

Appendix - G



Springvale Colliery
Section 75W Modification
Traffic Impact Assessment
August 2013

prepared for

Springvale Coal Pty Ltd

prepared by

ARC Traffic + Transport

	Contents	pg
	Executive Summary	i
	Introduction	1
1	The Springvale Colliery	3
1.1	Location	3
1.2	Existing Operations	6
1.3	Vehicle Access	7
1.4	Traffic Generation	7
1.5	Parking	8
2	Existing Traffic Operations	9
2.1	Key Roads	9
2.2	Intersection Castlereagh Highway & Springvale Road	9
2.3	Existing Traffic Flows	10
2.4	Castlereagh Highway & Springvale Road Level of Service	11
2.5	Castlereagh Highway & Springvale Road Turn Warrants	13
2.6	Castlereagh Highway Capacity	15
2.6	Accident Data	16
3	The Springvale Modification Proposal	17
3.1	Modification Components	17
3.2	Access	17
3.3	Operational Traffic	17
3.4	Parking	17
4	Sub-Regional Projects	18
4.1	Western Coal Services Project	18
4.2	Neubeck Coal Project	18
4.3	Airly Coal Project	19
4.4	Coalpac Consolidation Project	19
4.5	Average Annual Traffic Growth	19
5	Future Traffic Operations	20
5.1	Future Traffic Flows	20
5.2	Castlereagh Highway & Springvale Road Level of Service	20
5.3	Castlereagh Highway & Springvale Road Design Warrants	21
5.4	Castlereagh Highway Capacity	23
6	Conclusions & Recommendations	24
	Appendix A Traffic Surveys	
	Appendix B Crash Summary Data	

Executive Summary

Springvale Coal Pty Ltd (**Springvale Coal**) is seeking to modify the current Springvale Colliery (**Springvale**) Development Consent (**DA 11/92**) to allow for the extraction of up to 4.5 million tonnes per annum from the existing operations at Springvale (the **Modification**). The Modification would also provide for the employment of up to 30 additional staff at the Springvale Pit Top (the **Pit Top**).

The Modification does not provide for an extension of Springvale operations after September 2014 when DA 11/92 expires; Springvale Coal is currently preparing a broader Springvale Colliery Mine Extension Project to assess such an extension. This Traffic Impact Assessment is limited to an assessment of operations at Springvale, further to an approval of the Modification, to September 2014.

Further to a detailed and independent assessment of the Modification, ARC Traffic + Transport (**ARC**) has determined the following: -

Intersection of Castlereagh Highway & Springvale Mine Access Road

The Modification will generate an additional 7 vehicle trips per hour at the Pit Top prior to and following each of the day, afternoon and night mining shifts. These trips would all access the Pit Top via the intersection of Castlereagh Highway & the Springvale **Mine Access Road**.

Further to consideration of the additional traffic generated by the Modification, annual average growth in the Castlereagh Highway, and by potential sub-regional projects, ARC has determined that the intersection would continue to operate at a good level of service through September 2014, with low average delays and significant spare capacity during Springvale shift peak periods and across the day.

Parking

All parking for Pit Top staff will continue to be provided on-site in existing parking areas, which have capacity to accommodate the additional Modification staff parking demands even during peak shift overlap periods.

Coal Transportation

Coal will continue to be transported to the adjacent Mount Piper and Wallerawang Power Stations, and to the Springvale Coal Services facility at Blackmans Flat, by overland conveyor. Existing DA 92/11 provisions for contingency coal transport by public road to the Wallerawang Power Station and Mt Piper Power Station are unchanged by the Modification.

Introduction

i. Project Overview

Springvale Coal Pty Ltd (**Springvale Coal**) is seeking to modify the current Springvale Colliery (**Springvale**) Development Consent (**DA 11/92**) subject to Section 75W of the Environmental Planning & Assessment Act 1979 (**EP&A Act**) to allow for the extraction of up to 4.5 million tonnes per annum (**Mtpa**) from the existing operations at Springvale (the **Modification**). Coal production at Springvale is currently limited to 3.4 Mtpa of Run of Mine (**ROM**) coal.

The increase in production will primarily be achieved through the installation and operation of new generation mining equipment and the implementation of other operational practices to achieve greater utilization of that equipment. A minor increase in the total employment on-site will be required to facilitate the operation of an additional continuous miner.

The Modification does not require any other changes to the existing Springvale mining operation to achieve the increase in production. Full details of the Modification are provided in the Springvale Modification Environmental Assessment (**Modification EA**) which this assessment accompanies.

Significantly, the Modification does not provide for an extension of operations at Springvale past September 2014 when DA 11/92 expires. A broader Environmental Impact Statement (**EIS**) is currently being prepared by Springvale Coal to support a Springvale Colliery Mine Extension Project which would provide for an extension of Springvale operations past September 2014.

