0	1	15	1	16	1	1	2	0	0	0	0	0	0	1	1	2	0	0	0	16	3	19	4	1	5
9:30 to 9:45	3	0	3	1	0	1	1	0	1	1	0	1	17	0	17	0	1	1	0	0	0	0	0	0	1	0	1	3	1	4	19	2	21	1	0	1
9:45 to 10:00	2	0	2	0	0	0	0	0	0	1	0	1	27	4	31	6	0	6	0	1	1	0	0	0	2	1	3	0	0	0	15	2	17	4	0	4
Totals	45	0	45	3	1	4	12	0	12	9	1	10	217	23	240	13	5	18	2	4	6	1	0	1	6	5	11	13	9	22	166	22	188	18	2	20

Figure A8 AustRoads Vehicles Classification System

Level 1	Level 2		Level 3	AUSTROADS Classification		
Length (indicative)	Axles and Axle Groups		Vehicle Type			
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration
LIGHT VEHICLES						
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) \leq 3.2\text{m}$ and axles = 2	
	3, 4 or 5	3	Short - Towing Trailer, Caravan, Boat, etc	2	groups = 3 $d(1) \geq 2.1\text{m}$, $d(1) \leq 3.2\text{m}$, $d(2) \geq 2.1\text{m}$ and axles = 3, 4 or 5	
Medium 5.5m to 14.5m			HEAVY VEHICLES			
	2	2	Two Axle Truck or Bus	3	$d(1) > 3.2\text{m}$ and axles = 2	
	3	2	Three Axle Truck or Bus	4	axles = 3 and groups = 2	
	> 3	2	Four Axle Truck	5	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2\text{m}$, axles = 3 and groups = 3	
	4	> 2	Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 4 and groups > 2	
	5	> 2	Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 5 and groups > 2	
	≥ 6	> 2	Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium Combination 17.5m to 36.5m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6	
	> 6	5 or 6	Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6	
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6	



Springvale Colliery

Mine Extension Project

Traffic Impact Assessment

Appendix B Crash Data

Figure B1.1	RMS Crash Plot Newnes State Forest
Figure B1.2	RMS Crash Plot Castlereagh Highway
Table B1.1	RMS Crash Data Summary Newnes State Forest
Table B1.2	RMS Crash Data Summary Castlereagh Highway

