Mt Arthur Coal

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Appendix K –
Road Transport Assessment

Mt Arthur Coal Open Cut Modification

Muswellbrook

NSW

Road Transport Assessment

transportation planning, design and delivery

12S1431000 19/12/12

GTAconsultants

Mt Arthur Coal Open Cut Modification

Muswellbrook, NSW

Road Transport Assessment

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1. Introduction

1.1 Background

The Mt Arthur Coal Mine is located approximately 5 kilometres (km) south-west of Muswellbrook and 130 km north-west of Newcastle in the Upper Hunter Valley of New South Wales (NSW) (Figure 1-1). GTA Consultants was commissioned by Resource Strategies to prepare an assessment of the road transport implications of the proposed Mt Arthur Coal Open Cut Modification (the Modification). The Modification includes the continuation of open cut mining operations at the Mt Arthur Coal Mine for an additional life of approximately four years.

This assessment considers the road transport implications of the proposed Modification with regard to the forecast road transport conditions with the current approved operations at the Mt Arthur Coal Mine, together with the cumulative impacts of other developments in the region which have been approved in recent years.

1.2 Purpose of this Report

The study has been undertaken with reference to the road-based aspects of the traffic and transport components of the Director General's Requirements (DGRs) for the Environmental Assessment of Modification, which require:

Traffic and Transport *– including:*

- *accurate predictions of the road and rail traffic generated by the proposal;*
- *a detailed assessment of the potential impacts of the modified project on the capacity, efficiency and safety of the:*
    - *local and regional rail network, having regard to the strategic objectives and cumulative impacts for the passenger and freight rail network;*
    - *local and regional road network, with particular regard to a cumulative traffic impact assessment; condition assessment of the existing network; proposed new road infrastructure; and impacts of coal trains on level crossing operations;*
- *details of mine to port or other domestic customer transport movements, train path availability and any required rail infrastructure works; and*
- *a detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road and rail networks in the surrounding area over the life of the project.*

The rail implications of the Modification have been considered separately in the Main Text of the Environmental Assessment. As specified in the DGRs, the assessment has been prepared with regard to the NSW Roads and Traffic Authority's (RTA) *Guide to Traffic Generating Developments* (2002), and the RTA's *Road Design Guide* (1996).

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It is noted that while the DGRs refer to the *Road Design Guide*, NSW Roads and Maritime Services (RMS) (formerly RTA), together with all road agencies across Australia, have agreed to adopt the Austroads guides. The Austroads guides and the Australian Standards referenced in them are now the primary technical references for use within RMS. The Austroads *Guide to Road Design* series and the accompanying RMS Supplement are therefore the relevant reference rather than the *Road Design Guide* (1996).

2. Mt Arthur Coal Open Cut Modification

2.1 Site Location

The Mt Arthur Coal Mine is bounded to the west by Edderton Road, to the north-west by Denman Road, to the north-east by Thomas Mitchell Drive and the Drayton Coal Mine to the east (Figure 2-1).

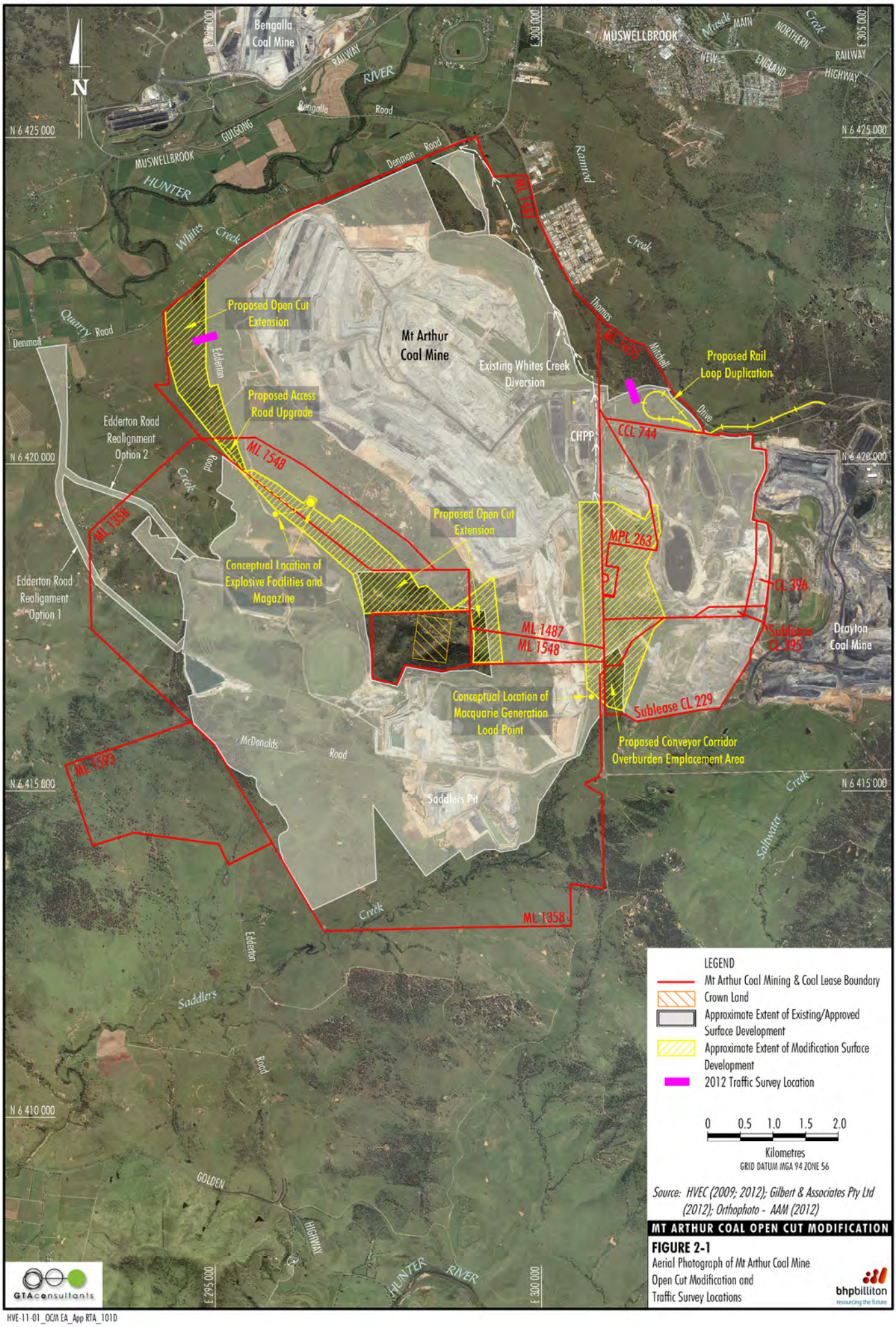
2.2 Existing Operations at Mt Arthur Coal Mine

The Mt Arthur Coal Mine is owned and operated by Hunter Valley Energy Coal Pty Ltd (HVEC), which is a wholly owned subsidiary of BHP Billiton.

In 2010, approval was granted to extend open cut operations and consolidate existing approvals for open cut mining operations and surface infrastructure (Project Approval [PA] 09_0062) (herein referred to as the Consolidation Project). The open cut is currently approved with a mining rate of up to 32 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. In addition, underground mining with a rate up to 8 Mtpa of ROM coal was approved in 2008. The total site extraction rate is capped at 36 Mtpa of ROM coal.

The current approval allows for open cut mining up to 2022 in the Mt Arthur Northern Open Cut (also known as Mt Arthur North) and the Southern Open Cut (comprising South Pit, Saddlers Pit and Belmont Pit). Up to 27 Mtpa of product coal is transported by rail with a maximum of 24 rail movements per day. HVEC has approval to employ a total of approximately 2,600 full time equivalent employees during peak production, and 240 full time equivalent employees during peak construction phases. All coal operations and associated activities occur 24 hours per day, seven days per week. Onsite construction may also occur 24 hours per day, seven days per week consistent with operational requirements. Construction hours for the proposed Edderton Road realignment are 7.00 am to 5.00 pm Monday to Saturday, except in the case of an emergency. An existing fully bunded onsite explosives magazine for the storage of detonators and other materials is located within the existing mine infrastructure area.

Formal vehicular access for the Mt Arthur Coal Mine is provided to and from Thomas Mitchell Drive, on the north-eastern boundary of the site (Figure 2-1). Vehicular access to Mt Arthur Coal Mine via Edderton Road occurs intermittently for access to equipment shutdown or construction activities. In addition, access is also provided to the summit of Mount Arthur for emergency services and legitimate users in accordance with Condition 47(e) of PA 09_0062.



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2.3 Approved Mt Arthur Consolidation Project

The traffic and transport impact assessment for the now-approved Consolidation Project (Hansen Bailey, 2009) provides forecasts of the additional traffic expected to be generated by the Consolidation Project, noting the following:

- all employees and contractors associated with the Consolidation Project were assumed to access the site using the existing access road from Thomas Mitchell Drive;
- existing workforce car-pooling was assumed to be 85 cars for every 100 employees;
- shift arrangements would remain unchanged;
- relative distribution of the residential locations of employees would remain unchanged; and
- maximum of 70 percent (%) of the workforce would travel to the site on a weekday.

Table 2.1 presents the estimated Consolidation Project traffic forecasts from Hanson Bailey (2009).

Table 2.1: Daily Mt Arthur Coal Consolidation Project Traffic (vehicles/day)

Road	Location	Construction 2011		Operations 2014 to 2022	
		Light	Heavy	Light	Heavy
Mt Arthur Coal Mine Access Road	Thomas Mitchell Drive intersection	284	20	896	40
Thomas Mitchell Drive	West of Mt Arthur Coal Mine Access Road	186	14	582	26
Thomas Mitchell Drive	East of Mt Arthur Coal Mine Access Road	98	6	314	14
Denman Road	North of Thomas Mitchell Drive	168	10	528	18
Denman Road	South of Thomas Mitchell Drive	18	4	54	8
New England Highway	South of Muswellbrook town	0	0	0	0
New England Highway	Ravensworth	98	6	314	14

Source: Hansen Bailey, 2009

The majority of the forecast traffic is associated with employees travelling to and from work each day. During the operational phase at peak production (2014), visitors were estimated to account for 20 light vehicle trips per day, deliveries were estimated to account for 20 light and 40 heavy vehicle trips per day (including the delivery of raw explosives materials). The remaining 856 light vehicle trips were associated with employees.

The traffic and transport impact assessment for the Mt Arthur Consolidation Project (Hansen Bailey, 2009) included anticipated traffic growth resulting from other projects in the region including the Mangoola Coal Mine (refer to Section 4.3), Drayton Coal Mine Extension (refer to Section 4.4) and Bengalla Wantana Extension (refer to Section 4.2.1). Increased traffic resulting from the Mount Pleasant Project (refer to Section 4.1) was not included due to uncertainty about its development status (Hanson Bailey, 2009). Increases in traffic associated with extension of the Muswellbrook Industrial Estate and residential subdivision projects in the area were also not specifically included, and were considered to be accounted for the annual growth allowances.

The resulting two-way daily traffic volumes on roads of relevance to the Modification (as determined by Hansen Bailey, 2009) are summarised in Table 2.2. These forecasts include the traffic expected to be generated by the Consolidation Project, as well as the extension of the Drayton Coal Mine (approved in 2008), the Bengalla Wantana Extension (approved in 2008), the Mangoola Coal Mine (approved in 2007) and background growth in traffic unrelated to specific developments.

Table 2.2: Daily Traffic Volumes with Approved Mt Arthur Consolidation Project (vehicles/day)

Road	Year 2008 Survey	Year 2011 Forecast	Year 2014 Forecast	Year 2019 Forecast
Mt Arthur Coal Mine Access Road West of Thomas Mitchell Drive	1,404	3,248	3,880	3,880
Thomas Mitchell Drive West of Mt Arthur Coal Mine Access Road	4,369	5,790	6,482	6,994
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	-	3,529	3,918	4,215
Denman Road North of Thomas Mitchell Drive	6,756	8,599	9,406	10,198
Denman Road South of Thomas Mitchell Drive	3,944	4,748	5,046	5,508
New England Highway South of Muswellbrook town	10,397	12,389	12,464	12,588
New England Highway Ravensworth	10,280	12,656	12,633	12,231
Edderton Road South of Denman Road	732	-	-	-

Source: Hansen Bailey, 2009

Table 2.2 indicates that with the Consolidation Project, Mt Arthur Coal Mine is expected to generate 3,248 vehicles per day (vehicles/day) in 2011, and 3,880 vehicles/day in 2014 and onward.

The assessment found that the Level of Service at the intersection of Thomas Mitchell Drive and Denman Road would be unacceptable in the evening peak with the additional traffic. In accordance with Condition 47(c), Schedule 3 of the Consolidation PA 09_0062, Mt Arthur Coal Mine will upgrade this intersection, which will result in an acceptable Level of Service. This condition is reproduced below:

> *47. The Proponent shall:*
>
> *...*
>
> *(c) upgrade the Thomas Mitchell Drive/Denman Road intersection to the satisfaction of the applicable roads authority, by the end of December 2019 unless otherwise agreed by the roads authority;*

The assessment also found that the Level of Service at the intersection of the Mt Arthur Coal Mine Access Road and Thomas Mitchell Drive would be satisfactory in 2011 and 2019 without need for any upgrade.

The Consolidation Project also includes the realignment of the northern portion of Edderton Road in approximately 2019. Two conceptual options for the realignment were considered, both of which relocate the intersection of Edderton Road and Denman Road approximately 2.5 km to the west of its current location (Figure 2-1). The realignment of Edderton Road would not impact on the traffic volumes carried, but would result in an increase in travel time for travel on Edderton Road from Muswellbrook to Golden Highway, and a decrease or no change to travel time for travel from Denman towards Golden Highway.

With regard to the road network, the approval for the Consolidation Project includes conditions which require HVEC to (Condition 47, Schedule 3 of PA 09_0062):

(a) *fund the upgrade of Thomas Mitchell Drive, as outlined in the RTA's* Review of Thomas Mitchell Drive Route Assessment (August 2010), *in accordance with the terms of the planning agreement required in condition 14 of schedule 2;*

(b) *upgrade the Thomas Mitchell Drive/New England Highway intersection to the satisfaction of the applicable roads authority, by the end of June 2011 unless otherwise agreed by the roads authority;*
(c) *upgrade the Thomas Mitchell Drive/Denman Road intersection to the satisfaction of the applicable roads authority, by the end of December 2019 unless otherwise agreed by the roads authority;*
(d) *realign Edderton Road and its intersection with Denman Road prior to mining within 200 metres of the road, to the satisfaction of Council and the RTA; and*
(e) *maintain reasonable access to the summit of Mt Arthur for emergency services and legitimate users on a 24 hour per day basis, except for temporary closures as required for blasting.*

2.4 Overview Description of the Modification

The Modification is a proposed continuation of open cut mining operations at the Mt Arthur Coal Mine for an additional operational life of approximately four years. It includes the following key components:

- a four year continuation of the open cut mine life from 2022 to 2026 at the currently approved maximum rate of 32 Mtpa;
- increase in open cut disturbance areas;
- use of the conveyor corridor for overburden emplacement;
- duplication of the existing rail loop;
- increase in the maximum number of train movements per day from 24 to 38;
- relocation of the load point for the overland conveyor which delivers coal to Macquarie Generation's Bayswater Power Station;
- relocation and upgrade of the explosives, storage, magazine and associated facilities; and
- construction of additional offices and a control room and a small extension to the ROM coal stockpile footprint.

The open cut extension is shown on Figure 2-1.

In addition to the changes mentioned above to the open cut and overburden management, some changes to existing infrastructure are also proposed as part of the Modification. In particular, the relocation of the explosives magazines and facilities may result in changes to local traffic conditions, as described below.

Relocation of Explosives Magazines and Facilities

The existing explosives magazine and facilities would require relocation as part of the Modification (Figure 2-1). Explosives that would be required would include initiating products and detonators, Ammonium Nitrate Fuel Oil and emulsion explosives.

Ammonium Nitrate Fuel Oil would continue to be the main explosive used at the Mt Arthur Coal Mine.

The explosives magazine would be constructed in accordance with relevant Australian Standards, including AS 2187.1:1998 *Explosives - Storage, Transport and Use*.

The explosives magazine and facilities would store products in the following quantities:

- 1,500 tonnes (t) of prill (ammonium nitrate);
- 1,100 t of emulsion; and

- 90 kilolitres (kl) of diesel.

As part of this relocation, access to the new explosives magazine and facilities would be provided from Edderton Road via an existing access track, which would be upgraded and currently allows access to the summit of Mount Arthur for emergency services and legitimate users in accordance with Condition 47[e], Schedule 3 of PA 09_0062. This access would provide for the approximately 60 employees that would work at the explosives facility and approximately 5,000 heavy vehicle deliveries per annum that would access the explosives magazine.

HVEC currently has approval for the realignment of Edderton Road via PA 09_0062. This realignment is scheduled to occur in approximately 2019. A new access to the explosives magazine and facilities would be constructed as part of the Modification once this realignment is established.

Other development/construction activities associated with the Modification (e.g. Mt Arthur Coal Rail Loop Duplication – High Capacity Option, Relocation of Load Point for Existing Overland Conveyor to Bayswater Power Station, Coal Handling and Preparation Plant (CHPP) Control Room and Office Facilities, Mine Infrastructure Area, Coal Stockpile Expansion and Administration Building) would be accessed from the existing site access road off Thomas Mitchell Drive, and would be largely indistinguishable from existing/approved construction activities associated with the Consolidation Project.

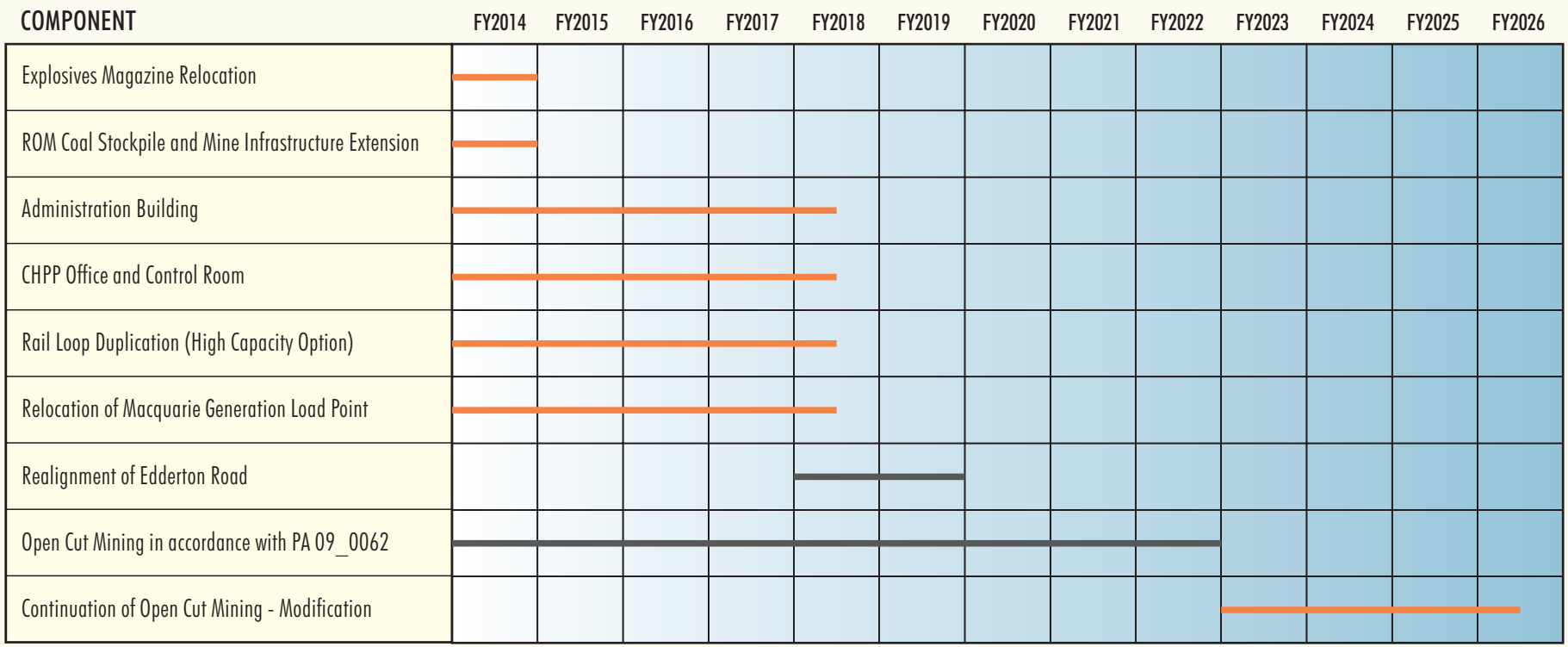
Construction is anticipated to occur between June 2013 and December 2017, with the explosives magazine relocation and ROM coal stockpile and mine infrastructure area due to be completed by approximately June 2014 (Figure 2-2). The realignment of the northern section of Edderton Road would be completed by the end of 2019 (Figure 2-2).