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, traffic and general transportation issues associated with the Modification.

This TIA examines the existing Springvale operations (**Section 1**) and the road network which provides for the Pit Top (**Section 2**). An assessment of the access and traffic components of the Modification (**Section 3**) is 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 4**). The operation of the Pit Top road network through September 2014 further to an approval of the Modification is examined in **Section 5**.

This methodology specifically responds to recent correspondence between Springvale Coal and the Department of Planning & Infrastructure (**DP&I**) relating to the Modification; it is our understanding that the DP&I has agreed to the scope of assessment proposed by Springvale Coal (22nd March 2013) which includes: -

Traffic - a detailed traffic impact assessment including: -

- *a description of the existing environment, using sufficient baseline data;*
- *an assessment of the potential impacts of all stages of the proposal, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; and*
- *a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the proposal, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment.*

This TIA references the traffic and transport guidelines and assessment criteria appropriate to the specific Modification 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**).

ARC has consulted with the Roads and Maritime Service (**RMS**) in regard to accident data for the sub-region. ARC acknowledges the assistance of RMS officers.

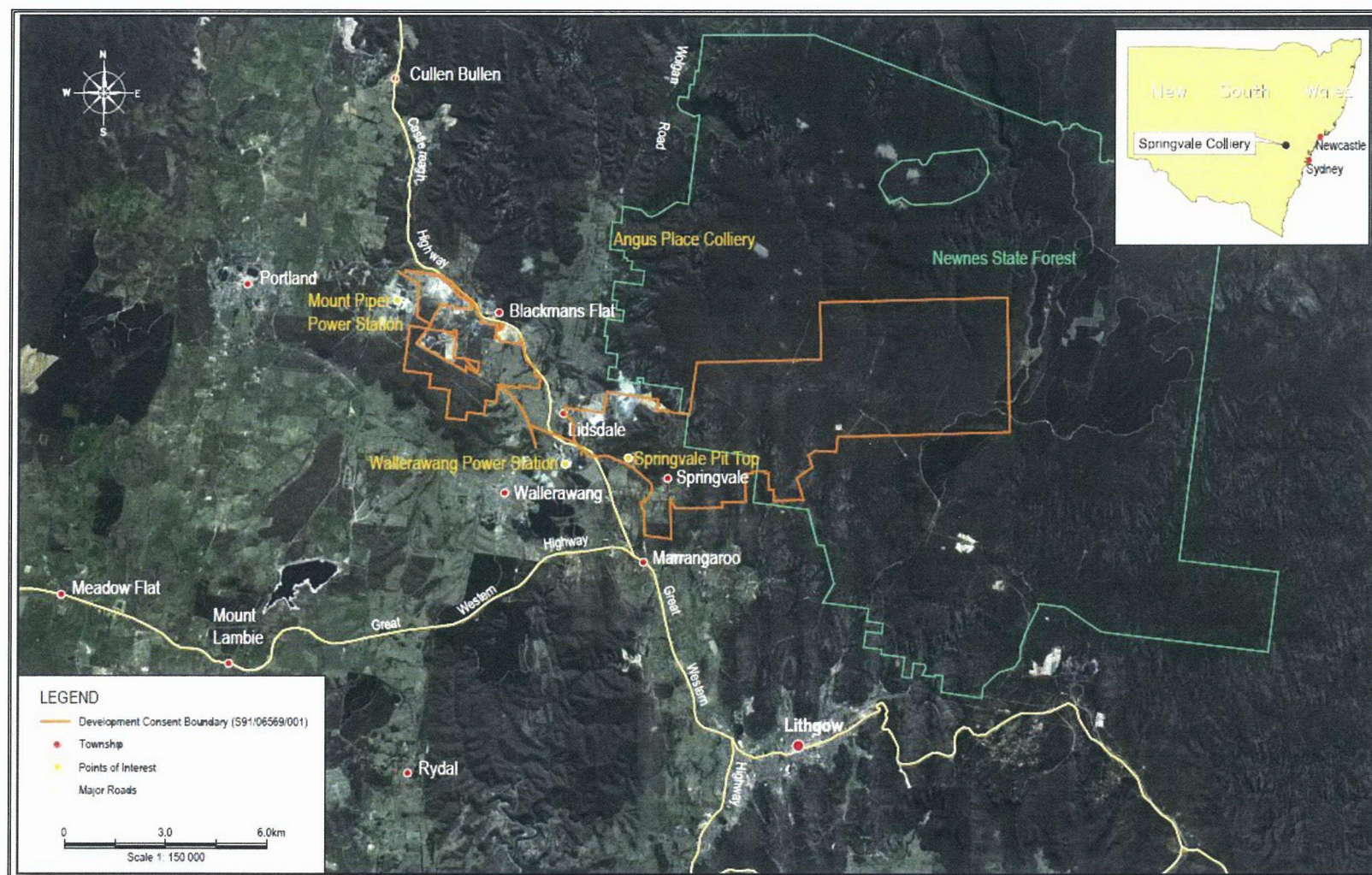
1 The Springvale Colliery

1.1 Location

Springvale is located north-west of Lithgow and east of Lidsdale, NSW. The Springvale Pit Top (the **Pit Top**) is located off the Castlereagh Highway east of the Wallerawang Power Station (**WPS**). The Pit Top - which will generate minor additional traffic further to the Modification - is the key location for assessment in this TIA.