Source All: **RMS**

Figure B1.1 RMS Crash Plot Newnes State Forest

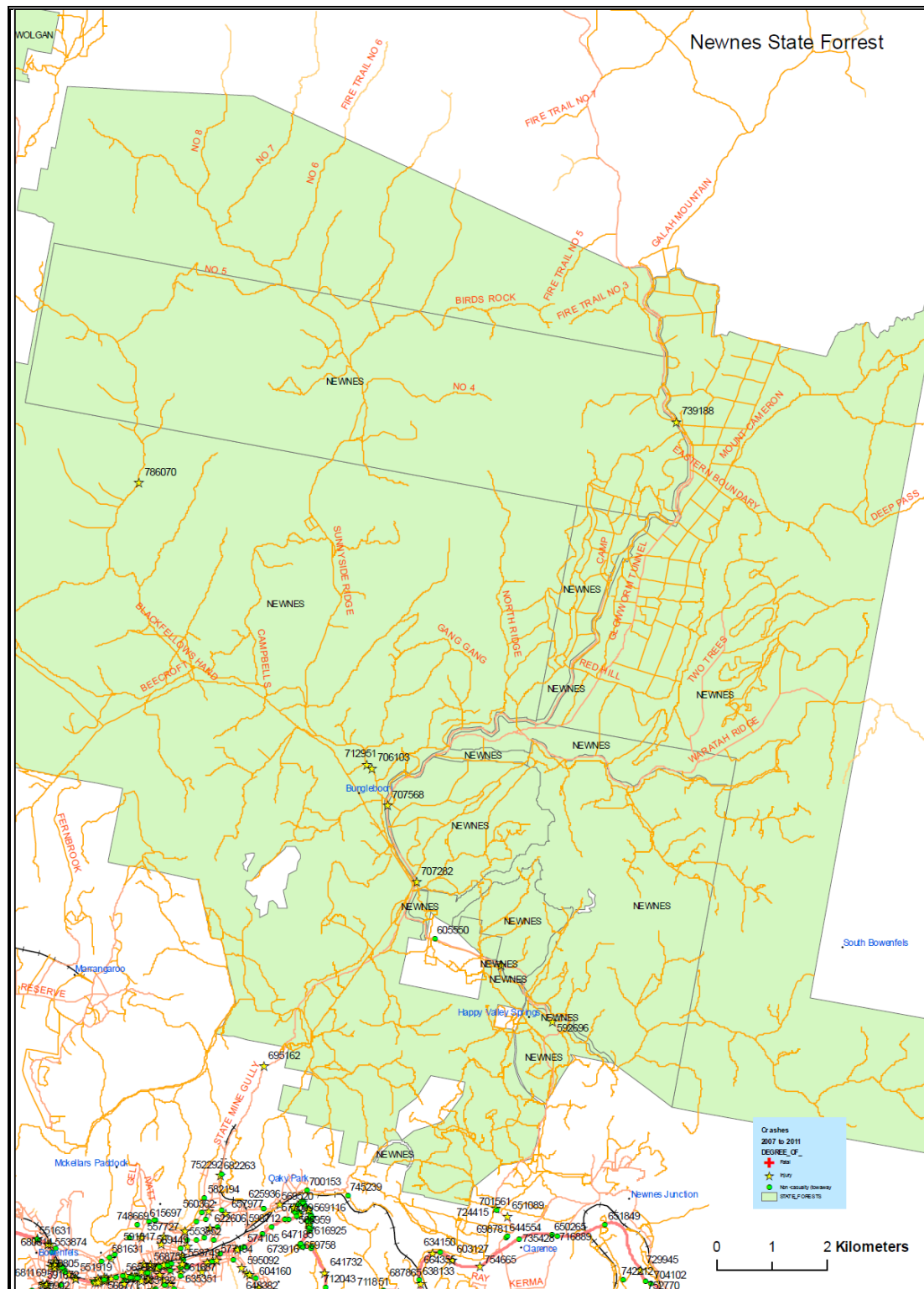