2.5 Modification Construction Road Transport Implications

As part of the Modification, HVEC proposes to construct a relocated explosives magazine and storage facility on the western side of the site, which would be accessed from Edderton Road (Figure 2-1). With regard to road transport during the construction phase of the Modification, construction employees and deliveries to the worksite would generate traffic on the road system.

Other components of the Modification that require construction (rail loop duplication, additional offices, etc.) would involve construction employees accessing the site via the existing Thomas Mitchell Drive access road. In practice, these construction employees would not be discernible from the construction workforce associated with the existing approved Consolidation Project. As the impacts associated with these employees has been assessed in the Consolidation Project (Hanson Bailey, 2009), this construction section has a focus on the relocated explosives magazine and storage facility. This is also considered to be appropriate given that the 2012 traffic data indicates that traffic forecasts in the Consolidation Project were conservatively high (refer to Section 3.4.2).

MT ARTHUR OPEN CUT MODIFICATION
PROVISIONAL DEVELOPMENT SCHEDULE



Source: HVEC (2012)

MT ARTHUR COAL OPEN CUT MODIFICATION

FIGURE 2-2

Provisional Modification Development Schedule

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2.5.1 Construction Traffic Generation

During the peak construction phase of the relocated explosives magazine and storage facility, approximately 20 employees would travel to and from the worksite each day. These employees would be expected to generate up to 40 vehicle trips per day. Car-pooling would decrease the number of vehicle trips generated, however for the purpose of this assessment, construction employees are conservatively assumed to travel independently.

Construction activity would also generate approximately 20 concrete deliveries, approximately 12 steel and structural deliveries, and a possible four temporary building deliveries. These deliveries would generate a total of 72 heavy vehicle trips to and from the worksite; however these would be spread over the construction period. For the purpose of this assessment, it is assumed that on a busy day during peak construction, there may be up to four deliveries in one day, which would generate eight vehicle trips.

2.5.2 Construction Traffic Distribution

It is assumed that the relative distribution of the residential locations of construction employees would be similar to that of the existing Mt Arthur Coal Mine operational employees (Hanson Bailey, 2009). Construction deliveries are likely to be sourced from Muswellbrook, Singleton and Newcastle.

Table 2.3 summarises the daily traffic generation of the Modification during the construction phase.

Table 2.3: Peak Daily Construction Modification Traffic 2014 (vehicles/day)

Road	Location	Light	Heavy	Total
Mt Arthur Coal Mine Access Road	West of Thomas Mitchell Drive	0	0	0
New Explosives Facility Access	East of Edderton Road	40	8	48
Thomas Mitchell Drive	West of Mt Arthur Coal Mine Access Road	0	0	0
Thomas Mitchell Drive	East of Mt Arthur Coal Mine Access Road	0	0	0
Denman Road	North of Thomas Mitchell Drive	24	4	28
Denman Road	South of Thomas Mitchell Drive	24	4	28
Denman Road	South of Edderton Road	2	0	2
New England Highway	South of Muswellbrook town	0	0	0
New England Highway	Ravensworth	14	4	18
Edderton Road	North of Explosives Access	26	4	30
Edderton Road	South of Explosives Access	14	4	18

Construction activity would generate approximately 48 vehicle trips per day on a busy day, during peak construction.

2.6 Modification Operational Road Transport Implications

As part of the Modification, HVEC proposes to construct a new explosives magazine and storage facility on the western side of the site, which would be accessed from Edderton Road. With regard to road transport during the operational phase of the Modification, employees and deliveries to the proposed facility would generate traffic on the road system. These trips were previously included in the assessment of the operations of the Consolidation Project, however were assumed to use the main Mt Arthur Coal Mine Access Road off Thomas Mitchell Drive. The Modification would therefore result in a transfer of trips from the existing access off Thomas Mitchell Drive to the proposed access off Edderton Road, compared with the approved Consolidation Project operations.

2.6.1 Operational Traffic Generation

Approximately 60 permanent employees would work at the explosives facility. These employees would travel directly to the facility for their shift, rather than to the main office off Thomas Mitchell Drive. With car-pooling resulting in 85 cars for every 100 employees, and up to 70% of employees travelling to work on a weekday (refer to Section 2.3), the explosives facility employees would travel in 36 cars on a weekday. This is equivalent to 72 vehicle trips per day.

Approximately 5,000 heavy vehicle movements per year would access the facility for the delivery of materials and consumables. These movements currently take place at the existing facility, which is accessed from the Mt Arthur Coal Mine Access Road off Thomas Mitchell Drive. On average, there would be approximately 14 heavy vehicle movements per day, allowing for seven day operations.

2.6.2 Operational Traffic Distribution

Table 2.4 compares the daily traffic generated by the Consolidation Project on the surrounding roads with that generated with the Modification. This assumes that employees to and from areas to the south-east, such as Denman, would use Denman Road and Edderton Road North rather than Golden Highway and Edderton Road South.

Explosives deliveries are currently sourced from Newcastle and this would remain unchanged with the Modification. Golden Highway is the most direct route, however these trucks are not permitted to use Golden Highway, so would use New England Highway, Thomas Mitchell Drive and Denman Road to access Edderton Road and the explosives facility.

Table 2.4 compares the Mt Arthur Coal Mine traffic generated by the approved Consolidation Project with that of the Modification. This transfers 72 light vehicle trips and 14 heavy vehicle trips per day from the existing Thomas Mitchell Drive access to the new Edderton Road access. The balance of the Consolidation Project traffic would remain at the Thomas Mitchell Drive access.

Table 2.4: Daily Operational Mt Arthur Coal Mine Traffic (vehicles/day)

Road and Location	Approved Consolidation Project 2012 to 2022		Proposed Modification 2015 to 2026	
	Light	Heavy	Light	Heavy
Mt Arthur Coal Mine Access Road Thomas Mitchell Drive intersection	896	40	824	26
New Explosives Facility Access East of Edderton Road	0	0	72	14
Thomas Mitchell Drive West of Mt Arthur Coal Mine Access Road	582	26	536	40
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	314	14	288	14
Denman Road North of Thomas Mitchell Drive	528	18	528	18
Denman Road South of Thomas Mitchell Drive	54	8	92	22
Denman Road South of Edderton Road	54	8	54	8
New England Highway South of Muswellbrook town	0	0	0	0
New England Highway Ravensworth	314	14	314	14
Edderton Road North of Explosives Facility	0	0	46	14
Edderton Road South of Explosives Facility	0	0	26	0

The Modification would thus result in a transfer of 86 vehicle trips per day from the existing Mt Arthur Coal Mine Access Road off Thomas Mitchell Drive to the proposed access road on Edderton Road from the approved Consolidation Project. This would result in a decrease in the anticipated traffic on Thomas Mitchell Drive and an increase on Denman Road between Thomas Mitchell Drive and Edderton Road. The Modification would extend the operational traffic on the road system for four additional years to 2026.

2.7 Modification Scenarios

With regard to the direct implications of the Modification, there are three distinct periods for future traffic conditions. These are:

i Construction of new explosives storage facility – Year 2014.
ii Operational phase prior to realignment of Edderton Road North – prior to December 2019.
iii Operational phase after realignment of Edderton Road North – after December 2019.

To provide comparisons with the approved Consolidation Project traffic conditions, the third period above can be divided into two distinct time horizons:

i Approved end of life of Mt Arthur Coal Mine – to Year 2022.
ii Proposed end of life of Mt Arthur Coal Mine – to Year 2026.

The realignment of Edderton Road North will not in itself impact on the volume or distribution of traffic generated by the proposed explosives facility, nor on the background traffic volumes on the surrounding roads. The two operational scenarios above therefore represent different levels of background traffic growth and potentially different geometric layouts at the intersection of Edderton Road and Denman Road.

For the purpose of this assessment, the road transport implications of the Modification are considered with regard to the approved Consolidation Project, which represents the approved baseline conditions for the Mt Arthur Coal Mine. The timing of the future scenarios therefore considers the same time horizons as the Consolidation Project assessment, which will quantify the implications of the altered access arrangements. An additional scenario (2026) is considered and this reviews the future traffic conditions with the extended life of the mine.

3. Road Network

3.1 Road Hierarchy

It is usual to classify roads according to a road hierarchy, in order to determine their functional role within the road network. Changes to traffic flows on the roads can then be assessed within the context of the road hierarchy. Roads are classified according to the role they fulfil and the volume of traffic they should appropriately carry given their classification.

There are various classification systems used by local authorities and the RMS. The RMS has set down the following guidelines for the functional classification of roads:

- Arterial Road – typically a main road carrying over 15,000 vehicles/day and fulfilling a role as a major inter-regional link (over 1,500 vehicles per hour [vehicles/hour]).
- Sub-arterial Road – defined as secondary inter-regional links, typically carrying volumes between 5,000 and 20,000 vehicles/day (500 to 2,000 vehicles/hour).
- Collector Road – provides a link between local roads and regional roads, typically carrying between 2,000 and 10,000 vehicles/day (250 to 1,000 vehicles/hour). At volumes greater than 5,000 vehicles/day, residential amenity begins to decline noticeably.
- Local Road – provides access to individual allotments, carrying low volumes, typically less than 2,000 vehicles/day (250 vehicles/hour).

In recent years the RMS has adopted a classification system relating to funding purposes. It defines roads as:

- State Roads – performing an important state function for which the RMS funds 100% of the maintenance cost. State roads are essentially arterial roads.
- Regional Roads – roads performing a significant regional function and for which the RMS and Council contribute 50% each towards maintenance. Regional roads are essentially sub-arterial roads.
- Local Roads – roads performing a local or collector function and for which the Council funds 100% of the maintenance cost.

3.2 Road System

The existing road network in the vicinity of the Mt Arthur Coal Mine is shown in Figure 2-1, and the key roads in the road network surrounding the site are described below.

New England Highway

New England Highway (Highway 9) is a major State road and as such is an RMS controlled road. New England Highway is the main north-south link through the Hunter Region and connects Muswellbrook and Newcastle as part of its route from Hexham to the Queensland border. It is an alternative to the Pacific Highway for the north-south vehicular link between Brisbane and Sydney, and as such carries a significant proportion of regional and interstate traffic movements.

Outside of the urban areas that the Highway passes through, it is generally a two lane high standard rural highway with regular overtaking lanes, wide sealed shoulders, designated turning lanes and a posted speed limit of 100 kilometres per hour (km/h). New England Highway is a designated B-Double route.

The intersection of New England Highway and Golden Highway is a formal seagull intersection with dedicated and protected turning lanes, deceleration lanes and acceleration lanes. The intersection of New England Highway and Thomas Mitchell Drive is a Type C, with a right turn bay and left turn deceleration lane in New England Highway, and a left turn lane in Thomas Mitchell Drive. New England Highway has one southbound and two northbound through lanes at this intersection, and the northbound lanes merge to a single lane to the north of the intersection. At the time of writing, construction work was underway at this intersection.

Golden Highway

Golden Highway (Highway 27) is also known as Jerry's Plains Road, and is a State road under the control of the RMS. Golden Highway provides a road link between Singleton and Dubbo. It is generally a two lane rural highway with a posted speed limit of 100 km/h outside of urban areas. As noted by Parsons Brinckerhoff (2008):

> *The road has a good alignment, with horizontal geometry consisting of straight or high radii curved sections and level grades. The road is appropriate for use by heavy vehicles offering wide sealed width with pavement in good condition, good line marking and delineation, sealed shoulders, and reasonable clear zones.*

Golden Highway is an approved B-double route. It is noted that a vehicle checking station is located on Golden Highway approximately 30 km west of New England Highway.

The intersection of New England Highway and Golden Highway is a formal seagull intersection with dedicated and protected turning lanes, deceleration lanes and acceleration lanes. The intersection of Golden Highway and Denman Road is a rural Type AU (give way control) intersection with a deceleration left turn and a right turn bay for vehicles turning from the Golden Highway to Denman Road. The intersection of Golden Highway and Edderton Road is proposed to be realigned as part of the Drayton South Coal Project (refer to Section 0). The existing intersection has no additional turn lanes on any of the approaches, with flaring of Edderton Road on its approach to Golden Highway.

Denman Road

Denman Road (Main Road 209) is a State road which is funded by the RMS but maintained by Muswellbrook Shire Council. Denman Road connects the township of Denman to Muswellbrook and provides a road link between Golden Highway and New England Highway. Outside of the urban areas, Denman Road is a two lane rural road, with a 7 metre (m) wide sealed carriageway, additional sealed shoulders, and a posted speed limit of 100 km/h. Denman Road is a designated B-double route.

Denman Road provides access to a number of existing mining operations via local roads such as Edderton Road and Thomas Mitchell Drive. As a result, Denman Road carries a significant proportion of mine-related traffic, particularly employee traffic accessing the mining operations.

The intersection of Denman Road with Golden Highway is a rural Type AU (give way control) intersection with a deceleration left turn and a right turn bay for vehicles turning from the Golden Highway to Denman Road.

The intersection of Denman Road and Edderton Road does not have additional turn lanes on any of the approaches, with some flaring of Edderton Road on its approach to Denman Road.

The intersection of Thomas Mitchell Drive with Denman Road has a left turn deceleration lane and short left turn acceleration lane in Denman Road, and a Type B right turn treatment, which allows northbound vehicles to pass around vehicles waiting to turn right into Thomas Mitchell Drive. This intersection is planned to be upgraded by the end of December 2019.

Edderton Road

Edderton Road is a local road under the control of Muswellbrook Shire Council. It runs in a north-south alignment through the Mt Arthur Coal Mine area and provides a road connection between Golden Highway in the south and Denman Road in the north.

Edderton Road has a load limit restriction of a maximum of 14 t which relates to a causeway near its southern end. It has a sealed carriageway in the order of 6 to 7 m wide, and a posted speed limit of 100 km/h for approximately 3 km at its northern end, and approximately 5 km at its southern end. The speed limit along the remainder of Edderton Road is 80 km/h. The length with the lower speed limit is generally a somewhat lower standard of road, with more curves and poorer road surface on the edges of the carriageway.

The intersection of Edderton Road and Golden Highway is proposed to be realigned as part of the Drayton South Coal Project, which includes realignment of approximately 7 km of Edderton Road (refer to Section 4.5). The existing intersection has no additional turn lanes on any of the approaches, with flaring of Edderton Road on its approach to Golden Highway. The intersection of Edderton Road and Denman Road does not have additional turn lanes on any of the approaches, with some flaring of Edderton Road on its approach to Denman Road.

Thomas Mitchell Drive

Thomas Mitchell Drive is a local road under the control of Muswellbrook Shire Council. It provides a link between Denman Road and New England Highway to the south of Muswellbrook township, thus providing a bypass of Muswellbrook for some traffic. It is a 7 m wide sealed road, and provides access to the Drayton Coal Mine and Muswellbrook Industrial Area, as well as other local roads and private properties. Where Thomas Mitchell Drive is crossed by the railway, a railway overbridge is provided. The speed limit on Thomas Mitchell Drive is 80 km/h at its western end, increasing to 100km/h east of the industrial area.

Thomas Mitchell Drive provides access to and from the Muswellbrook Industrial Area, and is an approved B-Double route.

Thomas Mitchell Drive is planned to be completely redesigned and reconstructed by Muswellbrook Shire Council, including the intersections with New England Highway and Denman Road. The concept design[1] for Thomas Mitchell Drive provides a typical road cross-section which generally has 3.5 m wide travel lanes, 2 m wide shoulders and 0.5 m wide verges.

[1] http://www.muswellbrook.nsw.gov.au/about-council/Meetings/InfrastructureCommitteeAgendas/20120227_Infrastructure_Committee_Agenda.pdf

The concept design provides two broad treatments:

- From Denman Road to Mt Arthur Coal Mine entry – heavy patching of localised failures and new flexible pavement for areas of widening.
- From Mt Arthur Coal Mine entry to New England Highway – new flexible pavement for areas of widening and granular overlay construction of existing failed road pavement.

At the time of writing, construction work was underway for the upgrading of the intersection of Thomas Mitchell Drive with New England Highway. The existing intersection of Thomas Mitchell Drive and New England Highway is a Type C, with a right turn bay and left turn deceleration lane in New England Highway, and a left turn lane in Thomas Mitchell Drive.

The existing intersection of Thomas Mitchell Drive with Denman Road has a left turn deceleration lane and short left turn acceleration lane in Denman Road, and a Type B right turn treatment, which allows northbound vehicles to pass around vehicles waiting to turn right into Thomas Mitchell Drive. Thomas Mitchell Drive has separate left and right turn lanes at the intersection. As required by the Consolidation Project Approval conditions, this intersection will be upgraded by the end of December 2019. It is understood that the design is currently in final review with RMS.

Mt Arthur Coal Mine Access Road

Vehicular access to and from the Mt Arthur Coal Mine is provided via an access road which extends eastwards from Thomas Mitchell Drive. The access road is a sealed two-way local road.

Left and right turn deceleration lanes are provided in Thomas Mitchell Drive for vehicles turning into the access road. The northbound lane in Thomas Mitchell Drive is flared on its departure from the intersection, forming a defacto acceleration lane for vehicles turning left from the access road.

3.3 Historic Traffic Volumes

The RMS publishes traffic volume data for its permanent and temporary count locations across NSW. The latest published data for the Hunter Region, in which the Mt Arthur Coal Mine is located, are from 2004. RMS has additional unpublished Annual Average Daily Traffic (AADT) and provisional or sample Annual Daily Traffic (ADT) data for these stations between 2005 and 2010.