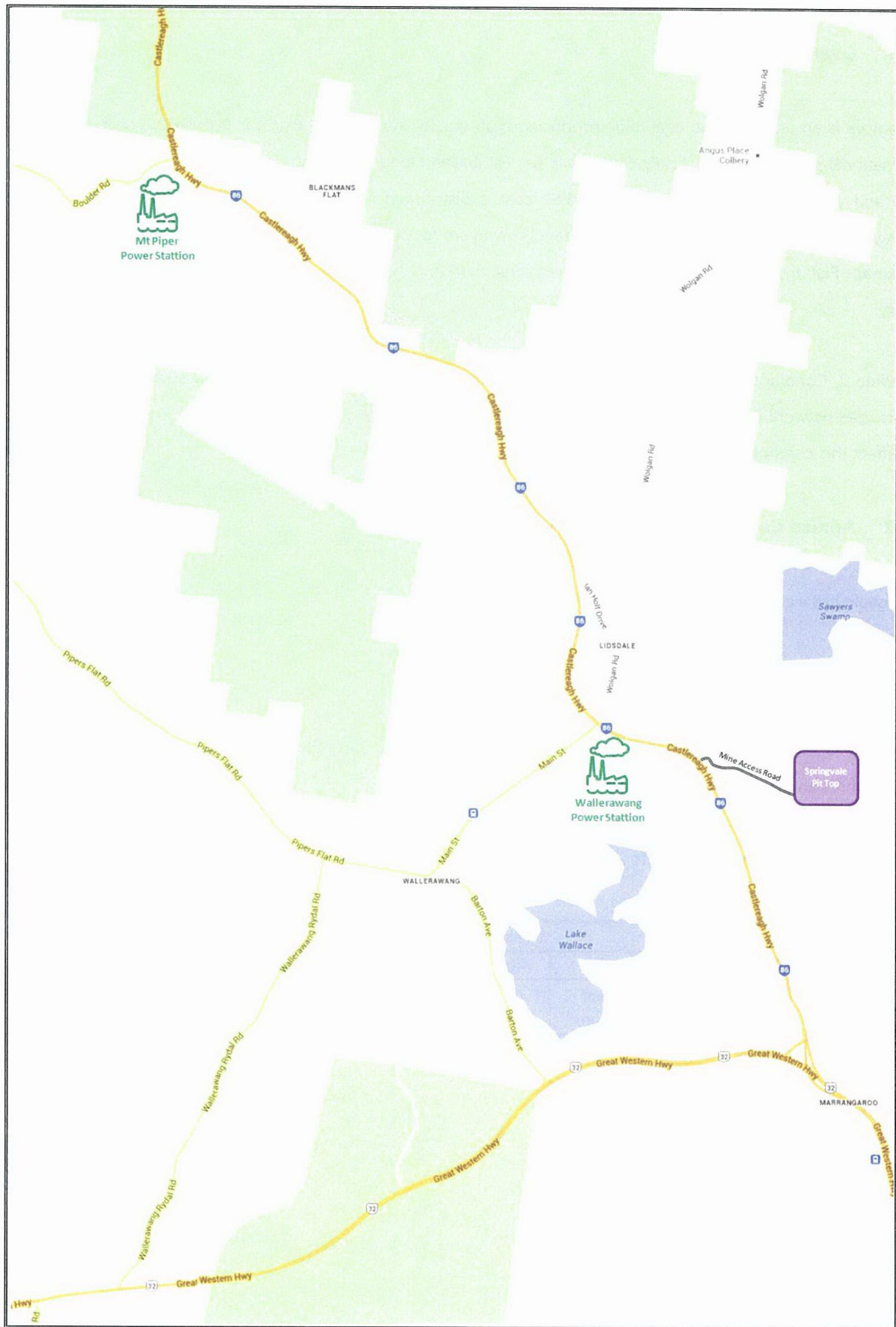
Springvale in its sub-regional context is shown in **Figure 1.1.1**, while **Figure 1.1.2** shows the Pit Top and the sub-regional road network.