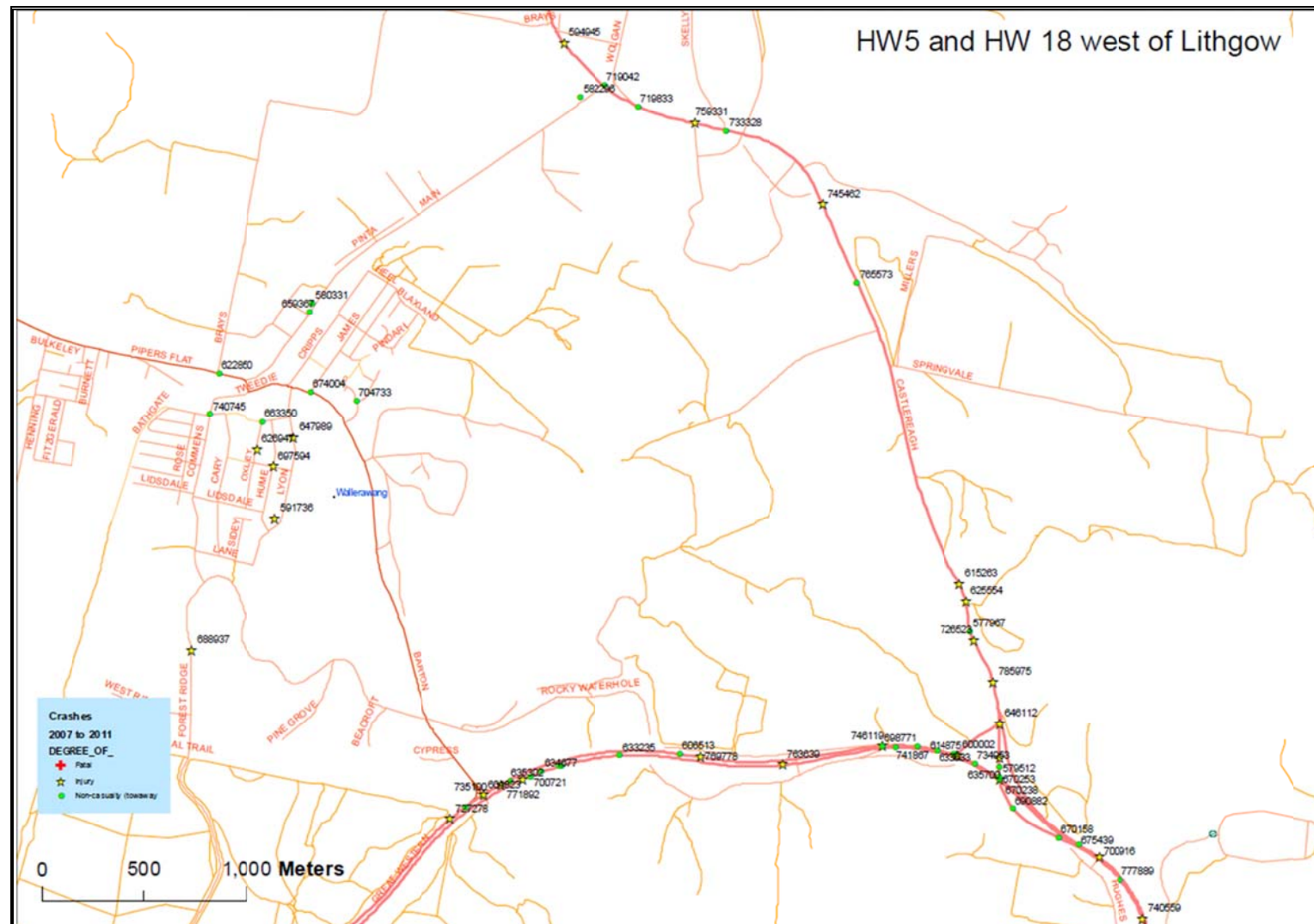
Figure B1.2 RMS Crash Plot Castlereagh Highway