The RMS traffic volume data is summarised in Table 3.1. The volumes demonstrate that in general, traffic volumes in the vicinity of the Mt Arthur Coal Mine have generally increased gradually over the period from 1992 to 2010, with some variations. It is noted that the Muswellbrook Western Roads Strategic Study applied an annual growth rate of 1.5% to background traffic (Muswellbrook Shire Council, 1997).

Table 3.1: Annual Average Daily Traffic 1992 to 2010

Road and Location		Published AADT 1992-2004					Unpublished AADT 2005-2008				Provisional ADT	
		1992	1995	1998	2001	2004	2005	2006	2007	2008	2009	2010
SH27 Golden Highway												
05.485	At Hunter River Bridge, Jerry's Plains	1,502	1,528	2,213	2,337	2,583	2,564	2,439	2,636	2,661	2,812	2,810
05.223	North of Denman[A]	2,010	2,153	1,993	2,134	2,343	2,332	2,331	2,416	2,447	2,678	2,707
05.481	Mt Thorley	4,508	7,997	6,256	7,059	5,572	-	-	3,294	-	-	-
05.841	Whittingham West of New England Highway	2,286	3,337	3,333	3,724	3,637	-	-	-	-	-	4,596
SH9 New England Highway												
05.244	Muswellbrook South of Denman Road	10,707	10,255	10,114	12,084	10,269	10,335	10,481	10,809	11,148	11,489	-
05.037	Ravensworth	-	12,643	11,468	10,611	11,472	-	-	10,725	-	-	-
MR209 Denman Road												
05.477	Muswellbrook, West of New England Highway	8,253	8,363	11,355	8,326	8,860	-	-	9,701	-	-	9,474

Source: RMS (2011).

[A] Provisional data at 05.223 is vehicles, all other data is axle pairs.

3.4 Traffic Volumes and Composition

3.4.1 Traffic Surveys

Surveys of existing traffic volumes were undertaken on roads of relevance to the Modification during one week from Tuesday 27 March to Monday 2 April 2012. At each location, hourly traffic volumes were recorded by direction, and the classification of vehicles was also undertaken using the Austroads Vehicle Classification System, which is included in Attachment A with the traffic surveys.

The surveys were conducted at the following locations (Figure 2-1):

- Edderton Road 200 m south of Denman Road.
- Mt Arthur Coal Mine Access Road off Thomas Mitchell Drive.

3.4.2 Traffic Volumes

The results of the surveys are summarised in Table 3.2, which presents the surveyed peak hourly traffic volumes before midday and after midday (the time of the peak hour may vary day to day), and the daily traffic volume.

Table 3.2: Existing Traffic Volumes on Edderton Road and Mt Arthur Coal Mine Access Road

	Edderton Road			Mt Arthur Coal Mine Access Road		
	AM Peak[A]	PM Peak[A]	Daily[B]	AM Peak[A]	PM Peak[A]	Daily[B]
Monday	96	95	1,000	550	345	2,976
Tuesday	83	94	941	506	331	3,069
Wednesday	106	92	1,059	544	323	3,097
Thursday	90	95	987	463	352	2,989
Friday	89	116	1,070	478	334	2,732
Saturday	61	44	622	303	284	1,149
Sunday	48	54	595	291	291	1,037
Average Weekday[C]	**87**	**88**	**1,011**	**451**	**314**	**2,973**

[A] vehicles/hour.
[B] vehicles/day.
[C] The peak hour on the average weekday may not be the average of the individual peak hours due to peaks occurring during different hours on different days.

On an average weekday, the surveys demonstrate that Edderton Road carries approximately 1,000 vehicles/day, with peak hourly traffic of approximately 90 vehicles/hour. The weekday peak hourly volume varied between 83 and 116 vehicles/hour, which is within the typical range of 8 to 12% of daily total traffic.

On an average weekday, the Mt Arthur Coal Mine Access Road carries approximately 3,000 vehicles/day, with peak hourly traffic of approximately 450 vehicles/hour. As this is the only vehicular access for the Mt Arthur Coal Mine, it follows that the Mine generates approximately 3,000 vehicles/day on weekdays. The weekday peak hourly traffic varied between 331 and 550 vehicles/hour. The morning peak hour typically occurred between 6.00 am and 7.00 am, with an average of 15% of the daily total traffic, while the evening peak hour typically occurred between 6.00 pm and 7.00 pm, with an average of 10% of the daily total traffic. These peaks reflect the existing shift arrangements at the Mt Arthur Coal Mine, with employees arriving just prior to the start of their shift and departing just after its conclusion.

It is noted that the surveyed daily traffic on Mt Arthur Coal Mine Access Road in 2012 was 275 vehicles/ day below that anticipated by Hansen Bailey (2009) to occur in 2011 (refer to Table 2.2), and 907 vehicles/day below that anticipated to occur in 2014. The surveyed volume in 2012 on Edderton Road of 1,011 vehicles/ day is 279 vehicles/day above that surveyed in 2008.

3.4.3 Traffic Composition

The classification of vehicles is based on the Austroads Vehicle Classification System, which is included in Attachment A. Light vehicles include motorcycles, cars, vans, 4-wheel drives, and utes (including those towing a trailer or caravan). Rigid vehicles include single unit trucks and buses with two, three or four axles and up to 14.5 m long. Articulated vehicles include semi-trailers and rigid trucks with trailers, B Doubles and road trains. Table 3.3 presents the surveyed composition of traffic on Edderton Road and the Mt Arthur Coal Mine access road.

Table 3.3: Existing Daily Traffic Composition on Edderton Road and Mt Arthur Coal Mine Access Road

	Edderton Road			Mt Arthur Coal Mine Access Road		
	Light	Rigid	Articulated	Light	Rigid	Articulated
Vehicles/Day						
Monday	906	86	8	2,668	247	61
Tuesday	844	87	10	2,598	303	168
Wednesday	917	130	12	2,697	234	166
Thursday	866	101	18	2,591	238	161
Friday	943	113	14	2,477	219	36
Saturday	571	40	11	1,036	75	38
Sunday	559	35	1	968	48	21
Average Weekday	895	103	12	2,606	248	118
Percent of Daily Traffic						
Monday	90.6	8.6	0.8	89.7	8.3	2.0
Tuesday	89.7	9.2	1.1	84.7	9.9	5.5
Wednesday	86.6	12.3	1.1	87.1	7.6	5.4
Thursday	87.9	10.3	1.8	86.7	8.0	5.4
Friday	88.1	10.6	1.3	90.7	8.0	1.3
Saturday	91.8	6.4	1.8	90.2	6.5	3.3
Sunday	93.9	5.9	0.2	93.3	4.6	2.0
Average Weekday	88.6	10.2	1.2	87.7	8.3	4.0

The survey results demonstrate that on the average weekday, traffic on Edderton Road is made up of 88.6% light vehicles, 10.2% rigid heavy vehicles, 1.2% articulated vehicles.

The Mt Arthur Coal Mine generates approximately 250 rigid heavy vehicle trips per day, and approximately 120 articulated vehicle trips per day. Light vehicles make up the majority of trips into and out of the mine on an average weekday, with approximately 2,600 vehicle trips per day. Overall, on an average weekday, 87.7% of the total Mt Arthur Coal Mine traffic is light vehicles, 8.3% is rigid heavy vehicles and 4% is articulated vehicles.

3.5 Road Safety

Road crash data has been sourced from RMS for the key roads in the vicinity of the Mt Arthur Coal Mine, including:

- Edderton Road between Denman Road and Golden Highway;
- Thomas Mitchell Drive between Denman Road and New England Highway; and
- Denman Road between Golden Highway and New England Highway.

The data is presented in full in Attachment B, and those sections of road of particular relevance to the Modification are discussed below.

3.5.1 Edderton Road

The RMS data for the period 1 October 2006 to 30 September 2011 showed 13 crashes along Edderton Road (excluding its intersections with Denman Road and Golden Highway). The reported crashes are summarised in Table 3.4. It is noted that these crash records pre-date the reduction in the speed limit on Edderton Road from 100 to 80 km/h. Eleven of the crashes occurred on that section of Edderton Road which has now had the speed limit reduced.

Table 3.4: Crashes on Edderton Road (Denman Road to Golden Highway)

Date and Time	Location	Crash Type and Degree	Factors/Conditions
7.00 Mon 26/9/11	3.3 km south of Denman Road	Northbound truck left the carriageway and struck a body of water – non-injury	Daylight Raining Wet road
21.45 Sat 22/8/09	4 km south of Denman Road	Southbound truck lost control on straight road – injury	Darkness Fine weather Dry road Fatigue
6.43 Wed 8/6/11	4 km south of Denman Road	Eastbound motorcycle left the carriageway on a bend and struck a tree/bush – injury	Dawn Fine weather Dry road
6.30 Tue 12/8/08	5 km south of Denman Road	Southbound car left the carriageway on a bend and struck a drain/culvert – injury	Dawn Fine weather Dry road Speed Fatigue
16.30 Wed 5/12/07	6 km south of Denman Road	Northbound overtaking ute struck rear of northbound truck – injury	Daylight Fine weather Dry road
7.00 Sat 12/4/08	6 km south of Denman Road	Southbound truck left the carriageway and struck a drain/culvert – injury	Dawn Fine weather Dry road Speed Fatigue
21.40 Sat 16/10/10	7 km south of Denman Road	Southbound car left the carriageway and struck a fence – non-injury	Darkness Fine weather Dry road
20.45 Thu 4/8/11	8 km south of Denman Road	Northbound ute left the carriageway and struck a tree/bush – fatal	Darkness Fine weather Dry road Fatigue

Date and Time	Location	Crash Type and Degree	Factors/Conditions
12.45 Tue 3/7/07	9 km south of Denman Road	Southbound truck left the carriageway and struck a drain/culvert – Injury	Daylight Fine weather Dry road Fatigue
11.30 Wed 25/11/09	8.8 km north of Golden Highway	Northbound truck left the carriageway on a bend and struck a tree/bush – non-injury	Daylight Fine weather Dry road
19.10 Wed 6/7/11	8 km north of Golden Highway	Southbound car on the incorrect side of the road (not overtaking) struck a northbound truck head on – injury	Darkness Fine weather Dry road
14.30 Sat 14/2/09	3.38 km north of Golden Highway	Southbound truck on the incorrect side of the road (not overtaking) struck a northbound truck head on – injury	Daylight Raining Wet road
7.30 Tue 22/7/10	2 km north of Golden Highway	Southbound truck on the incorrect side of the road (not overtaking) struck a northbound truck head on – non-injury	Daylight Fine weather Dry road Fatigue

Nine of the crashes on Edderton Road involved single vehicles, and two crashes occurred in wet weather conditions. Fatigue was noted as a contributing factor in six of the crashes, and two of these also noted speed as a contributing factor. The single vehicle crashes typically involved a vehicle leaving the carriageway and then striking an object.

3.5.2 Thomas Mitchell Drive

The RMS data for the period 1 October 2006 to 30 September 2011 showed 25 crashes along Thomas Mitchell Drive (excluding its intersections with Denman Road and New England Highway). The reported crashes on that portion of Thomas Mitchell Drive between Mt Arthur Coal Mine Access Road and Denman Road are summarised in Table 3.5.

Table 3.5: Crashes on Thomas Mitchell Drive (Denman Road to Mt Arthur Coal Mine Access Road)

Date and Time	Location	Crash Type and Degree	Factors/Conditions
21.30 Sun 7/6/09	15 m east of Enterprise Crescent	Northbound car in Enterprise Crescent left the carriageway and struck a fence – non-injury	Darkness Overcast Dry road
12.10 Mon 15/12/08	220 m north of Blakefield Road	Northbound truck struck a stationary northbound truck in rear end – injury	Daylight Fine weather Dry road
6.10 Fri 3/7/09	50 m north of Carramere Road	Southbound van struck the rear left of a southbound car turning left – non-injury	Dawn Fine weather Dry road
6.50 Mon 31/1/11	At Carramere Road	Northbound truck turning right struck a southbound car – injury	Daylight Fine weather Dry road
7.15 Sat 26/6/10	120 m south of Glen Munro Road	Southbound car on incorrect side of the road (not overtaking) struck a northbound truck – injury	Daylight Overcast Wet road Fatigue
9.45 Mon 23/5/11	330 m south of Glen Munro Road	Southbound truck doing a U turn struck in rear by southbound truck – injury	Daylight Fine weather Dry road

Date and Time	Location	Crash Type and Degree	Factors/Conditions
7.45 Thu 20/5/10	1.2 km south of Carramere Road	Westbound truck struck rear end of stationary westbound 4WD and semitrailer – injury	Daylight Fine weather Dry road
21.10 Sat 30/8/08	100 m west of Mt Arthur Coal Mine Access Road	Westbound 4WD struck straying stock on the carriageway – injury	Darkness Fine weather Dry road
15.15 Thu 27/9/07	At Mt Arthur Coal Mine Access Road	Northbound car in Mt Arthur Coal Mine Access Road struck rear end of stationary northbound truck in Mt Arthur Coal Mine Access Road – non-injury	Daylight Fine weather Dry road

In contrast to Edderton Road, the majority of crashes on this portion of Thomas Mitchell Drive involved two or more vehicles. There are no locations in which more than one crash occurred.

Data for the remaining section of Thomas Mitchell Drive between the Mt Arthur Coal Mine Access Road and New England Highway is presented in Attachment B, noting that there was a concentration of ten crashes over the western end of Thomas Mitchell Drive within approximately 500 m of New England Highway. With one exception, these crashes involved a single vehicle leaving the carriageway on a bend. The remaining crash was a head-on crash in which a vehicle which was not overtaking struck a stationary vehicle.

3.5.3 Denman Road

The RMS data for the period 1 October 2006 to 30 September 2011 showed 13 crashes along Denman Road between Thomas Mitchell Drive and the location of the proposed future intersection of Edderton Road (approximately 2.5 km west of the existing intersection of Edderton Road, refer to Section 2.3). The reported crashes on that portion of Denman Road are summarised in Table 3.6.

Table 3.6: Crashes on Denman Road (Thomas Mitchell Drive to West of Edderton Road)

Date and Time	Location	Crash Type and Degree	Factors/Conditions
6.20 Thu 8/1/09	At Thomas Mitchell Drive	Northbound car turning right struck a southbound motorcycle – injury	Daylight Fine weather Dry road
3.50 Fri 26/1/07	At Bengalla Road	Southbound car in Bengalla Road ran off end of the carriageway at t-junction struck a fence – non-injury	Darkness Fine weather Dry road Fatigue
14.45 Wed 22/6/11	Bengalla Road 8 m North of Denman Road	Westbound articulated tanker turning right lost control – injury	Daylight Fine weather Dry road Speed
8.25 Wed 23/5/07	1 km West of Thomas Mitchell Drive	Westbound car on the incorrect side of the road (not overtaking) struck an eastbound car head-on – injury	Daylight Fine weather Dry road Fatigue
8.00 Fri 7/8/09	500 m West of Bengalla Road	Eastbound truck struck rear end of an eastbound car waiting to turn right – injury	Daylight Fine weather Dry road
18.10 Tue 29/7/08	1 km West of Bengalla Road	Westbound car struck an animal on the carriageway – injury	Darkness Fine weather Dry road

Date and Time	Location	Crash Type and Degree	Factors/Conditions
18.45 Sat 26/3/11	1 km West of Bengalla Road	Westbound car left the carriageway and struck a tree/bush – injury	Darkness Fine weather Dry road Speed
19.40 Tue 15/9/09	990 m North of Edderton Road	Southbound car struck a pedestrian walking across the carriageway – injury	Darkness Fine weather Dry road
7.10 Mon 15/10/07	2 km East of Edderton Road	Westbound truck struck a westbound truck veering left and a stationary ute rear end – injury	Daylight Fine weather Dry road
7.08 Tue 19/4/11	At Edderton Road	Northbound truck in Edderton Road left the end of the carriageway at the t-junction and struck a drain/culvert	Dawn Fog or mist Wet road
15.55 Tue 8/6/10	5 km West of Bengalla Road	Westbound truck turning right struck an eastbound car - non-injury	Daylight Fine weather Dry road
0.15 Sat 3/7/10	700 m West of Edderton Road	Eastbound car left the carriageway and struck a utility pole – injury	Darkness Overcast Dry road Speed
2.00 Sat 16/2/08	1 km West of Edderton Road	Westbound truck left the carriageway on a bend and struck a fence – injury	Darkness Fine weather Dry road Speed

Of the 13 crashes, 7 were single vehicle incidents which typically involved a vehicle leaving the carriageway and striking an object. Only one crash occurred at the intersection of Denman Road with Edderton Road, which was a single vehicle crash.

4. Other Developments in the Region

A key aspect of the traffic assessment of the Modification will be the cumulative traffic impacts of the Modification with other planned mining activity in the region and more specifically in the Muswellbrook area. Recent approvals and applications made to the NSW Department of Planning and Infrastructure for mining projects in the region have been reviewed and are described below, in the context of their potential road transport implications.

This review focuses on the roads of relevance to the Modification, i.e. the roads on which the Modification is expected to directly alter traffic volumes. The main roads potentially impacted by the Modification (Sections 2.5 and 2.6) are Edderton Road; Denman Road between Edderton Road and Thomas Mitchell Drive; and Thomas Mitchell Drive.

4.1 Mount Pleasant Project

The Mount Pleasant Project is located approximately 4 km north-west of Muswellbrook. The Mount Pleasant Project was approved in 1999 for extraction of approximately 197 million tonnes of ROM coal at rates up to 10.5 Mtpa over a 21 year period. The Mount Pleasant Project is located immediately to the north of the Bengalla Coal Mine. The Mt Arthur Coal Mine is farther to the south, separated from the Bengalla Coal Mine and Mount Pleasant Mine by the Hunter River and Denman Road. The Mount Pleasant Project, owned by Rio Tinto Coal Australia , has not commenced mining operations.

The Environmental Impact Statement (EIS) for the initial Mount Pleasant Project Approval (ERM Mitchell McCotter, 1997) found the following with regard to the traffic and transport characteristics of the project:

- all coal would be moved by rail;
- peak operational workforce of 380 employees including administration staff;
- employees would use 314 cars to travel to and from the site, i.e. 628 vehicle trips per day;
- deliveries would bring 20 light vehicles and 10 heavy vehicles to the site each day, i.e., 60 vehicle trips per day; and
- traffic distribution assumes 66% to/from the south via Bengalla Link Road, 27% to/from the north via Mount Pleasant Western Link Road, and 7% to/from the west via Wybong Road and Roxburgh Road.

The assessment used a computer network model to distribute traffic associated with the Mount Pleasant Mine and other developments in the area. Based on the distribution presented by ERM Mitchell McCotter (1997), the traffic generated by the Mount Pleasant Mine peak operations would use the roads of relevance to the Modification as presented in Table 4.1.

Table 4.1: Daily Operational Mount Pleasant Mine Traffic (vehicles/day)

Road	Location	Percent	Light	Heavy
Bengalla Link Road	Thomas Mitchell Drive intersection	66%	440	14
Thomas Mitchell Drive	West of Mt Arthur Coal Mine Access Road	25%	166	6
Thomas Mitchell Drive	East of Mt Arthur Coal Mine Access Road	25%	166	6
Denman Road	North of Thomas Mitchell Drive	38%	254	8
Denman Road	South of Thomas Mitchell Drive	63%	420	14
Denman Road	South of Bengalla Link Road	3%	20	0
Denman Road	South of Edderton Road	0%	0	0
Edderton Road	South of Denman Road	3%	20	0

The assessment identified intersections which may require upgrading to provide sufficient capacity. Many of these upgrades have since occurred, however it is noted that the intersection of Denman Road and Edderton Road was identified as requiring upgrade to provide auxiliary lanes as a result of the cumulative impacts of the Mount Pleasant, Bengalla and Dartbrook Coal Mines. Details of the auxiliary lane requirements were not specified, however the traffic distribution presented assumed the Mount Pleasant Project would contribute additional traffic turning left into Edderton Road and right out of Edderton Road.