Figure 1.1.1 The Springvale Colliery



Source: Centennial Springvale

Figure 1.1.2 Springvale Pit Top & Sub-Regional Road Network



Source: Google Maps

1.2 Existing Operations

1.2.1 Overview

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 the Mt Piper Power Station (**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.

Schedule 2, Condition 7(b) of DA 11/92 provides for the contingency transport of up to 50,000tpa of coal via the public road network to *local domestic market customers* – and specifically the WPS and MPPS. The Modification would not affect this condition.

1.2.2 Annual Capacity

Springvale has a current extraction limit of 3.4 Mtpa of ROM coal.

1.2.3 Operation Hours & Staff

Springvale operates 24 hours a day, 7 days a week, and employs 280 full-time staff and up to 70 contract staff. Current shifts and staffing levels are shown below in **Table 1.2.3**.

Table 1.2.3 Springvale Staff 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	66	44		37	19
General	36	1	1	2	1
Contractor	14	12	8		
Total	116	57	9	39	20

Source: Springvale Coal

With reference to **Table 1.2.3**, general (administration) staff have varying start times between 5:00am and 8:00am, with finishing times between 3:00pm and 6:00pm.

1.3 Pit Top Access

Access to the Pit Top for both light (defined as Class 1 and Class 2 vehicles with reference to the AustRoads *Vehicle Classification System* – **AustRoads VCS** – see **Appendix A**) and heavy (defined as Class 3 – 12 vehicles with reference to AustRoads VCS) is provided via Mine Access Road which intersects with the Castlereagh Highway at Wallerawang opposite the WPS. From the Castlereagh Highway, access is readily available to the sub-regional and regional road network; a majority (approximately 70%) of trips to/from Mine Access Road are generated to/from the south, i.e. towards Lithgow.

1.4 Traffic Generation

1.4.1 Staff Trips

Based on our observations and a review of the traffic data in **Section 2**, it is apparent that almost the entire staff complement drives to the Pit Top via private vehicle, and that 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 Springvale; the abject lack of other travel options; and the [appropriate] provision of on-site parking.

Springvale shift arrival and departure peaks are off-set; for example, the traffic peak associated with arrivals for the Day Shift (prior to 6:00 am) is over before the traffic peak associated with departures from the Night Shift commences (after 8:00 am). The end of the Day Shift and start of the Afternoon Shift; and end of the Afternoon Shift and start of the Night Shift, are similarly off-set.

The Pit Top generates peak traffic flows over 1 – 2 hours periods prior to and following the shifts outlined in **Table 1.2.3**, and traffic flows during these periods generally mirror staff numbers (i.e. one car per staff member). 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 |

1.4.2 Service Vehicle Trips

The Pit Top generates a moderate heavy vehicle demand, including deliveries of equipment and light materials; maintenance vehicles; and occasionally machinery and the like. The majority of Pit Top heavy vehicles are smaller heavy vehicles (Class 4 with reference to AustRoads VCS).

Pit Top heavy vehicle trip generation would not be affected by the Project.

1.5 Parking

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 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 approximately 173 parking spaces; as such the available parking provides spare capacity even during this peak demand period.

2 Existing Access & Traffic

The sub-regional road network which provides access for 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 operations.

2.2 Castlereagh Highway & Mine Access Road 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 existing Springvale trip generation, and the minor additional Modification generation, has potential for any significant impact. It is therefore the key location for analysis in this TIA.

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**) 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 the Castlereagh Highway to Mine Access Road is provided as a Channelised Left (**CHL**) treatment with turn lane protected by a wide tapered splitter island, and then a Give Way intersection at Mine Access Road which provides priority to vehicles arriving via the right turn from Castlereagh Highway). This is essentially the highest form of left turn treatment that can be provided.

2.3 Traffic Flows

2.3.1 Traffic Surveys

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**.

2.3.2 Daily Traffic Flows

2.3.2.1 Castlereagh Highway

The Castlereagh Highway 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 are not approved for travel on the Castlereagh Highway under RMS *Restricted Access Vehicle* regulations).

2.3.2.2 Mine Access Road

The Mine Access Road 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.