Table B1.1 RMS Crash Data Newnes State Forest

Date	Crash ID	Rum Code	Rum Description	Road Type	Surface Condition	Light	Killed	Injured	Time	Street	Road Surface	Weather	Speed Limit	Impact	Vehicle Type	Fatigue	Speeding	Alcohol
29/07/2006	530511	20	Head on	2-way undivided	Dry	Daylight	0	1	1546	OLD BATHURST	Unsealed	Fine	60	Head-on	Light truck	No or unknown	No or unknown	Unknown
20/08/2007	592696	71	Off rd left => obj	2-way undivided	Wet	Daylight	0	1	0804	NEWNES FOREST	Unsealed	Raining	100	Vehicle - Object	Large rigid	Yes	No or unknown	No
20/10/2007	605550	81	Off left/rt bnd=>obj	2-way undivided	Dry	Dusk	0	0	1730	OLD BELLS LINE	Unsealed	Fine	100	Vehicle - Object	Station wagon	No or unknown	Yes	Unknown
16/10/2008	644554	70	Off road to left	2-way undivided	Dry	Daylight	0	0	1400	OLD BELLS LINE	Unsealed	Fine	100	Rollover	B-double (road train prio	Yes	No or unknown	No
30/12/2008	651089	82	Off right/right bend	2-way undivided	Dry	Daylight	0	1	1404	NEWNES	Unsealed	Fine	80	Rollover	4 wheel drive	No or unknown	No or unknown	No
6/01/2010	695162	87	Off lft/lft bnd=>obj	2-way undivided	Dry	Darkness	0	1		NSF	Unsealed	Nil		Vehicle - Object	Car (sedan/hatch)	No or unknown	Speeding	No
13/01/2010	698781	74	On road-out of cont.	2-way undivided	Wet	Dusk	0	0	1630	OLD BELLS LINE	Unsealed	Raining	60	Rollover	Light truck	No or unknown	No or unknown	No
16/01/2010	707568	88	Out of cont on bend	2-way undivided	Dry	Daylight	0	1	1400	GLOWWORM TUNNE	Unsealed	Fine	60	Rollover	Motorcycle	No or unknown	No or unknown	No
13/02/2010	706103	80	Off left/right bend	2-way undivided	Wet	Daylight	0	1	1500	BLACKFELLOWS H	Unsealed	Overcast	60	Rollover	Motorcycle	No or unknown	Yes	Unknown
27/02/2010	701561	20	Head on	2-way undivided	Dry	Dusk	0	0	1910	OLD BELLS LINE	Unsealed	Fine	60	Head-on	Car (sedan/hatch)	No or unknown	No or unknown	No
27/02/2010	707695	88	Out of cont on bend	2-way undivided	Dry	Daylight	0	1	1430	OLD BELLS LINE	Unsealed	Fine	60	Rollover	Motorcycle	No or unknown	Yes	Yes
28/03/2010	712951	20	Head on	2-way undivided	Dry	Daylight	0	1	1000	OLD BELLS LINE	Unsealed	Fine	80	Head-on	Motorcycle	No or unknown	Yes	No
22/04/2010	707282	82	Off right/right bend	2-way undivided	Dry	Darkness	0	3	0030	GLOW WORM TUNN	Unsealed	Fine	80	Rollover	Light truck	No or unknown	Yes	Yes
8/08/2010	724415	88	Out of cont on bend	2-way undivided	Wet	Daylight	0	1	1400	OLD BELLS LINE	Unsealed	Overcast	80	Rollover	Motorcycle	No or unknown	Yes	Unknown
9/01/2011	739188	71	Off rd left => obj	2-way undivided	Wet	Daylight	0	2	Sunday	NSF	Unsealed			Vehicle - Object	4 wheel drive	Fatigued	No or unknown	No
20/11/2011	786070	88	Out of cont on bend	2-way undivided	Wet	Daylight	0	1	Sunday	NSF	Unsealed			Rollover	Motorcycle	No or unknown	Speeding	No