A Modification to the Mount Pleasant Mine (Mount Pleasant Modification) was approved in September 2011, which involved:

- providing indicative infrastructure areas for siting the approved mine infrastructure as detailed in the original EIS (including haul roads);
- providing an optional conveyor/service corridor between the Mount Pleasant Project area and the adjoining Bengalla Coal Mine to the south and using the Bengalla Coal Mine's rail facilities as an alternative to building and using the approved rail line and loop and loader facilities;
- extending the life of the Development Consent by two years until 31 December 2022; and
- modifying the existing Development Consent boundary to accommodate these changes.

The Mount Pleasant Modification is not expected to make any additional significant contribution to local traffic conditions above that already allowed for in the original approval. The extension of the life of the mine would result in continuation of its existing traffic generation for two additional years during 2021 and 2022.

Despite having these approvals, mining operations have generally not commenced at the Mount Pleasant Mine. In 2004, the Development Consent was physically commenced by way of Stage 1 construction works, with some additional work undertaken in 2005. It has recently been reported[2] that the decision about the future of the mine will not be made until 2013. It has previously been speculated that the project will not proceed, although Rio Tinto Coal Australia has expressed confidence that it will proceed at some time.

[2] 1233 ABC Newcastle "Mt Pleasant sidelined until next year" http://www.abc.net.au/news/2012-08-15/pleasant-2013/4199764/?site=newcastle David Marchese, 15 August 2012

The assessment for the Mount Pleasant Modification (EMGA Mitchell McLennan, 2010) anticipated that construction would commence in mid to late 2011, with extraction of ROM coal commencing in mid to late 2013. With the delay on the decision about the future of the mine until sometime in 2013 at the earliest, it is unlikely that construction would commence before 2014, with extraction of ROM coal unlikely to proceed until at least 2016. It is noted that the peak operations are not expected to occur until Year 13 of the project, which would not occur until 2026 assuming commencement in 2014.

4.2 Bengalla Coal Mine

The Bengalla Coal Mine is located immediately to the south of the Mount Pleasant Mine, and north of the Mt Arthur Coal Mine. It is separated from Mt Arthur Coal Mine by the Hunter River and Denman Road. The Bengalla Coal Mine is an open cut mine, with mining activity conducted 24 hours per day, seven days per week. It employs approximately 400 full time workers. Coal processing is conducted on-site, and product coal is transported by rail to the Port Waratah Coal Loader, with lesser amounts railed directly to local Macquarie Generation power stations. All access to the Bengalla Coal Mine administration area is via the Bengalla Access Road and Bengalla Link Road.

Modification 3 was approved in 2008, which involved realignment and construction of Bengalla Link Road Stage 2 and the deferral of the relocation of the ROM coal hopper. The Bengalla Link Road Stage 2 was a component of the Muswellbrook Western Roads Strategic Traffic Study (Muswellbrook Shire Council, 1997) which determined the required road network to the west of Muswellbrook to accommodate proposed mining developments in the area.

4.2.1 Wantana Extension

In October 2011, the Wantana Extension at the Bengalla Coal Mine was approved. The Wantana Extension involved the acceleration of mining activity within the Wantana Extension area at a rate of 2.5 Mtpa ROM coal (increased from the previously approved 1.5 Mtpa) to align the Wantana Extension operations with the main mining area at Bengalla Coal Mine. The acceleration of mining in the Wantana Extension area will be undertaken within the maximum previously approved production rate of 10.7 Mtpa ROM coal.

The approved Wantana Extension does not involve any change to the number of employees, hours of operation, life of the mine, maximum annual ROM coal production rates, mining methods or equipment fleet. The Wantana Extension would therefore not result in any changes to the traffic environment beyond that already occurring due to ongoing operations at Bengalla Coal Mine.

4.2.2 Bengalla Continuation Project

In March 2012, DGRs were issued for the proposed Bengalla Continuation Project. The proposed Bengalla Continuation Project is described in the Background Document (Hansen Bailey, 2012) submitted as part of the application:

- open cut coal mining at up to 15 Mtpa ROM coal for a further 24 years, continuing to utilise a dragline and truck / excavator fleet;
- continued mining to the west of current operations;
- an additional Overburden Emplacement Area to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;

- processing, handling and transportation of coal via the existing CHPP (to be upgraded) and rail loop for export and domestic sale;
- an additional CHPP coal stockpile and ROM coal stockpile;
- continued use, expansion and upgrades to existing site infrastructure;
- construction of a radio tower;
- relocation of the explosives magazine and reload facility;
- relocation of a section of Bengalla Link Road near the existing mine access road to enable coal extraction;
- diversion of Dry Creek via dams and pipe work with a later permanent realignment of Dry Creek through rehabilitation areas once stability is established;
- relocation of water storage infrastructure as mining progresses through existing dams (including the staged discharge dam);
- construction of raw water dams and a clean water dam;
- a workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production; and
- supporting power reticulation infrastructure.

The Bengalla Continuation Project is expected to be generally consistent with the existing operations at Bengalla Coal Mine (as modified). With regard to road traffic implications, the following is noted:

- Additional parking for heavy and light vehicles is proposed.
- All access to Bengalla Coal Mine would remain via the existing Bengalla Access Road off Bengalla Link Road. An alternative access road may be designed following infrastructure modifications if required. The access road would be used for emergency entry and exit.
- A 6 km section of Bengalla Link Road would be realigned in the south-west corner of Bengalla Coal Mine. The realigned road would be designed in accordance with RMS requirements for a typical two-way/two-lane rural road with a nominal speed limit of 100 km/h.
- The Bengalla Continuation Project would require approximately 900 full time equivalent personnel.
- Additional contractors and construction personnel would also be required.
- Maintenance activities, deliveries, coal processing, coal transport and mining operations will continue to be conducted 24 hours per day, seven days per week.
- All product coal would continue to be moved by rail.

Hanson Bailey (2012) foresees a minor increase in local traffic flows, primarily noticeable during shift change times along Thomas Mitchell Drive, Denman Road and Bengalla Road during the construction and operational phases of the Bengalla Continuation Project. Management of traffic would be required as part of the realignment of Bengalla Link Road. It notes that Bengalla Link Road provides access from Denman Road to both Mangoola Coal Mine (refer to Section 4.3) and Mount Pleasant Mine (refer to Section 4.1), and beyond to Sandy Hollow.

It is understood that DC Traffic Engineering will prepare an assessment of the road traffic implications of the Continuation.

4.3 Mangoola Coal Mine

Mangoola Coal Mine is an open cut coal mine, previously known as Anvil Hill Mine. It is located near Wybong, approximately 20 km west of Muswellbrook, and approximately 10 km north of Denman. It has its vehicular access to and from Wybong Road.

A modification to Mangoola Coal Mine (Mangoola Modification) was approved in June 2012, which relates to redesign of the mine plan and staging associated with the relocation of the 500 kilovolt electricity transmission line; water management and other ancillary changes resulting from the redesigned mine plans; temporary ROM coal stockpile; construction of a noise wall in the rail loop area; and minor changes to the approved project disturbance area.

The Modification is expected to increase operational employee traffic by 120 vehicle trips per day (Parsons Brinckerhoff, 2010). The assessment does not provide details on the expected increase in operational heavy vehicle trips, so for the purpose of this assessment, it is assumed to be equivalent to 15% of the additional light vehicle trips per day (based on the Bengalla Continuation Project assessment, Parsons Brinckerhoff, 2007).

The peak construction activity is expected to generate approximately 360 vehicle trips per day, and the average would be 205 vehicle trips per day over the 11 month construction period. The majority of the construction traffic would be generated by the 50 additional employees, estimated to generate four vehicle trips per day per employee.

No significant impact on traffic is expected as a result of the construction phase, with no resulting change to the road network's performance or to road safety. Mitigation and management measures are proposed to minimise potential impacts, including restricting road closures to off-peak hours, minimising the number of road closures, using variable message signage to inform drivers in advance, and excluding heavy vehicle movements during school bus operating times.

The depot for construction activity is to be located in the industrial estate on Thomas Mitchell Drive. During site establishment, up to 30 semi-trailer loads of specialised plant and equipment, stores and containers will be delivered to the depot. With the upgrading to be undertaken as part of the Consolidation Project Approval, the intersection of Denman Road and Thomas Mitchell Drive is expected to operate satisfactorily.

Table 4.2 summarises the estimated daily traffic generation of the approved Mangoola Modification on an average day during construction, and during the operational phase.

Table 4.2: Estimated Mangoola Modification Daily Traffic Generation (vehicles/day)

Road	Location	Construction		Operational	
		Light	Heavy	Light	Heavy
Mangoola Access Road	Off Wybong Road	200	5	120	18
Thomas Mitchell Drive	West of Mt Arthur Coal Mine	70	5	42	6
Thomas Mitchell Drive	West of New England Highway	70	5	42	6
Denman Road	North of Thomas Mitchell Drive	118	0	70	10
Denman Road	South of Thomas Mitchell Drive	188	5	112	16
Denman Road	South of Edderton Road	12	0	8	2
New England Highway	South of Muswellbrook town	0	0	0	0
New England Highway	Ravensworth	70	0	42	6
Edderton Road	South of Denman Road	0	0	0	0
Edderton Road	North of Golden Highway	0	0	0	0

4.4 Drayton Coal Mine

Drayton Coal Mine is an open-cut mine, located approximately 13 km to the south of Muswellbrook, to the east of Mt Arthur Coal Mine. It uses one dragline, excavators and a significant truck fleet and has approximately 300 employees. Vehicular access is to and from Thomas Mitchell Drive.

The Drayton Coal Mine obtained a mine extension approval in February 2008, which extends the mine's life to 2017 and increases the approved tonnage to 8 Mtpa. This approval required the development of various management plans and commissioning of new infrastructure.

An extension of the approved Drayton Coal Mine disturbance footprint by 7.5 hectares (ha) was approved in 2009, with the addition of 12 ha of land to the Drayton Wildlife Refuge.

In 2012, a modification was approved (Drayton Modification) which allows the emplacement of raw tailing within the East Pit Void instead of the previously approved co-disposed dry tailings product, and the construction and operation of an explosives storage facility. The site operations for the Drayton Modification would be generally in accordance with the previous approvals, with no increase in road or rail traffic movements. The Drayton Modification would result in a reduction in travel distances for the explosives supply vehicles, as these will be supplied directly to Drayton Coal Mine, rather than via Mt Arthur Coal Mine. No impacts to the transport networks would result from the approved Drayton Modification.

An application was lodged in February 2012 seeking to increase the area of approved mining operations and modify the approved equipment fleet. This application has since been withdrawn.

The Drayton Coal Mine is therefore expected to cease operating in approximately 2017, however the mining rate has been higher than predicted and current resources are expected to be exhausted by 2015. It is however expected to be replaced by the Drayton South Coal Project (refer to Section 4.5).

4.5 Drayton South Coal Project

An Environmental Assessment (November 2012) has been lodged for the Drayton South Coal Project. The Drayton Coal Mine's current approval expires in 2017 (refer to Section 4.4). The Drayton South Coal Project will be a replacement for the existing Drayton Coal Mine, and produce coal predominantly for the export market. The Drayton South Coal Project will deliver continued employment for up to 500 Drayton Coal Mine employees.

The Drayton South Coal Project proposes the development of an open cut and highwall mining operation extracting up to 7 Mtpa of ROM coal over 26 years. The existing Drayton Coal Mine infrastructure and workforce would be used. An internal transport corridor would be constructed between the Drayton South Coal Project and Drayton Coal Mine, using either haulage trucks or a conveyor to transport coal internally. The Antiene Rail Spur off the Main Northern Railway would be used to transport product coal to the Port of Newcastle for export. The Drayton Coal Mine would continue to operate in accordance with its existing approval, and there would be a period when Drayton Coal Mine and Drayton South Coal Project operate concurrently.

A 7 km realignment of Edderton Road is proposed around the western extent of the Drayton South Coal Project, of which 4 km is located within that Project Boundary and 3 km is located within land owned by HVEC. The realigned road would be constructed to RMS design requirements, and designed in consultation with Muswellbrook Shire Council. The realigned Edderton Road would intersect with Golden Highway at a new intersection some 3 km to the west of the existing intersection, on the western side of Saddlers Creek.

The Drayton South Coal Project would utilise the existing Drayton Coal Mine workforce, with the hours of operation (24 hours, seven days) to remain unchanged. The traffic and transport assessment for the Drayton South Project (DC Traffic Engineering, 2012) indicates that all vehicular access to the Project would be via the existing Drayton Coal Mine access road off Thomas Mitchell Drive and would use the internal transport corridor to travel between Drayton Coal Mine and Drayton South Coal Project. An emergency entry/exit would be developed off Edderton Road for health and safety purposes, which would not be used on a day-to-day basis.

Edderton Road would however be used by 10 to 15 employees per day during the construction works associated with the realignment of Edderton Road. All other construction access to the Drayton Coal Mine and Drayton South Coal Project sites would be via the existing Drayton Coal Mine from Thomas Mitchell Drive. Construction roads would be created internally to provide access to work fronts as required. Construction materials for the road realignment would be sourced from within the existing Drayton Coal Mine site and the Drayton South Coal Project area, and the existing quarry within the site would be re-established.

It is expected that road transport implications of the Drayton South Coal Project (above existing levels) would be limited to the construction phase of the project only, with the movement of the construction workforce and heavy vehicles to and from the site via Thomas Mitchell Drive.

4.6 Cumulative Impacts of Other Developments

Traffic associated with existing and approved operations at the Bengalla Wantana Extension, Drayton Coal Mine and Mangoola Coal Mine are included in background traffic surveys and the forecasts prepared for the Consolidation Project assessment (Hansen Bailey, 2009), therefore they are not analysed further. However, this review indicates that it is expected that numerous other major developments will generate additional traffic on the roads of relevance to the Modification above that surveyed in 2012 or considered in the assessment of the Consolidation Project. The timing of the various major developments will impact the overall cumulative impacts over time. The timing of the developments is generally uncertain, as approval for a development does not necessarily indicate that it will proceed at any particular time. For the purpose of this assessment, the following assumptions are made with regard to the cumulative impacts of other developments in the region at the times relevant to the Modification:

- Mount Pleasant Mine and Modification – operational in 2016 and onwards.
- Bengalla Wantana Extension – operational since 2011/12, but will not impact on the external road system (not included in the cumulative impacts assessment).
- Bengalla Continuation Project – at preliminary planning stage only (not included in the cumulative impacts assessment).
- Mangoola Modification – construction in 2014 (conservatively assumed to coincide with the Modification construction activity for robust assessment), and operational thereafter.
- Drayton Modification – no impacts on surrounding road network (not included cumulative impacts assessment).
- Drayton Coal Mine and Drayton South Coal Project – Drayton Coal Mine ceases operations in 2015, however no reduction in traffic is assumed in the cumulative assessment, as similar traffic volumes may transfer to the Drayton South Coal Project, which is not specifically included in the cumulative assessment.

Other projects in the Hunter Valley have not been specifically addressed, rather they are represented by the background traffic growth (refer to Section 5.1). The future scenarios under consideration are therefore as follows, in addition to the traffic conditions forecast for the approved Consolidation Project.

Modification Scenario 1 – Construction in 2014

- Modification peak construction traffic (Table 2.3).
- Mangoola Modification average construction day traffic (Table 4.2).
- Background non-specific growth to 2014.

Modification Scenario 2 – Operational in 2019

- Latest possible time horizon prior to realignment of Edderton Road.
- Modification operational traffic (Table 2.4).
- Mount Pleasant Mine operational traffic (Table 4.1).
- Mangoola Modification operational traffic (Table 4.2).
- Background non-specific growth to 2019.

Modification Scenario 3 – Operational in 2022

- Represents currently approved end of life of Mt Arthur Coal Mine.
- Modification operational traffic (Table 2.4).
- Mount Pleasant Mine operational traffic (Table 4.1).
- Mangoola Modification operational traffic (Table 4.2).
- Background non-specific growth to 2022.

Modification Scenario 4 – Operational in 2026

- Represents proposed end of life of Mt Arthur Coal Mine.
- Scenario 3 with additional non-specific growth to 2026 and Modification operational traffic (Table 2.4).

5. Future Traffic Conditions

5.1 Background Traffic Growth

Over time, traffic can be expected to grow in addition to the increases expected to result from the specific developments discussed in Section 4. Table 3.1 demonstrates how traffic on the RMS roads has varied from 1992 to 2010, which indicates that traffic volumes have generally increased gradually, with some fluctuations. It is noted that the Muswellbrook Western Roads Strategic Study applied an annual growth rate of 1.5% to background traffic, and that the Consolidation Project assessment assumed varying growth rates for different roads as advised by RMS:

- Thomas Mitchell Drive 2%;
- Denman Road 2%;
- New England Highway north of Thomas Mitchell Drive 0.2%; and
- New England Highway south of Thomas Mitchell Drive -0.7%.

Based on the background traffic volumes presented for the Consolidation Project, forecasts for the future scenarios of relevance to the Modification have been extrapolated. These are presented in Table 5.1 and include traffic changes associated with background growth, the approved Consolidation Project (ceasing in 2022), the Drayton Coal Mine (approved 2008), Bengalla Wantana Extension (approved 2008) and Mangoola Coal Mine (approved 2007). Non-specific growth on Edderton Road is assumed to be 2% per annum above the volumes surveyed in 2012.

Table 5.1: Background Growth in Daily Traffic (vehicles/day)

Road	Location	2014[A]	2019[A]	2022	2026
Thomas Mitchell Drive	West of Mt Arthur Coal Mine	6,482	6,994	7,328	7,773
Thomas Mitchell Drive	East of Mt Arthur Coal Mine	3,918	4,215	4,408	4,665
Denman Road	North of Thomas Mitchell Drive	9,406	10,198	10,716	11,406
Denman Road	South of Thomas Mitchell Drive	5,046	5,508	5,811	6,215
New England Highway	South of Muswellbrook	12,464	12,588	12,663	12,763
New England Highway	Ravensworth	12,633	12,231	11,998	11,687
Edderton Road[B]	South of Denman Road	1,051	1,153	1,213	1,294

[A] Source: Hansen Bailey (2009) except Edderton Road.
[B] Surveyed 2012 volumes with 2% per annum growth.

5.2 Future Daily Traffic Volumes

Table 5.2 presents the resulting two-way traffic volumes with and without the proposed Modification. It is noted that these forecasts are based on those developed by Hansen Bailey (2009) for the approved Consolidation Project, rather than the surveyed traffic generation of the Mt Arthur Coal Mine. The recent surveys indicate that the daily traffic generation of the Mt Arthur Coal Mine of 2,973 vehicles/day (Table 3.2) is 275 and 907 vehicles/day fewer than that forecast by Hansen Bailey to occur in 2011 and 2014, respectively. The forecasts are therefore considered to over-estimate the likely traffic volume conditions at a given time.