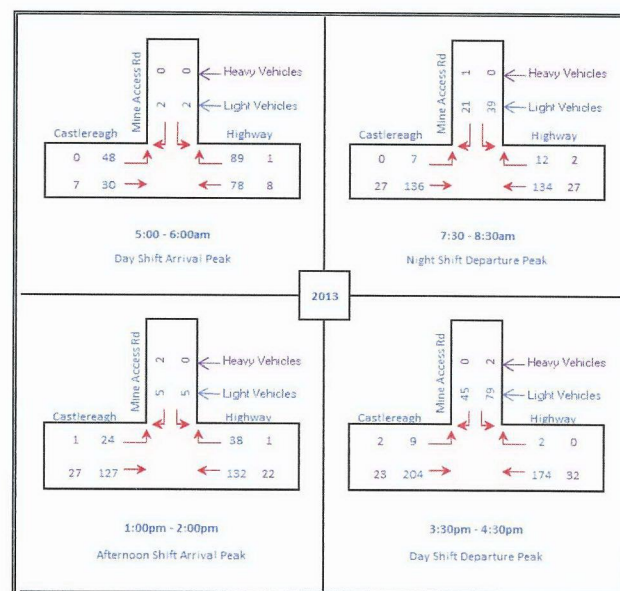
Both the ADT and AWT report that heavy vehicles constitute approximately 14% of total flows; with reference to the AustRoads VCS, approximately 12% of total flows are Class 4 vehicles, and 2% are Class 5 – 11 vehicles

2.3.3 Design Peak Hours

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 Castlereagh Highway ATC.

ARC has based the assessment of the intersection 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. 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
5:00 - 6:00 am	A	<10	12.8	0.07
7:30 - 8:30 am	A	<10	14.1	0.10
13:00 - 14:00 pm	A	<10	13.3	0.09
15:30 - 16:30 pm	A	<10	13.3	0.14

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.

Outside of these peak arrival and departure periods, reference to the ATC data in **Appendix A** shows that through flows in the Castlereagh Highway are at times higher, but turning demands to/from Mine Access Road during these periods are significantly lower. Sensitivity testing completed by ARC of peak periods across the day – including the hour 6:00 to 7:00 am during which many sub-regional mines generate day shift arrival peaks – reports similar LoS and capacity conditions as those reported in **Table 2.4.1**.

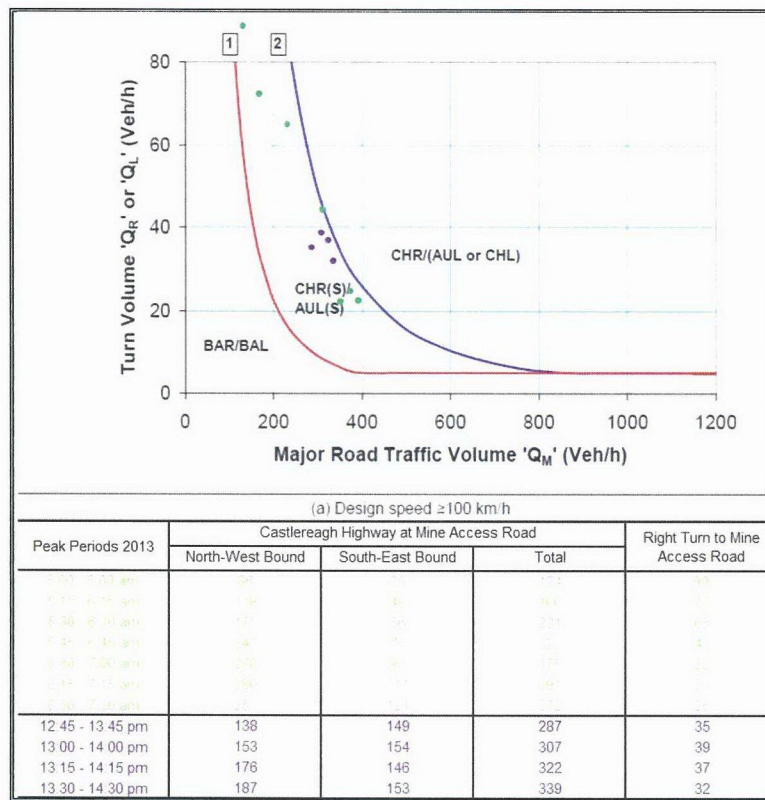
2.4.2 Intersection Turn Warrants

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 for the design peak hour flows in **Figure 2.3.3**) ARC has reviewed 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. ARC notes that 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 2014 forecast flows at the intersection is provided in **Section 5.3**.

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 pm – 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.

3 The Modification

3.1 Modification Components

Springvale Coal is seeking to modify DA 11/92 to allow for the extraction of up to 4.5 Mtpa from the existing operations at Springvale. Full details of the Modification are provided in the Modification EA which this report accompanies; from a traffic and transport perspective, the components of the Modification requiring specific assessment are essentially limited to: -

- **The generation of additional vehicle trips associated with an increase in Pit Top staff; and**
- **The operation of the intersection of Castlereagh Highway & Mine Access Road further to these increases through September 2014.**

3.2 Access

All access to the Pit Top will remain from Castlereagh Highway via Mine Access Road.