Table B1.2 RMS Crash Data Castlereagh Highway

Date	Crash ID	Rum Code	Rum Description	Type of Road	Surface Condition	Light	Killed	Injured	Time	Street	Alignment	Road Surface	Weather	Speed Limit	First Impact	Fatigue	Speeding	Alcohol
31/08/2011	765573	67	Struck animal	2-way undivided	Dry	Darkness	0		1800	CASTLEREAGH	Straight	Sealed	Fine	100	Vehicle - Animal	No or unknown	No or unknown	No
11/07/2011	785975	83	Off rt/rt bnd=>obj	2-way undivided	Dry	Daylight	0	1	0900	CASTLEREAGH	Curved	Sealed	Fine	100	Vehicle - Object	No or unknown	Speeding	No
5/07/2011	759331	32	Right rear	2-way undivided	Dry	Dawn	0	2	0645	CASTLEREAGH	Straight	Sealed	Overcast	80	Rear end	No or unknown	No or unknown	No
18/05/2011	753436	71	Off rd left => obj	Other	Dry	Daylight	0	1	0800	CASTLEREAGH	Straight	Sealed	Fine	100	Vehicle - Object	No or unknown	No or unknown	Unknown
12/03/2011	745462	71	Off rd left => obj	2-way undivided	Wet	Dusk	0	1	1830	CASTLEREAGH	Straight	Sealed	Raining	80	Vehicle - Object	No or unknown	No or unknown	No
25/11/2010	733328	30	Rear end	T-junction	Dry	Daylight	0		1210	CASTLEREAGH	Straight	Sealed	Fine	80	Rear end	No or unknown	No or unknown	No
27/08/2010	726523	20	Head on	2-way undivided	Wet	Daylight	0	4	1536	CASTLEREAGH	Curved	Sealed	Raining	100	Head-on	No or unknown	Speeding	No
31/07/2010	719833	36	Right turn sideswipe	Y-junction	Dry	Dusk	0		1650	CASTLEREAGH	Straight	Sealed	Fine	80	Other angle	No or unknown	No or unknown	No
14/07/2010	719042	13	Right near	T-junction	Dry	Daylight	0		1540	CASTLEREAGH	Curved	Sealed	Fine	80	Right angle	No or unknown	No or unknown	Drink drive
10/06/2009	670238	88	Out of cont on bend	Other	Snow or ice	Dawn	0	1	0640	CASTLEREAGH	Curved	Sealed	Snowing	80	Rollover	No or unknown	Speeding	No
10/06/2009	670253	82	Off right/right bend	Other	Snow or ice	Dawn	0		0640	CASTLEREAGH	Curved	Sealed	Snowing	80	Rollover	No or unknown	Speeding	No
12/11/2008	646112	10	Cross traffic	T-junction	Dry	Daylight	0	1	0939	CASTLEREAGH	Straight	Sealed	Fine	40	Right angle	No or unknown	No or unknown	No
23/08/2008	635700	81	Off left/rt bnd=>obj	Divided road	Snow or ice	Dawn	0		0632	CASTLEREAGH	Curved	Sealed	Fine	90	Vehicle - Object	No or unknown	Speeding	No
1/06/2008	625554	81	Off left/rt bnd=>obj	2-way undivided	Dry	Daylight	0	1	1205	CASTLEREAGH	Curved	Sealed	Overcast	100	Vehicle - Object	No or unknown	Speeding	No
7/03/2008	615263	30	Rear end	2-way undivided	Dry	Daylight	0	1	1410	CASTLEREAGH	Curved	Sealed	Fine	100	Rear end	No or unknown	Speeding	Unknown
22/06/2007	579512	83	Off rt/rt bnd=>obj	Divided road	Snow or ice	Dawn	0		0650	CASTLEREAGH	Curved	Sealed	Fog or mis	100	Vehicle - Object	No or unknown	Speeding	No
13/06/2007	577967	82	Off right/right bend	2-way undivided	Snow or ice	Darkness	0		0606	CASTLEREAGH	Curved	Sealed	Overcast	90	Rollover	No or unknown	Speeding	No



Springvale Colliery

Mine Extension Project

Traffic Impact Assessment

Appendix C NSF Project Sites Construction Schedule

Table C1.1	Springvale Project Construction Schedule 2013 - 2014
Table C1.2	Springvale Project Construction Schedule 2015 - 2016
Table C2.1	All Proposed NSF Projects Construction Schedule 2013 - 2014
Table C2.1	All Proposed NSF Projects Construction Schedule 2015 - 2016

Source All: *Angus Place Colliery; Springvale Colliery; ARC Traffic + Transport*

Figure C1.1 Springvale Project Construction Schedule October 2014 – December 2015