Table 5.2: Daily Traffic Volumes With and Without Modification (vehicles/day)

Road and Location	Year 2014			Year 2019			Year 2022			Year 2026		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
No Modification												
Mt Arthur Coal Mine Access Road West of Thomas Mitchell Drive	3,577	303	3,880	3,577	303	3,880	3,577	303	3,880	-	-	-
Thomas Mitchell Drive West of Mt Arthur Coal Mine	5,779	778	6,557	6,358	856	7,214	6,649	899	7,548	-	-	-
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	3,281	712	3,993	3,741	784	4,525	3,896	822	4,718	-	-	-
Denman Road North of Thomas Mitchell Drive	8,579	945	9,524	9,654	1,058	10,712	10,117	1,113	11,230	-	-	-
Denman Road South of Thomas Mitchell Drive	4,446	793	5,239	4,775	881	5,656	5,030	929	5,959	-	-	-
Denman Road South of Edderton Road	4,270	788	5,058	4,651	867	5,518	4,906	915	5,821	-	-	-
New England Highway South of Muswellbrook town	10,566	1,898	12,464	10,692	1,916	12,608	10,756	1,927	12,683	-	-	-
New England Highway Ravensworth	10,834	1,869	12,703	10,485	1,814	12,299	10,287	1,779	12,066	-	-	-
Edderton Road South of Denman Road	931	120	1,051	1,022	131	1,153	1,075	138	1,213	-	-	-
Edderton Road North of Golden Highway	931	120	1,051	1,022	131	1,153	1,075	138	1,213	-	-	-
With Modification												
Mt Arthur Coal Mine Access Road West of Thomas Mitchell Drive	3,577	303	3,880	3,505	289	3,794	3,505	289	3,794	3,505	289	3,794
New Mt Arthur Coal Mine Access Road East of Edderton Road	40	8	48	72	14	86	72	14	86	72	14	86
Thomas Mitchell Drive West of Mt Arthur Coal Mine	5,779	778	6,557	6,312	870	7,182	6,603	913	7,516	6,991	970	7,961
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	3,281	712	3,993	3,715	784	4,499	3,870	822	4,692	4,077	872	4,949
Denman Road North of Thomas Mitchell Drive	8,603	949	9,552	9,654	1,058	10,712	10,117	1,113	11,230	10,735	1,185	11,920
Denman Road South of Thomas Mitchell Drive	4,470	797	5,267	4,813	895	5,708	5,068	943	6,011	5,409	1,006	6,415
Denman Road South of Edderton Road	4,272	788	5,060	4,651	867	5,518	4,906	915	5,821	5,247	978	6,225
New England Highway South of Muswellbrook town	10,566	1,898	12,464	10,692	1,916	12,608	10,756	1,927	12,683	10,840	1,943	12,783
New England Highway Ravensworth	10,848	1,873	12,721	10,485	1,814	12,299	10,287	1,779	12,066	10,023	1,732	11,755
Edderton Road South of Denman Road	957	124	1,081	1,068	145	1,213	1,121	152	1,273	1,192	162	1,354
Edderton Road North of Golden Highway	945	124	1,069	1,048	131	1,179	1,101	138	1,239	1,172	148	1,320

The "No Modification" scenario has not been assessed for the 2026 scenario, due to the difficulty in accurately identifying the contribution of the existing Mt Arthur Coal Mine traffic on the surrounding road system. This scenario is presented to provide an indication of the operating conditions with the proposed extension of the life of the mine by four years combined with the relocation of the explosives storage facility.

Table 5.2 demonstrates that during the currently approved operating life of the Mt Arthur Coal Mine, the Modification would result in:

- additional 30 and 60 vehicles/day on Edderton Road between Denman Road and the new access during construction and operational phases respectively;
- additional 18 and 26 vehicles/day on Edderton Road between Golden Highway and the new access during construction and operational phases respectively;
- additional 28 and 52 vehicles/day on Denman Road between Thomas Mitchell Drive and Edderton Road during construction and operational phases respectively;
- no change in traffic volumes on Thomas Mitchell Drive during the construction phase; and
- decrease of 26 and 32 vehicles/day on Thomas Mitchell Drive to the east and west of the Mt Arthur Coal Mine Access Road during the operational phase.

5.3 Future Peak Hourly Traffic Volumes

Due to shift arrangements, it is likely that the increases in light vehicle traffic as a result of the Modification would occur during distinct short peaks at the shift changeover times. Heavy vehicle trips associated with the explosives deliveries to the new facility and construction deliveries would tend to be spread throughout the day, and thus the additional trips in any one hour would be very low and within the day-to-day variations which would be expected to occur regardless of the Modification. Table 5.3 presents the estimated peak hourly traffic with and without the Modification. This assumes that without the Modification, the peak hour volume would be equivalent to 10% of the daily volume, which is consistent with the typical range. As a robust assessment, and to reflect the fluctuations in employee-based traffic which makes up the majority of the traffic which would transfer from the existing access road to the new explosives magazine and storage facility access road, the Modification traffic is assumed to travel within the on-street peak hours, with half of the daily traffic travelling within each of the morning and evening peak hours.

Table 5.3: Peak Hour Traffic Volumes With and Without Modification (vehicles/hour)

Road	Year 2014			Year 2019			Year 2022			Year 2026		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
No Modification												
Mt Arthur Coal Mine Access Road West of Thomas Mitchell Drive	358	30	388	358	30	388	358	30	388	-	-	-
Thomas Mitchell Drive West of Mt Arthur Coal Mine	578	78	656	636	86	721	665	90	755	-	-	-
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	328	71	399	374	78	453	390	82	472	-	-	-
Denman Road North of Thomas Mitchell Drive	858	95	952	965	106	1,071	1,012	111	1,123	-	-	-
Denman Road South of Thomas Mitchell Drive	445	79	524	478	88	566	503	93	596	-	-	-
Denman Road South of Edderton Road	427	79	506	465	87	552	491	92	582	-	-	-
New England Highway South of Muswellbrook town	1,057	190	1,246	1,069	192	1,261	1,076	193	1,268	-	-	-
New England Highway Ravensworth	1,083	187	1,270	1,049	181	1,230	1,029	178	1,207	-	-	-
Edderton Road South of Denman Road	93	12	105	102	13	115	108	14	121	-	-	-
Edderton Road North of Golden Highway	93	12	105	102	13	115	108	14	121	-	-	-
With Modification												
Mt Arthur Coal Mine Access Road West of Thomas Mitchell Drive	328	71	399	322	23	345	322	23	345	322	23	345
New Mt Arthur Coal Mine Access Road East of Edderton Road	20	4	24	36	7	43	36	7	43	43	7	43
Thomas Mitchell Drive West of Mt Arthur Coal Mine	578	78	656	613	93	705	642	97	739	681	103	783
Thomas Mitchell Drive East of Mt Arthur Coal Mine Access Road	328	71	399	361	78	440	377	82	459	397	87	485
Denman Road North of Thomas Mitchell Drive	870	97	966	965	106	1,071	1,012	111	1,123	1,074	119	1,192
Denman Road South of Thomas Mitchell Drive	457	81	538	497	95	592	522	100	622	556	106	662
Denman Road South of Edderton Road	428	79	507	465	87	552	491	92	582	525	98	623
New England Highway South of Muswellbrook town	1,057	190	1,246	1,069	192	1,261	1,076	193	1,268	1,084	194	1,278
New England Highway Ravensworth	1,090	189	1,279	1,049	181	1,230	1,029	178	1,207	1,002	173	1,176
Edderton Road South of Denman Road	106	14	120	125	20	145	131	21	151	138	22	159
Edderton Road North of Golden Highway	100	14	114	115	13	128	121	14	134	128	15	142

5.4 Roadway Capacity

Austroads (2009) provides guidelines for the capacity of two lane, two-way rural roads, which in turn refers to the *Highway Capacity Manual* (Transportation Research Board [TRB], 2000). The capacity of a road is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions. The capacity of a single traffic lane will be affected by factors such as the pavement width and restricted lateral clearances, the presence of heavy vehicles and grades.

Level of Service is defined as a qualitative measure describing the operational conditions within a traffic stream as perceived by drivers and/or passengers. A Level of Service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. Level of Service A provides the best traffic conditions, with no restriction on desired travel speed or overtaking. Level of Service B to D describes progressively worse traffic conditions. Level of Service E occurs when traffic conditions are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre in the traffic stream. The service flow rate for Level of Service E is taken as the capacity of a lane or roadway. Level of Service D is generally accepted as the limit of acceptable operation, beyond which measures to provide additional capacity or reduce demand may be warranted.

TRB (2000) and Austroads (2009) present a guide to the Levels of Service attained under various traffic volume demands on two-way, two lane roads, and under various travel conditions, with Percent Time-Spent-Following (PTSF) being a key performance measure for the Level of Service experienced on two lane rural roads. PTSF is a measure of the level of opportunities to overtake, and increases as traffic demand increases, as the length of road where overtaking is prohibited increases, and as the directional split of traffic in each direction becomes more unbalanced. Table 5.4 presents the typical Levels of Service measures. Level of Service on Class I roads is defined in terms of both PTSF and average travel speed, and on Class II roads it is defined in terms of PTSF only.

Table 5.4: Level of Service on Two-Way Two Lane Roads

Level of Service	Average Travel Speed Class I[A]	Percent Time-Spent-Following	
		Class I[A]	Class II[B]
A	> 90	35	40
B	> 80 – 90	> 35 – 50	> 40 – 55
C	> 70 – 80	> 50 – 65	> 55 – 70
D	> 60 – 70	> 65 – 80	> 70 – 85
E	60	> 80	> 85

[A] Class I highways on which drivers expect to travel at relatively high speeds.
[B] Class II roads on which drivers do not expect to travel at high speeds.

TRB (2000) provides a general guide to compare the PTSF with two-way hourly vehicle volumes expressed in passenger car equivalents per hour (pc/h) under base conditions and are summarised in Table 5.5. Base conditions are a standard for roadway conditions which are adjusted to account for prevailing conditions. They assume good weather, good pavement conditions, drivers familiar with the roadway, and no impediments to traffic flow.

Table 5.5: Percent Time-Spent-Following versus Two-Way Flow Under Base Conditions

Percent Time-Spent-Following	Two-Way Flow Rate (pc/h)	Level of Service Threshold
35	550	A (Class I)
40	650	A (Class II)
50	900	B (Class I)
55	1,000	B (Class II)
65	1,350	C (Class I)
70	1,500	C (Class II)

Source: Adapted from TRB (2000).

The passenger car equivalent for heavy vehicles varies according to flow rates and the type of terrain, i.e. level terrain permits heavy vehicles to maintain approximately the same speed as passenger cars, and rolling terrain causes heavy vehicles to reduce their speeds substantially below that of passenger cars. The passenger car equivalent for trucks varies between 1 and 1.8 when determining PTSF.

The forecast volumes on the key roads of relevance to the Modification have been examined with regard to the PTSF thresholds. For the purpose of the assessment of Edderton Road, Denman Road and Thomas Mitchell Drive, a passenger car equivalent of 1.5 for heavy vehicles has been applied, and the resulting pc/h volumes are presented in Table 5.6. These roads are considered to be Class II roads.

Table 5.6: Midblock Levels of Service

	Two-Way Hourly Flow (pc/h)				Level of Service			
	2014	2019	2022	2026	2014	2019	2022	2026
No Modification								
Edderton Road, between New Access and Denman Road	111	122	129	-	A	A	A	-
Edderton Road, between New Access and Golden Highway	111	122	129	-	A	A	A	-
Denman Road, between Thomas Mitchell Drive and Edderton Road	564	610	643	-	A	A	A	-
Denman Road, north of Thomas Mitchell Drive	1,001	1,124	1,179	-	B	B	B	-
Thomas Mitchell Drive, between Denman Road and Mt Arthur Coal Mine Access Road	695	765	800	-	B	B	B	-
Thomas Mitchell Drive, between Mt Arthur Coal Mine Access Road and New England Highway	435	491	513	-	A	A	A	-
With Modification								
Edderton Road, between New Access and Denman Road	127	155	163	171	A	A	A	A
Edderton Road, between New Access and Golden Highway	121	135	142	151	A	A	A	A
Denman Road, between Thomas Mitchell Drive and Edderton Road	579	640	672	715	A	A	B	B
Denman Road, north of Thomas Mitchell Drive	1,016	1,124	1,179	1,253	B	B	B	B
Thomas Mitchell Drive, between Denman Road and Mt Arthur Coal Mine Access Road	695	753	788	836	B	B	B	B
Thomas Mitchell Drive, between Mt Arthur Coal Mine Access Road and New England Highway	435	478	500	528	A	A	A	A

Table 5.6 demonstrates that Level of Service on Denman Road between Thomas Mitchell Drive and Edderton Road would change from A to B in 2022 as a direct result of the Modification; at all other locations, the Level of Service would remain unchanged as a result of the Modification. Future midblock Levels of Service would remain good in the longer term with or without the Modification, and no measures would be required to provide additional midblock capacity for road traffic.

5.5 Edderton Road and Denman Road Intersection

The Modification would result in an increase in the number of vehicles turning at the intersection of Denman Road and Edderton Road. The existing intersection has no additional turning or passing lanes, and would be used until approximately 2018, when the northern part of Edderton Road would be realigned, and a new intersection created to the west of the existing intersection. This period would cover both the construction phase of the Modification and the operational phase.

Due to shift arrangements, it is likely that the increases in light vehicle traffic would occur during distinct short peaks at the shift changeover times. Heavy vehicle trips would tend to be spread throughout the day, and thus the additional trips in any one hour would be very low and within the day-to-day variations which would be expected to occur regardless of the Modification.

Table 5.7 presents estimates of the two-way traffic volumes on the approaches to the intersection of Edderton Road and Denman Road. This assumes that without the Modification, peak hour volumes would be 10% of the daily volume and that the Modification traffic is conservatively assumed to be spread such that 50% of the daily Modification traffic travels in each of the peak hours.

Table 5.7: Two-Way Peak Hour Traffic at Edderton Road/Denman Road Intersection (vehicles/hour)

Approach Road	No Modification				With Modification			
	2014	2019	2022	2026	2014	2019	2022	2026
Edderton Road	105	115	121	-	120	145	151	159
Denman Road North	524	566	596	-	538	592	622	662
Denman Road South	506	552	582	-	520	578	608	649

By way of comparison, Austroads (2007) sets out a guide to determine the need for detailed traffic capacity analysis. This indicates that with an intersection on a two lane major road (in this case, Denman Road), below the following two-way volumes, adequate capacity is assumed to be available and flaring of the approaches of an intersection is unlikely to be required:

Major Road (vehicles/hour)	Minor Road (vehicles/hour)
400	250
500	200
650	100

Comparing these volumes with those forecast on Denman Road (major road) and Edderton Road (minor road), it is evident that:

- In 2014, both with or without the Modification adequate capacity would be available and flaring of the intersection is unlikely to be needed based on capacity.
- In 2019, without the Modification, adequate capacity would be available and flaring of the intersection is unlikely to be needed based on capacity.

- In 2019 with the Modification, volumes would be at the threshold volumes suggested by the Austroads (2007) guide, and consideration may need to be given to the need for additional capacity.
- In 2022 without the Modification, volumes would be very close to the threshold volumes suggested by the Austroads (2007) guide, and consideration may need to be given to the need for additional capacity.
- In 2022 and 2026 with the Modification, volumes on Denman Road and Edderton Road would exceed the threshold volumes suggested by the Austoads (2007) guide, and consideration may need to be given to the need for additional capacity.

The intersection of Denman Road and Edderton Road is to be relocated as part of the realignment of Edderton Road approved as part of the Consolidation Project. The approval requires that the realignment must occur before mining is within 200 m of Edderton Road, and HVEC expects that the realignment will occur in approximately 2019. The forecast volumes above demonstrate that with regard to intersection capacity, the existing intersection is likely to have adequate capacity until approximately 2019. Should the realignment of Edderton Road not occur until after 2019, it is recommended that traffic volumes at this intersection be monitored to gauge whether the existing layout remains adequate for the actual demand.

The realignment of Edderton Road will result in construction of a new intersection of Edderton Road and Denman Road, and it is expected that the design of that intersection will take into consideration the forecast traffic volumes on the two roads, and any other issues which may arise as a result of the new location. The forecast volumes above suggest that auxiliary turn lanes would be required at the new intersection for capacity reasons.

5.6 Road Safety

The review of the crash history of the key roads (refer to Section 3.5) found that there is no specific location with a record of multiple crashes which may indicate an inherent problem with the road network at that location. The Modification would therefore not exacerbate any existing safety concerns at a particular location.

During the life of the Modification, the northern part of Edderton Road will be realigned as part of the approved Consolidation Project, and the new road will be designed and constructed to the satisfaction of Muswellbrook Shire Council. This will ensure the new section of road will meet all current safety requirements such as sight distances, curve radii, edge treatments, clear zones and so on. The Modification would not warrant any additional measures to address road safety concerns with the realignment of Edderton Road.

The new intersection of Edderton Road with the explosives facility access road will be designed and constructed in accordance with Council requirements, which will ensure it meets all safety requirements for the expected demands.

Once operational, the Modification would not result in any additional vehicle trips on the road system compared with the approved Consolidation Project, rather, there would be a minor transfer of traffic from the existing access on Thomas Mitchell Drive to the proposed new access off Edderton Road. Additional capacity is likely to be required to accommodate the additional turning vehicles at the intersection of Edderton Road and Denman Road (refer to Section 5.5) which is to be relocated and redesigned. The main increases as a result of the Modification are expected to occur on the left turn from Denman Road to Edderton Road, and the right turn from Edderton Road to Denman Road. As required by the Consolidation Project Approval conditions, the design of the new intersection will be to the satisfaction of RMS and Muswellbrook Shire Council, which will ensure that it will meet all necessary safety requirements for the expected demands. The Modification would therefore not warrant any additional measures.

During the construction phase, the Modification would result in small increases in traffic volumes on the surrounding road system, with the greatest increases expected to occur on Edderton Road between the new access and Denman Road. The main increases as a result of the Modification are expected to occur on the left turn from Denman Road to Edderton Road, and the right turn from Edderton Road to Denman Road. The minor increases in traffic, and the short duration of the construction phase would not warrant any additional measures to address safety concerns on the road network.

Overall, the planned changes/upgrades to the road system as a result of the Consolidation Project and other planned developments will be undertaken in accordance with standard design requirements. The road transport implications of the Modification are sufficiently minor in nature that additional measures to address safety concerns on the surrounding road network would be warranted.

5.7 Measures to Maintain or Improve Capacity, Efficiency and Safety

The assessment above demonstrates that with the planned changes in the road system and the changes in road traffic attributable to the Modification and other planned developments, the operation of the road system would remain satisfactory with regard to midblock capacities during peak hours. Should the realignment of Edderton Road be delayed beyond 2019, it is recommended that the traffic demands at its intersection with Edderton Road be reviewed to determine if additional capacity (such as auxiliary lanes) is required. The review of the history of road crashes has not identified any locations with inherent safety concerns which may be exacerbated by the changes in traffic expected to result from the Modification.

Planned changes to the road system include realignment of the northern part of Edderton Road and its intersection with Denman Road, upgrading of the intersection of Denman Road and Thomas Mitchell Drive, upgrading of Thomas Mitchell Drive, and upgrading of the intersection of New England Highway and Thomas Mitchell Drive. These roadworks would improve the capacity, efficiency and safety of the key roads with regard to the proposed Modification. The changes in traffic demands associated with the Modification would be very minor in nature and would not warrant any additional measures to improve the capacity, efficiency and safety of the roads.