3.3. Traffic Generation

The Modification would provide for up to 30 additional full time staff at the Pit Top. Further to discussions with Springvale Coal, it is estimated that **this will equate to an additional 7 staff for each of the weekday shifts** (Day, Afternoon and Night). As such, up to 7 additional vehicle trips per hour (**vtph**) could be generated in the hour prior to the start of each shift; and in the hour following the completion of each shift.

These trips have been distributed to the intersection of Castlereagh Highway & Mine Access Road with reference to the existing distribution of arrival and departure trips.

3.4 Parking

The future peak on-site parking demand – which again results during the change-over period between the Night Shift and Day Shift (between 6:00am and 8:00am) – could increase to 187 parking spaces as a result of the Modification.

With a total of 203 staff parking spaces available at the Pit Top, the existing parking areas would therefore provide for the additional staff parking demand and still retain spare capacity.

4 Potential Cumulative Traffic

To account for potential cumulative traffic impacts at the intersection of Castlereagh Highway & Mine Access Road, ARC has completed a desktop review of sub-regional projects which could potentially generate traffic to this intersection through September 2014.

Each of the sub-regional projects outlined below is located to the north of Springvale; based on the distribution of Springvale trips at Mine Access Road, ARC has estimated that up to 75% of these sub-regional project trips could be generated to/from the south, i.e. through the intersection.

4.1 Western Coal Services Project

The Western Coal Services Project (**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 a construction program that will generate up to 60 vtph during arrival (between 6:00 – 8:00 am and departure (between 4:00 – 6:00 pm) peaks during peak construction.

During the Springvale morning peak period, it is estimated that up to 5 arrival vtph could be generated in the hour 5:00 – 6:00 am, and up to 15 arrival vtph could be generated in the hour 7:30 – 8:30 am. During the Springvale afternoon peak hours, it is estimated that up to 15 departure vtph could be generated in the hour 3:30 – 4:30 pm.

4.2 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. Based on the shift structure at Springvale, it is estimated that of the 65 staff, 40 staff could be assigned to a Day Shift, 20 to an Afternoon Shift and 5 to a Night Shift, generating

This would result in the generation of 30 vtph prior to and following the Day Shift; 15 vtph prior to and following the Afternoon Shift; and 4 vtph prior to and following the Night Shift, at the intersection of Castlereagh Highway & Mine Access Road. The potential exists for these trips to be generated during the same peak hours as Springvale.

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.

4.3 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. Based on the shift structure at Springvale, it is estimated that of the 35 staff, 20 staff could be assigned to a Day Shift; 10 to an Afternoon Shift; and 5 to a Night Shift.

This would result in the generation of 15 vtpm prior to and following the Day Shift; 8 vtpm prior to and following the Afternoon Shift; and 4 vtpm prior to and following the Night Shift, at the intersection of Castlereagh Highway & Mine Access Road. The potential exists for these trips to be generated during the same peak hours as Springvale.

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.

4.4 Coalpac Consolidation Project

The Coalpac Consolidation Project (**Coalpac Project**) 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 arrival vtpm (6:00 – 7:00 am) and 60 PM departure vtpm (4:00 – 5:00 pm).

During the Springvale morning peak period, it is estimated that up to 10 arrival vtpm could be generated in the hour 5:00 – 6:00 am, and up to 15 arrival vtpm could be generated in the hour 7:30 – 8:30 am. During the Springvale afternoon peak period, it is estimated that up to 24 departure vtpm could be generated in the hour 3:30 – 4:30 pm.

4.5 [Average] Annual Traffic Growth

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 further to an approval.

5 Future Traffic Operations

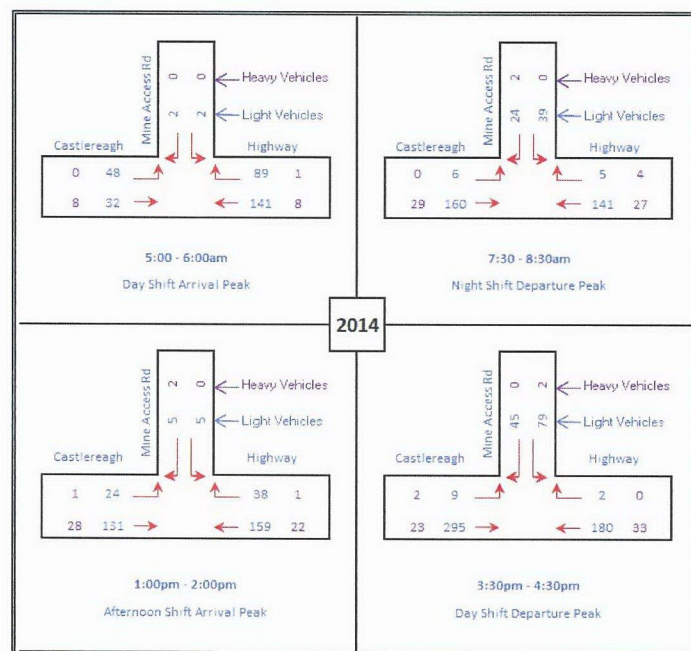
5.1 Future Traffic Flows

With reference to sections above, the **total 2014 flows at the intersection of Castlereagh Highway & Mine Access Road** could include: -

- Existing flows (as per **Section 2.3**)
- Modification flows (as per **Section 3.3**)
- Sub-Regional Project flows, including peak construction flows (as per **Section 4.1 – Section 4.4**)
- Annual Average Growth (as per **Section 4.5**)

The resulting flows for the year 2014 are shown in **Figure 5.1** below.