Springvale Extension Project Construction Schedule	Services Bore				Bore 9				Bore 10				All Construction Traffic					
	Daily Movements				Daily Movements				Daily Movements				Daily Movements					
	HV		LV		HV		LV		HV		LV		HV		LV		TOTAL	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out		
Oct-14	4	4	4	4									4	4	4	4	16	
Oct-14	4	4	4	4									4	4	4	4	16	
Oct-14	4	4	4	4									4	4	4	4	16	
Oct-14	4	4	4	4									4	4	4	4	16	
Oct-14	4	4	4	4									4	4	4	4	16	
Nov-14	4	4	4	4									4	4	4	4	16	
Nov-14	4	4	4	4									4	4	4	4	16	
Nov-14	4	4	4	4									4	4	4	4	16	
Nov-14	4	4	4	4									4	4	4	4	16	
Nov-14	4	4	4	4									4	4	4	4	16	
Dec-14	4	4	4	4									4	4	4	4	16	
Dec-14	4	4	4	4									4	4	4	4	16	
Dec-14	4	4	4	4									4	4	4	4	16	
Dec-14	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Jan-15	4	4	4	4									4	4	4	4	16	
Feb-15	4	4	4	4									4	4	4	4	16	
Feb-15	4	4	4	4									4	4	4	4	16	
Feb-15	4	4	4	4									4	4	4	4	16	
Feb-15	4	4	4	4									4	4	4	4	16	
Feb-15	4	4	4	4									4	4	4	4	16	
Mar-15	4	4	4	4									4	4	4	4	16	
Mar-15	4	4	4	4									4	4	4	4	16	
Mar-15	4	4	4	4									4	4	4	4	16	
Mar-15	4	4	4	4									4	4	4	4	16	
Apr-15													0	0	0	0	0	
Apr-15													0	0	0	0	0	
Apr-15													0	0	0	0	0	
Apr-15													0	0	0	0	0	
May-15													0	0	0	0	0	
May-15													0	0	0	0	0	
May-15													0	0	0	0	0	
May-15													0	0	0	0	0	
May-15													0	0	0	0	0	
Jun-15													0	0	0	0	0	
Jun-15													0	0	0	0	0	
Jun-15													0	0	0	0	0	
Jun-15													0	0	0	0	0	
Jul-15													0	0	0	0	0	
Jul-15													0	0	0	0	0	
Jul-15													0	0	0	0	0	
Jul-15													0	0	0	0	0	
Jul-15													0	0	0	0	0	
Aug-15													0	0	0	0	0	
Aug-15													0	0	0	0	0	
Aug-15													0	0	0	0	0	
Aug-15													0	0	0	0	0	
Sep-15													0	0	0	0	0	
Sep-15													0	0	0	0	0	
Sep-15													0	0	0	0	0	
Sep-15													0	0	0	0	0	
Oct-15													0	0	0	0	0	
Oct-15													0	0	0	0	0	
Oct-15													0	0	0	0	0	
Oct-15													0	0	0	0	0	
Oct-15													0	0	0	0	0	
Nov-15													0	0	0	0	0	
Nov-15													0	0	0	0	0	
Nov-15													0	0	0	0	0	
Nov-15													0	0	0	0	0	
Dec-15													0	0	0	0	0	
Dec-15													0	0	0	0	0	
Dec-15													0	0	0	0	0	
Dec-15													0	0	0	0	0	