Additional measures to provide additional capacity or improve the safety of the road system are therefore not considered to be warranted.

6. Conclusions

The proposal by HVEC to construct a new explosives storage facility off Edderton Road for the Mt Arthur Coal Mine would have an acceptable level of impact on the operation of the surrounding road system.

No significant impacts on the performance, capacity, efficiency and safety of the road network are expected to arise as a result of the Modification.

No specific management or mitigation measures are considered to be warranted by the Modification, noting that planned road works associated with the approved Consolidation Project would be designed and constructed to the satisfaction of Council and the RMS, and are thus likely to be in accordance with RMS design requirements.

Attachment A

Traffic Survey Data

AUSTROADS Vehicle 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) ≤ 3.2m and axles = 2		
	3, 4 or 5	3	**Short - Towing** Trailer, Caravan, Boat, etc	2	groups = 3 d(1) ≥ 2.1m, d(1) ≤ 3.2m, d(2) ≥ 2.1m and axles = 3, 4 or 5		
			HEAVY VEHICLES				
Medium 5.5m to 14.5m	2	2	**Two Axle Truck or Bus**	3	d(1) > 3.2m 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) > 3.2m, axles = 3 and groups = 3		
	4	> 2	**Four Axle Articulated** Four axle articulated vehicle, or Rigid vehicle and trailer	7	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 4 and groups > 2		
	5	> 2	**Five Axle Articulated** Five axle articulated vehicle, or Rigid vehicle and trailer	8	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m 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		

Definitions: Group: Axle group, where adjacent axles are less than 2.1m apart
Groups: Number of axle groups
Axles: Number of axles (maximum axle spacing of 10.0m)

d(1): Distance between first and second axle
d(2): Distance between second and third axle

Edderton Road 200m East of Denman Road Surveyed Two Way Traffic Volumes

Day	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Week Day	Weekend Day	Seven Day
Time	27/03/2012	28/03/2012	29/03/2012	30/03/2012	31/03/2012	01/04/2012	02/04/2012	Average	Average	Average
0:00	7	3	6	3	2	0	9	6	1	4
1:00	1	0	4	0	1	4	1	1	3	2
2:00	3	4	1	1	0	3	1	2	2	2
3:00	0	3	2	1	2	1	2	2	2	2
4:00	9	9	8	8	7	2	0	7	5	6
5:00	55	60	57	61	25	5	12	49	15	39
6:00	83	106	90	89	36	22	65	87	29	70
7:00	67	78	82	71	31	30	96	79	31	65
8:00	53	61	51	46	38	30	86	59	34	52
9:00	52	56	54	57	61	21	74	59	41	54
10:00	40	48	32	44	47	45	42	41	46	43
11:00	48	49	59	58	59	48	68	56	54	56
12:00	64	49	53	71	28	43	52	58	36	51
13:00	56	69	57	72	26	44	57	62	35	54
14:00	44	87	57	74	40	40	65	65	40	58
15:00	60	78	95	116	30	36	55	81	33	67
16:00	81	90	76	87	43	48	56	78	46	69
17:00	94	92	88	70	44	54	95	88	49	77
18:00	62	57	51	67	34	43	63	60	39	54
19:00	37	35	33	43	39	35	54	40	37	39
20:00	10	16	12	11	10	29	27	15	20	16
21:00	13	3	11	9	10	9	10	9	10	9
22:00	1	4	3	5	6	2	6	4	4	4
23:00	1	2	5	6	3	1	4	4	2	3
Total	**941**	**1,059**	**987**	**1,070**	**622**	**595**	**1,000**	**1,011**	**609**	**896**

Edderton Road 200m East of Denman Road Surveyed Average Weekday Two Way Traffic Vehicle Classifications

Time:	Total	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
0:00	6	5	0	1	0	0	0	0	0	0	0	0	0	0
1:00	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2:00	2	1	0	1	0	0	0	0	0	0	0	0	0	0
3:00	2	1	0	0	0	0	0	0	0	0	0	0	0	0
4:00	7	6	0	1	0	0	0	0	0	0	0	0	0	0
5:00	49	45	1	4	0	0	0	0	0	0	0	0	0	0
6:00	87	77	1	7	1	0	0	0	0	0	0	0	0	0
7:00	79	65	2	9	2	1	0	0	0	0	0	0	0	0
8:00	59	50	2	5	1	1	0	1	0	0	0	0	0	0
9:00	59	52	1	3	0	1	0	0	0	0	0	0	0	0
10:00	41	33	2	4	0	1	0	0	0	0	0	0	0	0
11:00	56	48	1	4	1	1	0	0	0	1	0	0	0	0
12:00	58	46	3	6	1	0	1	0	0	1	0	0	0	0
13:00	62	51	3	5	1	0	0	1	0	0	0	0	0	0
14:00	65	54	2	7	0	1	0	0	0	0	0	0	0	0
15:00	81	67	3	9	1	1	0	0	0	0	0	0	0	0
16:00	78	69	2	5	0	0	0	0	0	0	0	0	0	0
17:00	88	79	2	5	1	0	0	0	0	0	0	0	0	0
18:00	60	52	1	7	0	0	0	0	0	0	0	0	0	0
19:00	40	35	1	4	0	0	0	0	0	0	0	0	0	0
20:00	15	13	1	1	0	0	0	0	0	0	0	0	0	0
21:00	9	9	0	0	0	0	0	0	0	0	0	0	0	0
22:00	4	3	0	0	0	0	0	0	0	0	0	0	0	0
23:00	4	3	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,011**	**866**	**29**	**87**	**9**	**7**	**3**	**4**	**1**	**3**	**1**	**0**	**0**	**0**

Hourly volumes average of surveyed hour for Monday to Friday, rounded to nearest whole number, Class 13 error bin

Mt Arthur Coal Mine Access Road Surveyed Two Way Traffic Volumes

Day	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Week Day	Weekend Day	Seven Day
Time	27/03/2012	28/03/2012	29/03/2012	30/03/2012	31/03/2012	01/04/2012	02/04/2012	Average	Average	Average
0:00	6	8	7	3	8	5	10	7	7	7
1:00	3	4	1	6	4	3	10	5	4	4
2:00	9	8	5	4	8	3	2	6	6	6
3:00	3	8	7	3	6	5	4	5	6	5
4:00	22	37	25	24	13	9	4	22	11	19
5:00	290	251	271	286	90	15	23	224	53	175
6:00	506	544	463	478	303	92	263	451	198	378
7:00	249	236	246	215	51	291	550	299	171	263
8:00	148	109	126	99	31	32	213	139	32	108
9:00	97	130	125	86	34	15	112	110	25	86
10:00	104	129	108	83	21	22	122	109	22	84
11:00	132	129	112	91	26	16	108	114	21	88
12:00	131	109	162	151	22	34	105	132	28	102
13:00	109	124	136	117	22	15	133	124	19	94
14:00	177	188	183	200	21	16	99	169	19	126
15:00	192	293	196	172	16	18	142	199	17	147
16:00	205	185	196	134	29	17	200	184	23	138
17:00	239	196	186	150	91	24	209	196	58	156
18:00	331	323	352	334	284	82	231	314	183	277
19:00	54	49	39	47	39	291	345	107	165	123
20:00	23	15	20	20	15	13	30	22	14	19
21:00	20	12	13	13	7	9	26	17	8	14
22:00	14	9	9	10	2	3	20	12	3	10
23:00	5	1	1	6	6	7	15	6	7	6
Total	**3,069**	**3,097**	**2,989**	**2,732**	**1,149**	**1,037**	**2,976**	**2,973**	**1,093**	**2,436**

Mt Arthur Coal Mine Access Road Surveyed Average Weekday Two Way Traffic Vehicle Classifications

Time	Total	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
0:00	7	4	0	1	0	0	0	0	0	0	1	0	0	0
1:00	5	4	0	1	0	0	0	0	0	0	0	0	0	0
2:00	6	5	0	0	0	0	0	0	0	0	1	0	0	0
3:00	5	4	0	1	0	0	0	0	0	0	0	0	0	0
4:00	22	19	0	1	0	0	0	0	0	0	2	0	0	0
5:00	224	213	1	9	0	1	0	0	0	0	1	0	0	0
6:00	451	425	1	14	4	2	0	0	0	2	2	0	0	0
7:00	299	273	1	12	2	2	0	0	0	7	2	0	0	0
8:00	139	110	1	12	4	3	0	0	0	7	2	0	0	0
9:00	110	84	0	11	4	3	0	0	0	7	1	0	0	0
10:00	109	82	1	11	6	1	0	0	0	6	2	0	0	0
11:00	114	83	1	12	5	1	0	0	0	8	1	0	0	1
12:00	132	98	1	14	5	2	0	0	0	9	2	0	0	1
13:00	124	90	1	15	7	2	0	0	0	7	2	0	0	0
14:00	169	138	2	13	4	1	0	0	1	8	3	0	0	0
15:00	199	169	0	14	4	0	0	0	0	8	3	0	0	0
16:00	184	158	1	14	4	1	0	0	0	4	2	0	0	0
17:00	196	184	0	7	2	0	0	0	0	1	1	0	0	0
18:00	314	303	1	7	2	0	0	0	0	0	1	0	0	0
19:00	107	101	0	4	0	0	0	0	0	0	1	0	0	0
20:00	22	19	0	1	0	0	0	0	0	0	1	0	0	0
21:00	17	15	0	1	0	0	0	0	0	0	1	0	0	0
22:00	12	10	0	0	0	0	0	0	0	0	2	0	0	0
23:00	6	4	0	1	0	0	0	0	0	0	0	0	0	0
Total	**2,973**	**2,594**	**12**	**177**	**52**	**19**	**2**	**1**	**1**	**74**	**36**	**0**	**0**	**4**

Hourly volumes average of surveyed hour for Monday to Friday, rounded to nearest whole number, Class 13 error bin

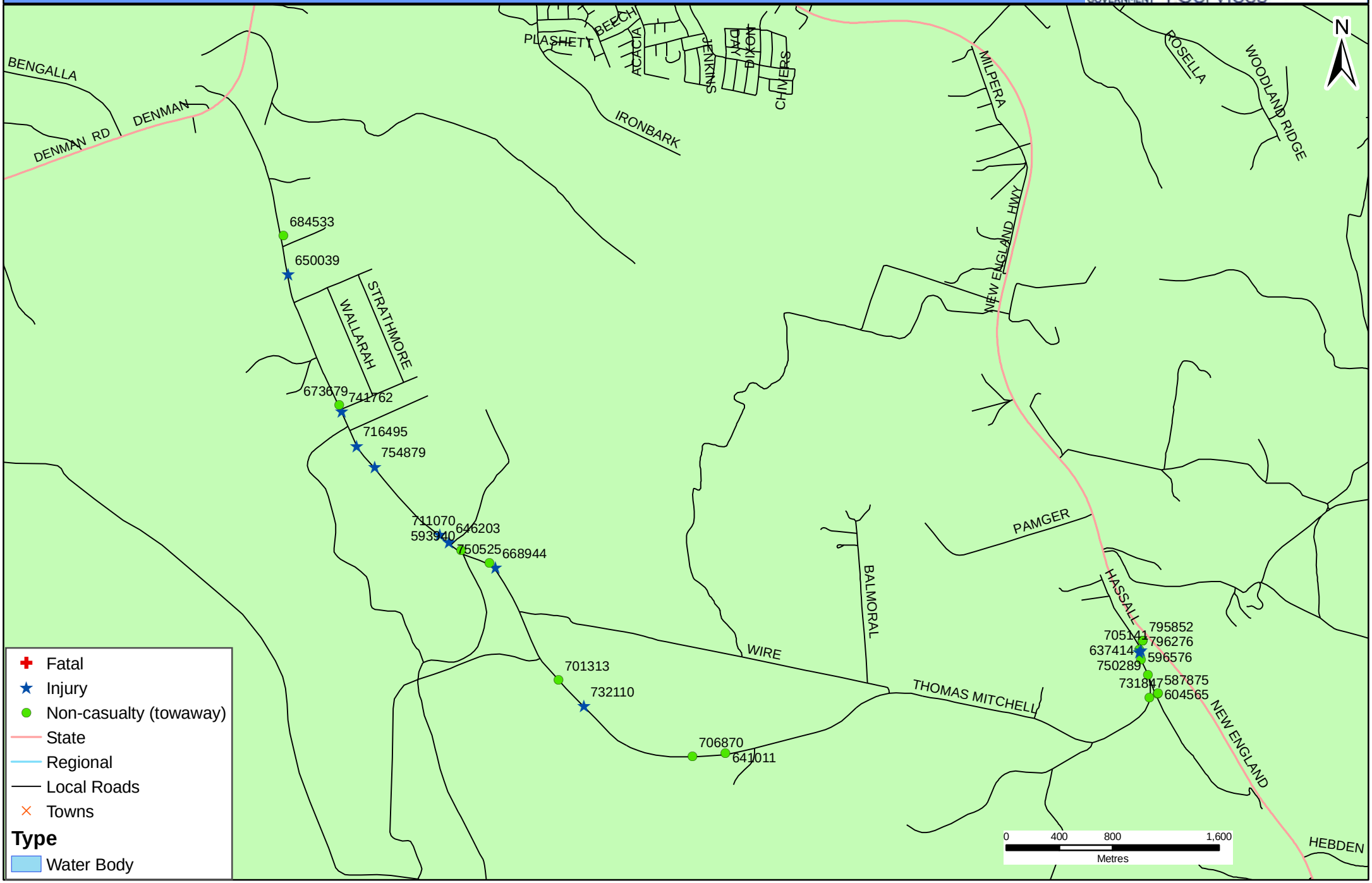
Attachment B

RMS Crash History Data

Thomas Mitchell Drive: Denman Road to New England Highway, Muswellbrook

Crashes Period: 1st October 2006 to 30th September 2011 (Finalised Data)

Transport Roads & Maritime Services



Jason Gillett July 2012

Summary Crash Report

Transport Centre for Road Safety

# Crash Type		
Car Crash	16	64.0%
Light Truck Crash	11	44.0%
Rigid Truck Crash	3	12.0%
Articulated Truck Crash	1	4.0%
'Heavy Truck Crash	(3)	(12.0%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(3)	(12.0%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	2	8.0%
Non intersection	23	92.0%

* Up to 10 metres from an intersection

~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	16	64.0%
Multi Vehicle	9	36.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	0	0.0%
Unclassified Road	25	100.0%

Contributing Factors		
Speeding	14	56.0%
Fatigue	3	12.0%

Weather		
Fine	11	44.0%
Rain	11	44.0%
Overcast	3	12.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	16	64.0%
Dry	9	36.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	1	4.0%
Daylight	18	72.0%
Dusk	1	4.0%
Darkness	5	20.0%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	3	12.0%
Opposing vehicles; turning	1	4.0%
U-turn	1	4.0%
Rear-end	4	16.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	1	4.0%
Off road, on straight	1	4.0%
Off road on straight, hit object	1	4.0%
Out of control on straight	0	0.0%
Off road, on curve	6	24.0%
Off road on curve, hit object	7	28.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit				
40 km/h or less	0	0.0%	~ 40km/h or less	0 0.0%
50 km/h zone	1	4.0%	80 km/h zone	7 28.0%
60 km/h zone	4	16.0%	90 km/h zone	1 4.0%
70 km/h zone	0	0.0%	100 km/h zone	12 48.0%
			110 km/h zone	0 0.0%

CRASHES	25	
Fatal crash	0	0.0%
Injury crash	10	40.0%
Non-casualty crash	15	60.0%

CASUALTIES	16	
Killed	0	0.0%
Injured	16	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	2	8.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	4	16.0%	4.2%
07:00 - 07:59	3	12.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	4	16.0%	4.2%
10:00 - 10:59	3	12.0%	4.2%
11:00 - 11:59	1	4.0%	4.2%
12:00 - 12:59	1	4.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	1	4.0%	4.2%
15:00 - 15:59	1	4.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	2	8.0%	4.2%
18:00 - 18:59	1	4.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	2	8.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
4	of 5 in Dark	80.0%

Crashes		Casualties
7	2011	3
6	2010	4
4	2009	2
5	2008	6
3	2007	1

~ School Travel Time		
Involvement	4	16.0%

McLean Periods			% Week
A	6	24.0%	17.9%
B	1	4.0%	7.1%
C	7	28.0%	17.9%
D	1	4.0%	3.5%
E	2	8.0%	3.6%
F	1	4.0%	10.7%
G	3	12.0%	7.1%
H	0	0.0%	7.1%
I	3	12.0%	12.5%
J	1	4.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	4	16.0%	Thursday	6	24.0%	Sunday	3	12.0%
Tuesday	3	12.0%	Friday	4	16.0%	WEEKDAY	19	76.0%
Wednesday	2	8.0%	Saturday	3	12.0%	WEEKEND	6	24.0%

New Year	0	0.0%	Queen's BD	1	4.0%	Easter SH	2	8.0%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	4.0%
Anzac Day	1	4.0%	January SH	1	4.0%	December SH	0	0.0%

Crashid dataset Thomas Mitchell Drive: Denman Road to New England Highway, Muswellbrook - 1/10/2006 to 30/9/2011

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Detailed Crash Report - sorted

Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
				Natural Lighting																**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
587875	03/08/2007	Fri	17:15	461 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	100	2	CAR	M22	E in THOMAS MITCHEL DR	80	Incorrect side	N	0	0	S
E31803353				Dusk		DCA : 201		Opp - Head on				LOR	M21	W in THOMAS MITCHEL DR	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Mt Arthur Rd**										
593940	27/09/2007	Thu	15:15	at	THOMAS MITCHEL DR	TJN	STR	Fine	Dry	50	2	CAR	M49	N in MT ARTHUR RD	5	Proceeding in lane	N	0	0	
E457435790				Daylight		DCA : 301		Same - Rear end				TRK	M43	N in MT ARTHUR RD	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
596576	25/10/2007	Thu	09:20	111 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	100	1	WAG	F48	W in THOMAS MITCHEL DR	50	Proceeding in lane	I	0	1	S
E32026658				Daylight		DCA : 802 L		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
604565	06/01/2008	Sun	10:50	460 m W	NEW ENGLAND HWY	2WY	CRV	Overcast	Wet	100	1	CAR	M19	E in THOMAS MITCHEL DR	95	Proceeding in lane	N	0	0	S
E115580196				Daylight		DCA : 804 R		Off left bend into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
646203	30/08/2008	Sat	21:10	100 m W	MT ARTHUR COAL RD	2WY	CRV	Fine	Dry	100	1	4WD	M43	W in THOMAS MITCHEL DR	80	Proceeding in lane	I	0	4	
E35035603				Darkness		DCA : 609		On path - Hit animal				Straying stock								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
637414	05/09/2008	Fri	14:40	200 m S	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	100	1	TRK	M22	S in THOMAS MITCHEL DR	65	Proceeding in lane	N	0	0	S
E66945102				Daylight		DCA : 804 R		Off left bend into obj				Embankment								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
641011	02/10/2008	Thu	02:00	4 km W	NEW ENGLAND HWY	2WY	STR	Fine	Dry	90	1	TRK	M26	W in THOMAS MITCHEL DR	70	Proceeding in lane	N	0	0	
E68010001				Darkness		DCA : 701		Off carriageway to left												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
650039	15/12/2008	Mon	12:10	220 m N	BLAKEFIELD RD	2WY	STR	Fine	Dry	80	2	TRK	M18	N in THOMAS MITCHEL DR	75	Proceeding in lane	I	0	2	
E36191329				Daylight		DCA : 301		Same - Rear end				TRK	M28	N in THOMAS MITCHEL DR	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
668944	20/05/2009	Wed	11:20	450 m N	WIRE LANE	2WY	CRV	Raining	Wet	100	2	LOR	M54	S in THOMAS MITCHEL DR	50	Incorrect side	I	0	2	S
E37218736				Daylight		DCA : 201		Opp - Head on				LOR	M25	N in THOMAS MITCHEL DR	40	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Enterprise Cres**										
684533	07/06/2009	Sun	21:30	15 m E	THOMAS ENTERPR DR	2WY	STR	Overcast	Dry	60	1	CAR	M19	N in ENTERPRISE CRES	60	Proceeding in lane	N	0	0	
E37420136				Darkness		DCA : 704		Right off cway into obj				Fence								