Figure 5.1 2014 Design Peak Flows Castlereagh Highway & Mine Access Road



5.2 Future Network Operations

5.2.1 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 2014 design peak flows in **Figure 5.1** - are provided in **Table 5.2.1**.

Table 5.2.1 2014 Castlereagh Highway & Mine Access Road Level of Service

Castlereagh Highway & Mine Access Road 2014	Level of Service	Average Delay (s)	Worst Delay (s)	Degree of Saturation
5:00 - 6:00 am	A	<10	12.8	0.10
7:30 - 8:30 am	A	<10	14.2	0.12
13:00 - 14:00 pm	A	<10	13.6	0.11
15:30 - 16:30 pm	A	<10	13.8	0.20

With reference to **Table 5.2.1**, it is clear that **the intersection of Castlereagh Highway & Mine Access Road will continue to operate at a good LoS during the Springvale shift arrival and departure periods through 2014**, with low average delays and significant spare capacity.

5.2.2 Intersection Turn Warrants

2014 warrants for the right turn movement from Castlereagh Highway to Mine Access Road have again assessed. **Figure 5.2.2.1** provides an assessment based on all potential sub-regional generation (as per **Section 4**) while **Figure 5.2.2.1** provides an assessment without the short term potential WCS Project and Coalpac Project construction peak flows.

Figure 5.2.2.1 2014 Turn Warrants All Potential Sub-Regional Projects

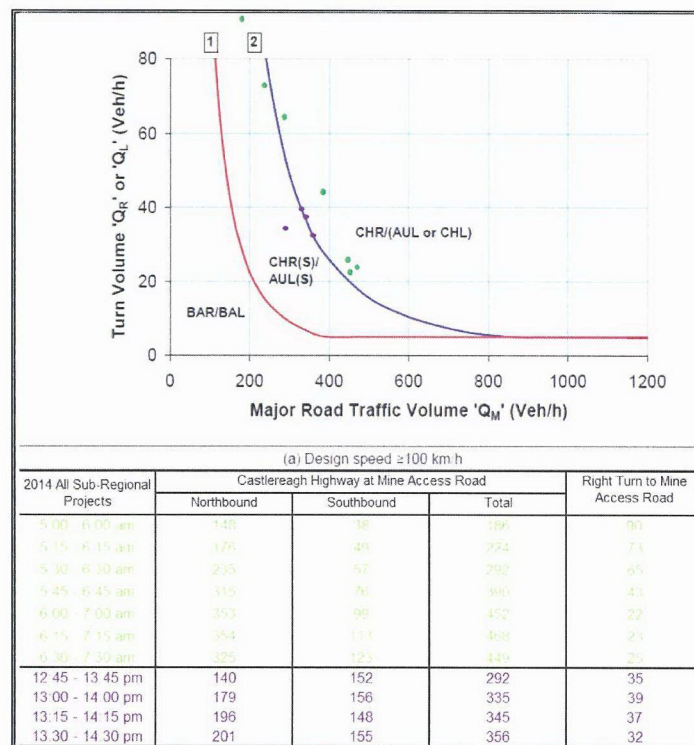
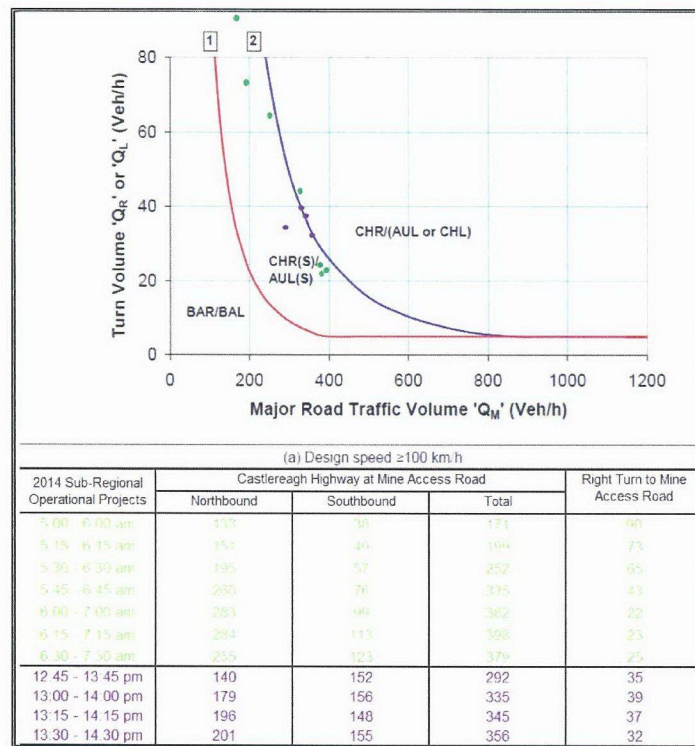