Figure C1.2 Springvale Project Construction Schedule January 2016 – March 2018

Springvale Extension Project Construction Schedule	Services Bore				Bore 9				Bore 18				All Construction Traffic				
	Daily Movements				Daily Movements				Daily Movements				Daily Movements				TOTAL
	HV		LV		HV		LV		HV		LV		HV		LV		
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	
Jan-16					4	4	4	4					4	4	4	4	16
Jan-16					4	4	4	4					4	4	4	4	16
Jan-16					4	4	4	4					4	4	4	4	16
Jan-16					4	4	4	4					4	4	4	4	16
Feb-16					4	4	4	4					4	4	4	4	16
Feb-16					4	4	4	4					4	4	4	4	16
Feb-16					4	4	4	4					4	4	4	4	16
Feb-16					4	4	4	4					4	4	4	4	16
Mar-16					4	4	4	4					4	4	4	4	16
Mar-16					4	4	4	4					4	4	4	4	16
Mar-16					4	4	4	4					4	4	4	4	16
Mar-16					4	4	4	4					4	4	4	4	16
Apr-16					4	4	4	4					4	4	4	4	16
Apr-16					4	4	4	4					4	4	4	4	16
Apr-16					4	4	4	4					4	4	4	4	16
Apr-16					4	4	4	4					4	4	4	4	16
May-16					4	4	4	4					4	4	4	4	16
May-16					4	4	4	4					4	4	4	4	16
May-16					4	4	4	4					4	4	4	4	16
May-16					4	4	4	4					4	4	4	4	16
Jun-16					4	4	4	4					4	4	4	4	16
Jun-16					4	4	4	4					4	4	4	4	16
Jun-16					4	4	4	4					4	4	4	4	16
Jul-16													0	0	0	0	0
Jul-16													0	0	0	0	0
Jul-16													0	0	0	0	0
Jul-16													0	0	0	0	0
Aug-16													0	0	0	0	0
Aug-16													0	0	0	0	0
Aug-16													0	0	0	0	0
Sep-16													0	0	0	0	0
Sep-16													0	0	0	0	0
Sep-16													0	0	0	0	0
Sep-16													0	0	0	0	0
Sep-16													0	0	0	0	0
Oct-16													0	0	0	0	0
Oct-16													0	0	0	0	0
Oct-16													0	0	0	0	0
Oct-16													0	0	0	0	0
Nov-16													0	0	0	0	0
Nov-16													0	0	0	0	0
Nov-16													0	0	0	0	0
Nov-16													0	0	0	0	0
Dec-16													0	0	0	0	0
Dec-16													0	0	0	0	0
Dec-16													0	0	0	0	0
Dec-16													0	0	0	0	0
Jan-17													0	0	0	0	0
Jan-17													0	0	0	0	0
Jan-17													0	0	0	0	0
Feb-17													0	0	0	0	0
Feb-17													0	0	0	0	0
Feb-17													0	0	0	0	0
Feb-17													0	0	0	0	0
Mar-17													0	0	0	0	0
Mar-17													0	0	0	0	0
Mar-17													0	0	0	0	0
Mar-17													0	0	0	0	0
Apr-17													0	0	0	0	0
Apr-17													0	0	0	0	0
Apr-17													0	0	0	0	0
May-17													0	0	0	0	0
May-17													0	0	0	0	0
May-17													0	0	0	0	0
May-17													0	0	0	0	0
Jun-17													0	0	0	0	0
Jun-17													0	0	0	0	0
Jun-17													0	0	0	0	0
Jun-17													0	0	0	0	0
Jul-17													0	0	0	0	0
Jul-17													0	0	0	0	0
Jul-17													0	0	0	0	0
Aug-17													0	0	0	0	0
Aug-17													0	0	0	0	0
Aug-17													0	0	0	0	0
Sep-17													0	0	0	0	0
Sep-17													0	0	0	0	0
Sep-17													0	0	0	0	0
Sep-17													0	0	0	0	0
Oct-17									4	4	4	4	4	4	4	4	16
Oct-17									4	4	4	4	4	4	4	4	16
Oct-17									4	4	4	4	4	4	4	4	16
Oct-17									4	4	4	4	4	4	4	4	16
Nov-17									4	4	4	4	4	4	4	4	16
Nov-17									4	4	4	4	4	4	4	4	16
Nov-17									4	4	4	4	4	4	4	4	16
Nov-17									4	4	4	4	4	4	4	4	16
Dec-17									4	4	4	4	4	4	4	4	16
Dec-17									4	4	4	4	4	4	4	4	16
Dec-17									4	4	4	4	4	4	4	4	16
Dec-17									4	4	4	4	4	4	4	4	16
Jan-18									4	4	4	4	4	4	4	4	16
Jan-18									4	4	4	4	4	4	4	4	16
Jan-18									4	4	4	4	4	4	4	4	16
Jan-18									4	4	4	4	4	4	4	4	16
Feb-18									4	4	4	4	4	4	4	4	16
Feb-18									4	4	4	4	4	4	4	4	16
Feb-18									4	4	4	4	4	4	4	4	16
Feb-18									4	4	4	4	4	4	4	4	16
Mar-18									4	4	4	4	4	4	4	4	16
Mar-18									4	4	4	4	4	4	4	4	16
Mar-18									4	4	4	4	4	4	4	4	16
Mar-18									4	4	4	4	4	4	4	4	16
Mar-18									4	4	4	4	4	4	4	4	16