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
673679	03/07/2009	Fri	06:10	50 m N	CARRAMERE RD	2WY	STR	Fine	Dry	60	2	VAN	M44	S in THOMAS MITCHEL DR	60 Proceeding in lane		N	0	0	
E38701753				Dawn		DCA : 302		Same - Rear left				CAR	M48	S in THOMAS MITCHEL DR	20 Turning left					
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
701313	08/11/2009	Sun	09:20	515 m N	DRAYTON COAL ENT	2WY	CRV	Fine	Wet	100	1	WAG	F42	E in THOMAS MITCHEL DR	80 Proceeding in lane		N	0	0	
E40953089				Daylight		DCA : 803 R		Off right bend into obj				Embankment								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
705141	30/03/2010	Tue	10:30	120 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	60	1	TRK	M43	W in THOMAS MITCHEL DR	60 Proceeding in lane		N	0	0	S
E40599438				Daylight		DCA : 802 R		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
706870	19/04/2010	Mon	09:45	150 m N	DRAYTON MINE ENT	2WY	CRV	Fine	Wet	100	1	CAR	M22	W in THOMAS MITCHEL DR	85 Proceeding in lane		N	0	0	S F
E40742404				Daylight		DCA : 803 L		Off right bend into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
711070	20/05/2010	Thu	07:45	1.2 km S	CARRAMERE RD	2WY	STR	Fine	Dry	100	3	LOR	M25	W in THOMAS MITCHEL DR	30 Proceeding in lane		I	0	1	
E41158050				Daylight		DCA : 301		Same - Rear end				4WD	F39	W in THOMAS MITCHEL DR	0 Stationary					
												SEM	M41	W in THOMAS MITCHEL DR	0 Stationary					
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
716495	26/06/2010	Sat	07:15	120 m S	GLEN MUNRO RD	2WY	STR	Overcast	Wet	80	3	CAR	M38	S in THOMAS MITCHEL DR	80 Incorrect side		I	0	2	F
E40992215				Daylight		DCA : 201		Opp - Head on				TRK	M34	N in THOMAS MITCHEL DR	80 Proceeding in lane					
												TRK	M47	N in THOMAS MITCHEL DR	80 Proceeding in lane					
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
732110	05/11/2010	Fri	17:40	1.55 km S	MT ARTHUR RD	2WY	CRV	Raining	Wet	100	1	CAR	M20	N in THOMAS MITCHEL DR	90 Proceeding in lane		I	0	1	S F
E43361439				Daylight		DCA : 804 R		Off left bend into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Thomas Mitchel Dr**										
731847	16/11/2010	Tue	07:10	500 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	100	1	CAR	M44	W in THOMAS MITCHEL DR	70 Proceeding in lane		N	0	0	S
E42994668				Daylight		DCA : 802 R		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Carramere Rd**										
741762	31/01/2011	Mon	06:50	at	THOMAS MITCHEL DR	TJN	STR	Fine	Dry	80	2	TRK	M32	N in THOMAS MITCHEL DR	15 Turning right		I	0	1	
E43508404				Daylight		DCA : 202		Opp - Right-thru				CAR	M28	S in THOMAS MITCHEL DR	80 Proceeding in lane					

Detailed Crash Report - sorted

Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
					Natural Lighting															**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
795852	07/04/2011	Thu	06:00	50 m S	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	80	1	TRK	M20	S in THOMAS MITCHEL DR	45	Proceeding in lane	N	0	0	S
E44495529					Daylight	DCA : 802 L		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
796276	07/04/2011	Thu	06:00	50 m S	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	80	1	TRK	M20	S in THOMAS MITCHEL DR	45	Proceeding in lane	N	0	0	S
E44495529					Daylight	DCA : 802 L		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
750289	16/04/2011	Sat	10:30	323 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	80	1	CAR	F26	W in THOMAS MITCHEL DR	40	Proceeding in lane	N	0	0	S
E44000236					Daylight	DCA : 803 R		Off right bend into obj				Embankment								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
750517	26/04/2011	Tue	00:50	140 m W	NEW ENGLAND HWY	2WY	CRV	Raining	Wet	60	1	TRK	M21	W in THOMAS MITCHEL DR	40	Proceeding in lane	I	0	1	S
E640897790					Darkness	DCA : 802 L		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
750525	27/04/2011	Wed	18:40	1.47 km E	GLEN MUNRO RD	2WY	CRV	Fine	Wet	100	1	CAR	M34	E in THOMAS MITCHEL DR	100	Proceeding in lane	N	0	0	S
E44187633					Darkness	DCA : 803 L		Off right bend into obj				Embankment								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**					**Thomas Mitchel Dr**									
754879	23/05/2011	Mon	09:45	330 m S	GLEN MUNRO RD	2WY	STR	Fine	Dry	80	2	TRK	M45	S in THOMAS MITCHEL DR	5	Perform U-turn	I	0	1	
E44141470					Daylight	DCA : 304		Same - U-turn				TRK	M26	S in THOMAS MITCHEL DR	80	Proceeding in lane				

Report Totals: Total Crashes: 25 Fatal Crashes: 0 Injury Crashes: 10 Killed: 0 Injured: 16

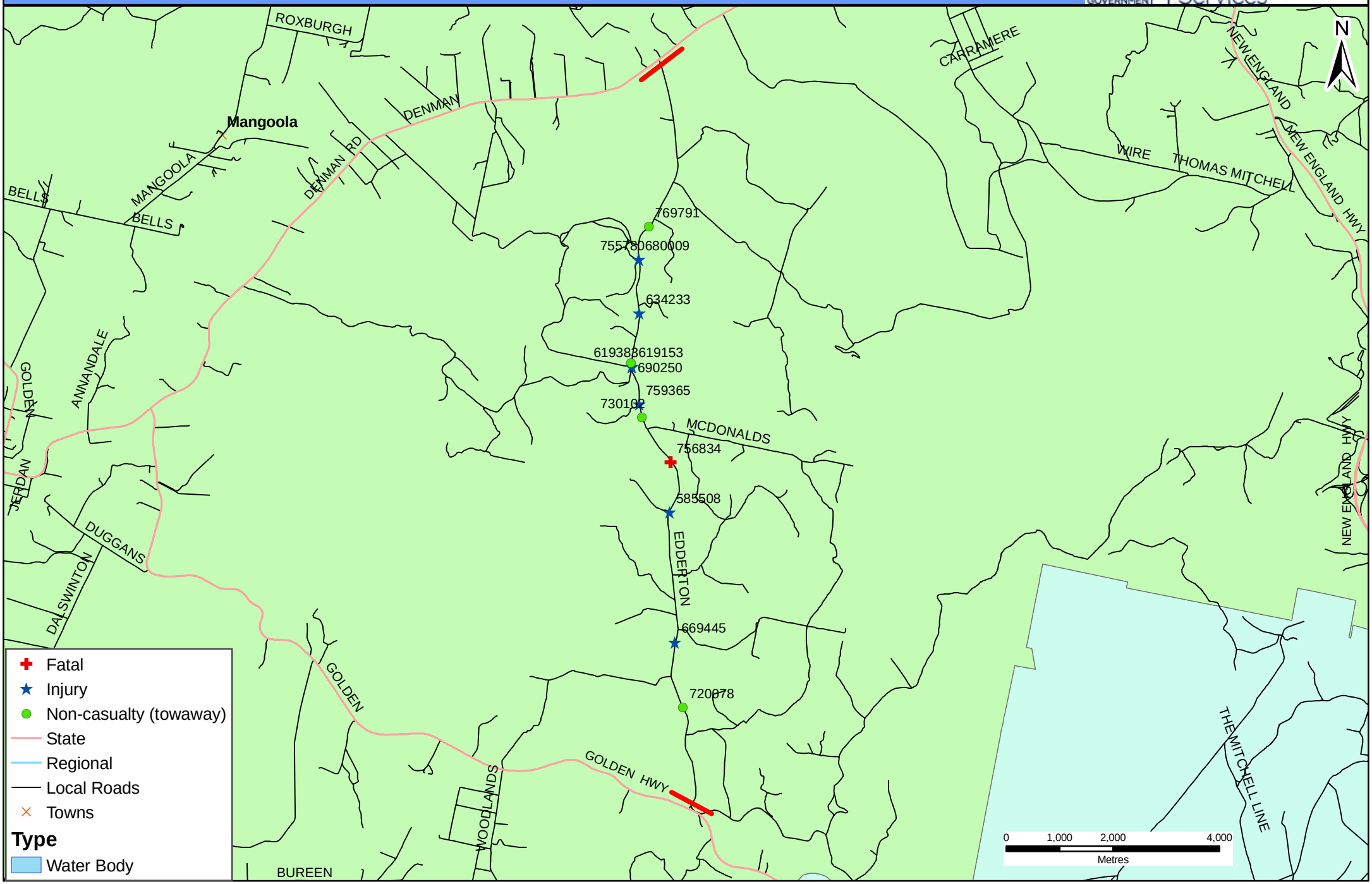
Crashid dataset Thomas Mitchell Drive: Denman Road to New England Highway, Muswellbrook - 1/10/2006 to 30/9/2011

Note: Ordered by: Crash Date.

Edderton Road: Denman Road to Golden Highway, Edderton

Crashes Period: 1st October 2006 to 30th September 2011 (Finalised Data)

Transport Roads & Maritime Services



Jason Gillett

July 2012

Summary Crash Report

Transport Centre for Road Safety

# Crash Type		
Car Crash	5	38.5%
Light Truck Crash	9	69.2%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(0)	(0.0%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(0)	(0.0%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	1	7.7%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	0	0.0%
Non intersection	13	100.0%

* Up to 10 metres from an intersection

~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	9	69.2%
Multi Vehicle	4	30.8%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	0	0.0%
Unclassified Road	13	100.0%

Contributing Factors		
Speeding	2	15.4%
Fatigue	6	46.2%

Weather		
Fine	11	84.6%
Rain	2	15.4%
Overcast	0	0.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	2	15.4%
Dry	11	84.6%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	3	23.1%
Daylight	6	46.2%
Dusk	0	0.0%
Darkness	4	30.8%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	3	23.1%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	5	38.5%
Out of control on straight	1	7.7%
Off road, on curve	0	0.0%
Off road on curve, hit object	3	23.1%
Out of control on curve	0	0.0%
Other crash type	1	7.7%

Speed Limit					
40 km/h or less	0	0.0%	~ 40km/h or less	0	0.0%
50 km/h zone	0	0.0%	80 km/h zone	1	7.7%
60 km/h zone	0	0.0%	90 km/h zone	1	7.7%
70 km/h zone	0	0.0%	100 km/h zone	11	84.6%
			110 km/h zone	0	0.0%

CRASHES	13	
Fatal crash	1	7.7%
Injury crash	8	61.5%
Non-casualty crash	4	30.8%

CASUALTIES	11	
Killed	1	9.1%
Injured	10	90.9%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	2	15.4%	4.2%
07:00 - 07:59	3	23.1%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	1	7.7%	4.2%
12:00 - 12:59	1	7.7%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	1	7.7%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	1	7.7%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	1	7.7%	4.2%
20:00 - 21:59	3	23.1%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil			% of Dark
4	of	4 in Dark	100.0%

Crashes		Casualties
4	2011	4
2	2010	0
3	2009	2
2	2008	2
2	2007	3

~ School Travel Time		
Involvement	2	15.4%

McLean Periods			% Week
A	4	30.8%	17.9%
B	1	7.7%	7.1%
C	2	15.4%	17.9%
D	1	7.7%	3.5%
E	0	0.0%	3.6%
F	2	15.4%	10.7%
G	1	7.7%	7.1%
H	0	0.0%	7.1%
I	0	0.0%	12.5%
J	2	15.4%	10.7%

Day of the Week						# Holiday Periods		
Monday	1	7.7%	Thursday	2	15.4%	Sunday	0	0.0%
Tuesday	2	15.4%	Friday	0	0.0%	WEEKDAY	9	69.2%
Wednesday	4	30.8%	Saturday	4	30.8%	WEEKEND	4	30.8%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	1	7.7%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	2	15.4%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	7.7%
Anzac Day	0	0.0%	January SH	0	0.0%	December SH	0	0.0%

Crashid dataset Edderton Road: Denman Road to Golden Highway, Edderton - 1/10/2006 to 30/9/2011

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Detailed Crash Report - sorted

Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
585508	03/07/2007	Tue	12:45	9 km S DENMAN RD		2WY	STR	Fine	Dry	100	1	TRK	M31	S in EDDERTON RD	Unk	Proceeding in lane	I	0	2	F
E30648756				Daylight		DCA : 703		Left off cway into object				Drain/culvert								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
619383	05/12/2007	Wed	16:30	6 km S DENMAN RD		2WY	STR	Fine	Dry	100	2	UTE	F23	N in EDDERTON RD	100	Pull out opposite	I	0	1	
E32577128				Daylight		DCA : 505		Ovtak - Pulling out rear end				TRK	M48	N in EDDERTON RD	Unk	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
619153	12/04/2008	Sat	07:00	6 km S DENHAM RD		2WY	STR	Fine	Dry	90	1	TRK	M19	N in EDDERTON RD	100	Proceeding in lane	I	0	1	S F
E33497645				Dawn		DCA : 703		Left off cway into object				Drain/culvert								
Hunter Region				**Muswellbrook LGA**		**Edderton**			**Edderton Rd**											
634233	12/08/2008	Tue	06:30	5 km S DENMAN RD		2WY	CRV	Fine	Dry	100	1	CAR	M64	S in EDDERTON RD	100	Proceeding in lane	I	0	1	S F
E122100496				Dawn		DCA : 803 L		Off right bend into obj				Drain/culvert								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
669445	14/02/2009	Sat	14:30	3.38 km N GOLDEN HWY		2WY	CRV	Raining	Wet	100	2	TRK	M43	S in EDDERTON RD	100	Incorrect side	I	0	1	
E36478934				Daylight		DCA : 201		Opp - Head on				TRK	M40	N in EDDERTON RD	Unk	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
680009	22/08/2009	Sat	21:45	4 km S DENMAN RD		2WY	STR	Fine	Dry	100	1	TRK	M34	S in EDDERTON RD	Unk	Proceeding in lane	I	0	1	F
E39069741				Darkness		DCA : 705		Out of control on cway												
Hunter Region				**Muswellbrook LGA**		**Edderton**			**Edderton Rd**											
690250	25/11/2009	Wed	11:30	8.8 km N GOLDEN HWY		2WY	CRV	Fine	Dry	100	1	TRK	M36	N in EDDERTON RD	70	Proceeding in lane	N	0	0	
E39243534				Daylight		DCA : 803 R		Off right bend into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Jerrys Plains**			**Edderton Rd**											
720078	22/07/2010	Thu	07:30	2 km N GOLDEN HWY		2WY	STR	Fine	Dry	100	2	TRK	M21	S in EDDERTON RD	70	Incorrect side	N	0	0	F
E42037574				Daylight		DCA : 201		Opp - Head on				TRK	F20	N in EDDERTON RD	90	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
730102	16/10/2010	Sat	21:40	7 km S DENMAM RD		2WY	STR	Fine	Dry	100	1	CAR	M44	S in EDDERTON RD	100	Proceeding in lane	N	0	0	
E42636179				Darkness		DCA : 704		Right off cway into obj				Fence								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Edderton Rd**											
755780	08/06/2011	Wed	06:43	4 km S DENMAN RD		2WY	CRV	Fine	Dry	100	1	M/C	M36	E in EDDERTON RD	100	Proceeding in lane	I	0	1	
E44401624				Dawn		DCA : 804 R		Off left bend into obj				Tree/bush								

Detailed Crash Report - sorted

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Edderton Rd**										
759365	06/07/2011	Wed	19:10	8 km N	GOLDEN HWY	2WY	CRV	Fine	Dry	80	2	CAR	M29	S in EDDERTON RD	75 Incorrect side		I	0	2	
E45090664				Darkness		DCA : 201	Opp - Head on					TRK	M24	N in EDDERTON RD	55 Proceeding in lane					
Hunter Region				**Muswellbrook LGA**		**Edderton**				**Edderton Rd**										
756834	04/08/2011	Thu	20:45	8 km S	DENMAN RD	2WY	STR	Fine	Dry	100	1	UTE	M22	N in EDDERTON RD	Unk Proceeding in lane		F	1	0	F
E45374718				Darkness		DCA : 704	Right off cway into obj					Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Roxburgh**				**Edderton Rd**										
769791	26/09/2011	Mon	07:00	3.3 km S	DENMAN RD	2WY	STR	Raining	Wet	100	1	TRK	M23	N in EDDERTON RD	95 Proceeding in lane		N	0	0	
E45507544				Daylight		DCA : 703	Left off cway into object					Body of water								

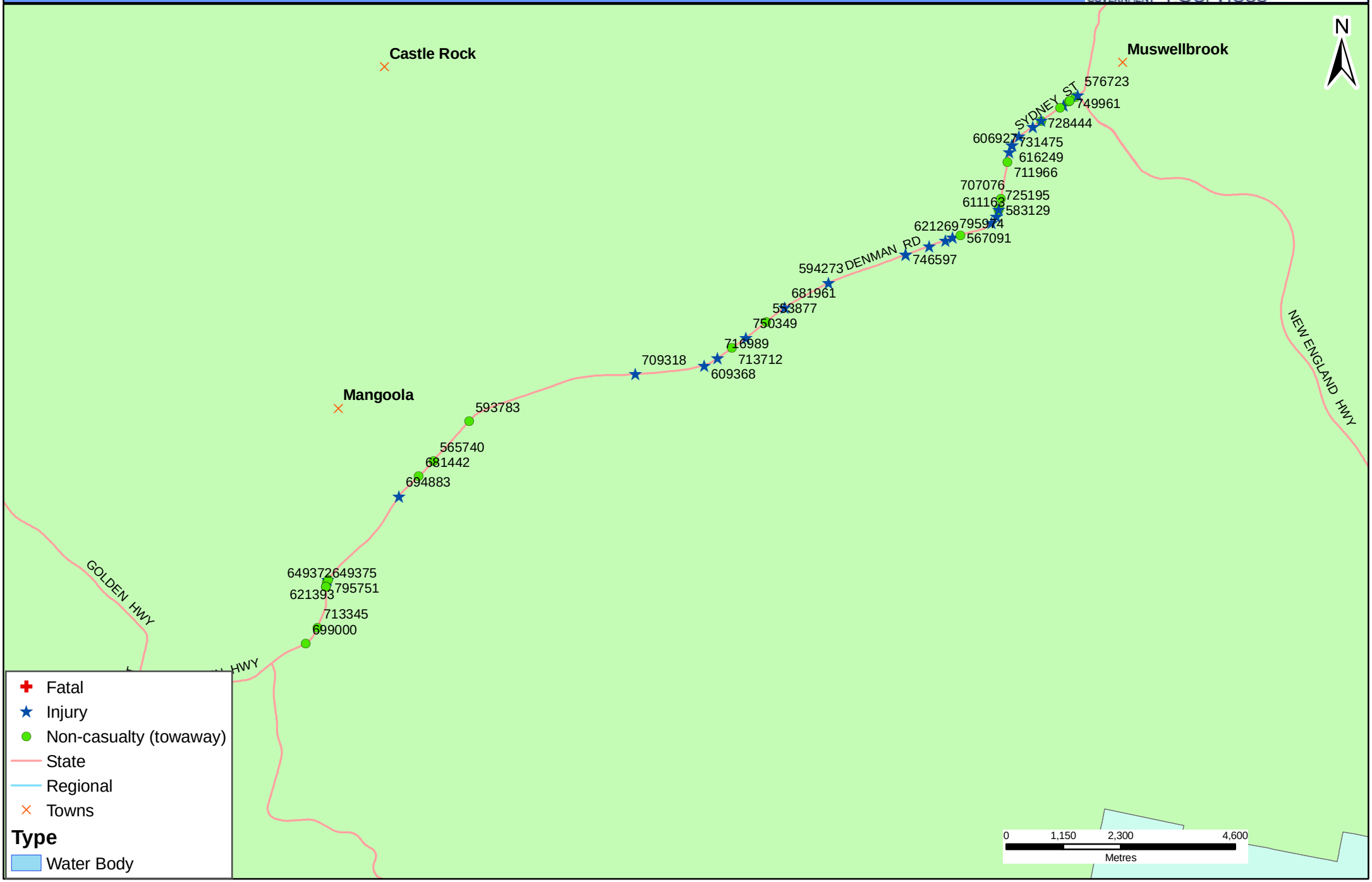
Report Totals: Total Crashes: 13 Fatal Crashes: 1 Injury Crashes: 8 Killed: 1 Injured: 10

Crashid dataset Edderton Road: Denman Road to Golden Highway, Edderton - 1/10/2006 to 30/9/2011

Note: Ordered by: Crash Date.