Figure 5.2.2.2 2014 Turn Warrants Sub-Regional Operational Projects Only



With reference to **Figure 5.2.2.1** and **Figure 5.2.2.2**, the potential introduction of moderate volumes of sub-regional project construction traffic in 2014 would result in warrants for an upgrade of the right turn Castlereagh Highway to Mine Access Road being met across broad periods of the morning. Importantly though, this would be the case regardless of the minor additional traffic generated by the Modification, **i.e. warrants would be met even if no traffic generation changes were proposed at Springvale** simply as a result of the additional through trip generation of the sub-regional projects (and particularly construction projects) detailed in **Section 4**.

Moreover, it is the opinion of ARC that the short term construction peaks which have the potential to occur prior to September 2014 should not be cited as peaks for design purposes at the intersection. Certainly if there were any indication in the SIDRA modelling (of design peak flows which include these potential construction flows) or crash data review that there were any delay, capacity or safety issues at the intersection; or evidence of long term additional generation, i.e. that conditions would remain elevated for any reasonable number of years; then an upgrade would require more detailed assessment.

However, this is not the case with regard to the Modification. Rather: -

- The additional generation to the key right turn movement is up to 5 vtph, i.e. extremely minor;
- The intersection will continue to provide a good LoS "A" through all peak periods;
- The intersection provides good sight distances to the north and south and – notwithstanding revisions to AustRoads guidelines – a design that caters for this level of traffic (and more) at locations all over NSW;

- The intersection has a good crash history, undoubtedly a result of the combination of low traffic flows, good intersection design and good sight distances;
- The temporary and – at this time – potential only construction trips generated by the WCS Project and Coalpac Project; and
- The moderate and – at this time – potential only operational trips generated by the Neubeck Project and Airly Project.

In summary, it is the opinion of ARC that the existing intersection of Castlereagh Highway & Mine Access Road will continue to operate at a high level of service with a design providing an appropriate level of safety and efficiency to September 2014.

ARC has conducted additional sensitivity testing of potential future conditions, i.e. further to a [proposed in the Springvale Extension Project] continuation of operations after September 2014. This testing suggests that by approximately 2017, continued Springvale traffic generation, annual average traffic increases in the Castlereagh Highway and sub-regional traffic generating projects will consistently combine across extended morning and afternoon Springvale shift arrival periods on most weekdays to meet warrants for an upgrade of the right turn Castlereagh Highway to Mine Access Road. Under these conditions, it is the opinion of ARC that an upgrade of the right turn Castlereagh Highway to Mine Access Road would be appropriate to ensure long term safety and efficiency.

This would necessarily be examined in further detail as part of the Springvale Extension Project.

5.2.3 Castlereagh Highway Capacity

With reference to the design peak hour flows in **Figure 5.1** – and the broader potential for sub-regional projects to generate trips to the Castlereagh Highway across the day – total flows in the Castlereagh Highway are unlikely to exceed the LoS “B” flow limits through 2014 other than during short term sub-regional project construction activity. Moreover, flows would remain well below the RMS capacity target of LoS “C”.

6 Conclusions

6.1 Castlereagh Highway & Springvale Mine Access Road

Further to consideration of the additional traffic generated by the Modification; annual average growth in the Castlereagh Highway; and by potential sub-regional projects, ARC has concluded that the intersection would continue to operate at a good LoS through September 2014, with low average delays and significant spare capacity during Springvale peak periods and across the day.

6.2 Parking

All parking for Pit Top staff will continue to be provided on-site in existing parking areas, which have capacity to accommodate the additional Modification staff parking demands even during peak shift overlap periods.

6.3 Coal Transportation

Coal will continue to be transported to the adjacent WPS and MPPS, and to the Springvale Coal Services facility at Blackmans Flat, by overland conveyor. Existing DA 92/11 provisions for short term contingency coal transport by public road to the WPS and MPPS are unchanged by the Modification.

Following our assessment of the key issues associated with the Modification, and with the application of the recommendation outlined above, ARC has concluded that the Modification is supportable from an access and traffic perspective.



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