Figure C2.1 All NSF Projects Construction Schedule October 2014 – December 2015

Springvale Extension Project Cumulative Construction Traffic within the Newnes State Forest	Springvale Extension Project					APC VF Project					APC Extension Project					All Project Newnes State Forest Construction Traffic					
	Daily Movements					Daily Movements					Daily Movements					Daily Movements					
	HV		LV		ALL	HV		LV		ALL	HV		LV		ALL	HV		LV		ALL	
	In	Out	In	Out		In	Out	In	Out		In	Out	In	Out		In	Out				
Jan-16	4	4	4	4	16												4	4	4	4	16
Jan-16	4	4	4	4	16												4	4	4	4	16
Jan-16	4	4	4	4	16												4	4	4	4	16
Jan-16	4	4	4	4	16												4	4	4	4	16
Feb-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Feb-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Feb-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Feb-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Mar-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Mar-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Mar-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Mar-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Apr-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Apr-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Apr-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Apr-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
May-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
May-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
May-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jun-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jun-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jun-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jul-16	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jul-16											4	4	4	4	16		4	4	4	4	16
Jul-16											4	4	4	4	16		4	4	4	4	16
Jul-16											4	4	4	4	16		4	4	4	4	16
Aug-16											4	4	4	4	16		4	4	4	4	16
Aug-16											4	4	4	4	16		4	4	4	4	16
Aug-16											4	4	4	4	16		4	4	4	4	16
Sep-16																	0	0	0	0	0
Sep-16																	0	0	0	0	0
Sep-16																	0	0	0	0	0
Sep-16																	0	0	0	0	0
Oct-16																	0	0	0	0	0
Oct-16																	0	0	0	0	0
Oct-16																	0	0	0	0	0
Oct-16																	0	0	0	0	0
Nov-16																	0	0	0	0	0
Nov-16																	0	0	0	0	0
Nov-16																	0	0	0	0	0
Nov-16																	0	0	0	0	0
Dec-16																	0	0	0	0	0
Dec-16																	0	0	0	0	0
Dec-16																	0	0	0	0	0
Dec-16																	0	0	0	0	0
Jan-17																	0	0	0	0	0
Jan-17																	0	0	0	0	0
Jan-17																	0	0	0	0	0
Feb-17																	0	0	0	0	0
Feb-17																	0	0	0	0	0
Feb-17																	0	0	0	0	0
Feb-17																	0	0	0	0	0
Mar-17																	0	0	0	0	0
Mar-17																	0	0	0	0	0
Mar-17																	0	0	0	0	0
Mar-17																	0	0	0	0	0
Apr-17																	0	0	0	0	0
Apr-17																	0	0	0	0	0
Apr-17																	0	0	0	0	0
Apr-17																	0	0	0	0	0
May-17																	0	0	0	0	0
May-17																	0	0	0	0	0
May-17																	0	0	0	0	0
May-17																	0	0	0	0	0
Jun-17																	0	0	0	0	0
Jun-17																	0	0	0	0	0
Jun-17																	0	0	0	0	0
Jun-17																	0	0	0	0	0
Jul-17																	0	0	0	0	0
Jul-17																	0	0	0	0	0
Jul-17																	0	0	0	0	0
Jul-17																	0	0	0	0	0
Aug-17											4	4	4	4	16		4	4	4	4	16
Aug-17											4	4	4	4	16		4	4	4	4	16
Aug-17											4	4	4	4	16		4	4	4	4	16
Sep-17											4	4	4	4	16		4	4	4	4	16
Sep-17											4	4	4	4	16		4	4	4	4	16
Sep-17											4	4	4	4	16		4	4	4	4	16
Sep-17											4	4	4	4	16		4	4	4	4	16
Oct-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Oct-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Oct-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Oct-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Nov-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Nov-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Nov-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Nov-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Dec-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Dec-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Dec-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Dec-17	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jan-18	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jan-18	4	4	4	4	16						4	4	4	4	16		8	8	8	8	32
Jan-18	4	4	4	4	16						4	4	4								