Denman Road: Golden Highway to New England Highway, Muswellbrook

Crashes Period: 1st October 2006 to 30th September 2011 (Finalised Data)



Jason Gillett July 2012

Summary Crash Report

Transport Centre for Road Safety

# Crash Type		
Car Crash	38	84.4%
Light Truck Crash	15	33.3%
Rigid Truck Crash	1	2.2%
Articulated Truck Crash	1	2.2%
'Heavy Truck Crash	(2)	(4.4%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(2)	(4.4%)
Emergency Vehicle Crash	1	2.2%
Motorcycle Crash	3	6.7%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	1	2.2%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	14	31.1%
Non intersection	31	68.9%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	24	53.3%
Multi Vehicle	21	46.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	45	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	12	26.7%
Fatigue	4	8.9%

Weather		
Fine	34	75.6%
Rain	7	15.6%
Overcast	3	6.7%
Fog or mist	1	2.2%
Other	0	0.0%

Road Surface Condition		
Wet	10	22.2%
Dry	35	77.8%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	4.4%
Daylight	24	53.3%
Dusk	2	4.4%
Darkness	17	37.8%

Crash Movement		
Intersection, adjacent approaches	2	4.4%
Head-on (not overtaking)	1	2.2%
Opposing vehicles; turning	3	6.7%
U-turn	0	0.0%
Rear-end	12	26.7%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	1	2.2%
Permanent obstruction on road	0	0.0%
Hit animal	6	13.3%
Off road, on straight	0	0.0%
Off road on straight, hit object	6	13.3%
Out of control on straight	1	2.2%
Off road, on curve	2	4.4%
Off road on curve, hit object	6	13.3%
Out of control on curve	0	0.0%
Other crash type	5	11.1%

CRASHES	45	
Fatal crash	0	0.0%
Injury crash	24	53.3%
Non-casualty crash	21	46.7%

CASUALTIES	31	
Killed	0	0.0%
Injured	31	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	5	11.1%	12.5%
03:00 - 04:59	4	8.9%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	3	6.7%	4.2%
07:00 - 07:59	2	4.4%	4.2%
08:00 - 08:59	2	4.4%	4.2%
09:00 - 09:59	1	2.2%	4.2%
10:00 - 10:59	1	2.2%	4.2%
11:00 - 11:59	2	4.4%	4.2%
12:00 - 12:59	4	8.9%	4.2%
13:00 - 13:59	2	4.4%	4.2%
14:00 - 14:59	2	4.4%	4.2%
15:00 - 15:59	4	8.9%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	6	13.3%	4.2%
18:00 - 18:59	4	8.9%	4.2%
19:00 - 19:59	2	4.4%	4.2%
20:00 - 21:59	1	2.2%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Crashes		Casualties
5	2011	3
13	2010	7
7	2009	4
8	2008	6
12	2007	11

~ School Travel Time		
Involvement	7	15.6%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	10	22.2%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	13	28.9%	100 km/h zone	22	48.9%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%
~ 40km/h or less	0	0.0%			

Street Lighting Off/Nil			% of Dark
14	of	17 in Dark	82.4%

McLean Periods			% Week
A	9	20.0%	17.9%
B	2	4.4%	7.1%
C	10	22.2%	17.9%
D	1	2.2%	3.5%
E	1	2.2%	3.6%
F	5	11.1%	10.7%
G	10	22.2%	7.1%
H	1	2.2%	7.1%
I	2	4.4%	12.5%
J	4	8.9%	10.7%

Day of the Week						# Holiday Periods		
Monday	3	6.7%	Thursday	12	26.7%	Sunday	2	4.4%
Tuesday	8	17.8%	Friday	10	22.2%	WEEKDAY	37	82.2%
Wednesday	4	8.9%	Saturday	6	13.3%	WEEKEND	8	17.8%

New Year	0	0.0%	Queen's BD	1	2.2%	Easter SH	3	6.7%
Aust. Day	2	4.4%	Labour Day	0	0.0%	June/July SH	2	4.4%
Easter	1	2.2%	Christmas	0	0.0%	Sept./Oct. SH	1	2.2%
Anzac Day	0	0.0%	January SH	5	11.1%	December SH	0	0.0%

Crashid dataset Denman Road: Golden Highway to New England Highway, Muswellbrook - 1/10/2006 to 30/9/2011

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Detailed Crash Report - sorted

Transport Centre for Road Safety

Natural Lighting

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors S F
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
553877	14/01/2007	Sun	04:00	7 km W	MUSWELLBROOK TN	2WY	STR	Fine	Dry	100	1	OMV	M29	W in DENMAN RD	90	Proceeding in lane	N	0	0	
E29358571				Darkness		DCA : 609		On path - Hit animal				Kangaroo								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
567091	26/01/2007	Fri	03:50	at	BENGALLA RD	TJN	STR	Fine	Dry	80	1	CAR	U U	S in BENGALLA RD	80	Proceeding in lane	N	0	0	F
E29763840				Darkness		DCA : 709		Off end cway or T junct				Fence								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
593783	14/03/2007	Wed	00:30	6 km W	EDDERTON RD	2WY	STR	Fine	Dry	100	1	CAR	F18	W in DENMAN RD	100	Proceeding in lane	N	0	0	
E29768734				Darkness		DCA : 703		Left off cway into object				Fence								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
565740	24/03/2007	Sat	21:15	7 km W	EDDERTON RD	2WY	STR	Raining	Wet	100	1	WAG	M23	W in DENMAN RD	90	Proceeding in lane	N	0	0	
E29471310				Darkness		DCA : 609		On path - Hit animal				Straying stock								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Sydney St**										
563395	29/03/2007	Thu	15:40	20 m S	BARRETT ST	2WY	STR	Fine	Dry	60	3	TRK	M21	N in SYDNEY ST	50	Proceeding in lane	I	0	1	
E29630215				Daylight		DCA : 301		Same - Rear end				M/C	M34	N in SYDNEY ST	0	Stationary				
												CAR	M44	N in SYDNEY ST	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
576477	27/04/2007	Fri	18:10	at	WOLLOMBI RD	TJN	STR	Raining	Wet	60	2	CAR	M40	E in DENMAN RD	Unk	Turning right	I	0	2	
E29978059				Dusk		DCA : 202		Opp - Right-thru				CAR	F40	W in DENMAN RD	60	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
621269	23/05/2007	Wed	08:25	1 km W	THOMAS MITCHEL DR	2WY	STR	Fine	Dry	80	2	CAR	M45	W in DENMAN RD	Unk	Incorrect side	I	0	3	F
E30088575				Daylight		DCA : 201		Opp - Head on				CAR	F29	E in DENMAN RD	Unk	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Sydney Rd**										
576723	08/06/2007	Fri	11:30	25 m W	NEW ENGLAND HWY	2WY	STR	Raining	Wet	60	2	CAR	M39	E in SYDNEY RD	60	Proceeding in lane	I	0	1	
E30980507				Daylight		DCA : 301		Same - Rear end				CAR	F75	E in SYDNEY RD	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**				**Denman Rd**										
583129	12/07/2007	Thu	12:15	270 m E	THOMAS MITCHEL DR	2WY	STR	Fine	Dry	80	1	CAR	M19	E in DENMAN RD	100	Proceeding in lane	N	0	0	S
E31093619				Daylight		DCA : 704		Right off cway into obj				Fence								

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
611163	20/09/2007	Thu	19:35	100 m N	THOMAS MITCHEL DR	2WY	CRV	Fine	Dry	100	1	UTE	M47	N in DENMAN RD	Unk	Proceeding in lane	I	0	2	S
E31770050				Darkness		DCA : 801 L		Off cway right bend												
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
594273	15/10/2007	Mon	07:10	2 km E	EDDERTON RD	2WY	STR	Fine	Dry	100	3	TRK	M43	W in DENMAN RD	100	Proceeding in lane	I	0	1	
E31891768				Daylight		DCA : 301		Same - Rear end				TRK	M22	W in DENMAN RD	5	Veering left				
												UTE	F46	W in DENMAN RD	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
621393	03/11/2007	Sat	04:45	2.2 km E	GOLDEN HWY	2WY	CRV	Raining	Wet	100	1	CAR	M23	E in DENMAN RD	80	Proceeding in lane	I	0	1	S F
E32010179				Darkness		DCA : 803 L		Off right bend into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
606927	25/01/2008	Fri	17:00	3 m N	RACECOURSE RD	TJN	STR	Overcast	Dry	60	2	TRK	M64	S in DENMAN RD	60	Proceeding in lane	I	0	1	
E285564291				Daylight		DCA : 303		Same - Rear right				CAR	F24	S in DENMAN RD	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
616249	14/02/2008	Thu	17:30	at	SKELLATAR STOC MS	TJN	STR	Fine	Dry	60	2	CAR	M18	E in DENMAN RD	60	Proceeding in lane	I	0	2	
E35313286				Daylight		DCA : 303		Same - Rear right				TRK	M48	E in DENMAN RD	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
609368	16/02/2008	Sat	02:00	1 km W	EDDERTON RD	2WY	CRV	Fine	Dry	100	1	TRK	M19	W in DENMAN RD	Unk	Proceeding in lane	I	0	2	S
E63982201				Darkness		DCA : 803 R		Off right bend into obj				Fence								
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
649372	08/05/2008	Thu	17:52	50 m N	WILLOWDELL QUA ENT	2WY	CRV	Fine	Dry	100	1	CAR	F26	N in DENMAN RD	90	Proceeding in lane	N	0	0	
E34460539				Darkness		DCA : 609		On path - Hit animal				Straying stock								
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
649375	08/05/2008	Thu	17:52	50 m N	WILLOWDELL QUA ENT	2WY	CRV	Fine	Dry	100	1	TRK	M58	N in DENMAN RD	100	Proceeding in lane	N	0	0	
E34460539				Darkness		DCA : 609		On path - Hit animal				Straying stock								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
639037	29/07/2008	Tue	18:10	1 km W	BENGALLA RD	2WY	STR	Fine	Dry	100	1	CAR	M46	W in DENMAN RD	80	Proceeding in lane	I	0	1	
E34517813				Darkness		DCA : 609		On path - Hit animal				Kangaroo								

Detailed Crash Report - sorted

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
643703	11/10/2008	Sat	09:30	5 m N	SKELLATAR ST	TJN	STR	Fine	Wet	60	1	CAR	F26	W in SKELLATAR ST	Unk	Turning right	N	0	0	S
E35115714			Daylight			DCA : 707 L		Right turn				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Denman**			**Dehman Rd**											
649555	12/12/2008	Fri	12:10	2.15 km E	GOLDEN HWY	2WY	CRV	Raining	Wet	100	1	TRK	F24	W in DEHMAN RD	Unk	Proceeding in lane	N	0	0	S
E35444660			Daylight			DCA : 803 L		Off right bend into obj				Fence								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
659038	08/01/2009	Thu	06:20	at	THOMAS MITCHEL DR	TJN	CRV	Fine	Dry	80	2	CAR	M37	N in DENMAN RD	Unk	Turning right	I	0	1	
E519715690			Daylight			DCA : 202		Opp - Right-thru				M/C	M27	S in DENMAN RD	75	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
678633	07/08/2009	Fri	08:00	500 m W	BENGALLA RD	2WY	STR	Fine	Dry	100	2	TRK	M22	E in DENMAN RD	80	Proceeding in lane	I	0	1	
E38444349			Daylight			DCA : 303		Same - Rear right				CAR	F37	E in DENMAN RD	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
681442	24/08/2009	Mon	13:30	5 km N	GOLDEN HWY	2WY	STR	Fine	Dry	80	2	CAR	M82	S in DENMAN RD	75	Proceeding in lane	N	0	0	
E40697188			Daylight			DCA : 610		On path - Load hit vehicle				TRK	M50	S in DENMAN RD	Unk	Proceeding in lane				
												Falling object								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
682311	13/09/2009	Sun	14:00	at	MITCHELL ST	XJN	STR	Fine	Dry	60	2	CAR	M42	E in SYDNEY ST	60	Proceeding in lane	N	0	0	
E38500506			Daylight			DCA : 303		Same - Rear right				4WD	M52	E in SYDNEY ST	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
681961	15/09/2009	Tue	19:40	990 m N	EDDERTON RD	2WY	CRV	Fine	Dry	100	2	CAR	M42	S in DENMAN RD	90	Proceeding in lane	I	0	1	
E38828358			Darkness			DCA : 1		Ped - Near side				PED	M30	W in DENMAN RD		Walk across carriageway				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
692490	14/12/2009	Mon	17:45	300 m N	THOMAS MITCHEL DR	2WY	CRV	Fine	Dry	80	1	4WD	M16	E in DENMAN RD	80	Proceeding in lane	N	0	0	S
E39608931			Darkness			DCA : 802 L		Off cway left bend												
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
694883	18/12/2009	Fri	11:50	4.415 km N	GOLDEN HWY	2WY	CRV	Raining	Wet	100	1	4WD	M65	S in DENMAN RD	Unk	Proceeding in lane	I	0	1	S
E39813029			Daylight			DCA : 804 L		Off left bend into obj				Fence								

Detailed Crash Report - sorted

Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
709318	07/01/2010	Thu	17:45	10 km E	GOLDEN HWY	2WY	STR	Fine	Dry	80	1	M/C	M57	E in DENMAN RD	80	Proceeding in lane	I	0	1	
E40809844				Daylight		DCA : 705		Out of control on cway												
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
699000	04/02/2010	Thu	15:00	800 m N	GOLDEN HWY	2WY	CRV	Fine	Wet	100	1	CAR	F18	W in DENMAN RD	80	Proceeding in lane	N	0	0	S
E39889776				Daylight		DCA : 803 L		Off right bend into obj				Drain/culvert								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
707076	13/04/2010	Tue	06:55	530 m N	THOMAS MITCHEL DR	2WY	STR	Fine	Dry	80	2	CAR	M55	S in DENMAN RD	80	Proceeding in lane	N	0	0	
E41377339				Daylight		DCA : 303		Same - Rear right				TRK	M37	S in DENMAN RD	Unk	Turning right				
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
713345	19/05/2010	Wed	02:48	1.2 km E	GOLDEN HWY	2WY	STR	Fine	Dry	100	1	UTE	M26	W in DENMAN RD	100	Proceeding in lane	N	0	0	
E40913376				Darkness		DCA : 609		On path - Hit animal				Straying stock								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
711966	28/05/2010	Fri	15:30	200 m S	RACECOURSE RD	2WY	STR	Overcast	Dry	80	2	UTE	M24	N in DENMAN RD	Unk	Proceeding in lane	N	0	0	
E41355371				Daylight		DCA : 301		Same - Rear end				TRK	M61	N in DENMAN RD	70	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
724955	01/06/2010	Tue	12:05	at	ANZAC PDE	TJN	STR	Fine	Dry	60	2	CAR	M25	W in ANZAC PDE	5	Turning right	N	0	0	
E41461329				Daylight		DCA : 104		Adj - Right-thru from right				CAR	F25	S in SYDNEY ST	50	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
713712	08/06/2010	Tue	15:55	5 km W	BENGALLA RD	2WY	STR	Fine	Dry	100	2	TRK	M42	W in DENMAN RD	20	Turning right	N	0	0	
E41044611				Daylight		DCA : 202		Opp - Right-thru				CAR	F32	E in DENMAN RD	100	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
716989	03/07/2010	Sat	00:15	700 m W	EDDERTON RD	2WY	STR	Overcast	Dry	100	1	CAR	M23	E in DENMAN RD	900	Proceeding in lane	I	0	1	S
E41469712				Darkness		DCA : 703		Left off cway into object				Utility pole								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
721768	12/08/2010	Thu	12:15	at	MILL ST	TJN	STR	Fine	Dry	60	2	CAR	F30	S in SYDNEY ST	40	Proceeding in lane	N	0	0	
E41940838				Daylight		DCA : 303		Same - Rear right				TRK	F54	S in SYDNEY ST	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
725195	17/09/2010	Fri	01:40	310 m N	THOMAS MITCHEL DR	2WY	STR	Fine	Dry	80	1	CAR	F20	N in DENMAN RD	Unk	Proceeding in lane	I	0	1	
E136355998				Darkness		DCA : 704		Right off cway into obj				Utility pole								

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Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
728444	19/10/2010	Tue	18:40	at	ANZAC PDE	TJN	STR	Fine	Dry	60	2	TRK	M38	N in SYDNEY ST	60	Proceeding in lane	I	0	1	
E42281811					Dusk	DCA : 303		Same - Rear right				CAR	F50	N in SYDNEY ST	0	Wait turn right				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
731475	05/11/2010	Fri	10:16	at	SKELLATAR STOC MS	TJN	STR	Raining	Wet	60	2	CAR	M86	W in SKELLATAR STOC MS	20	Proceeding in lane	I	0	2	
E42807007					Daylight	DCA : 101		Adj - Cross traffic				LOR	M31	S in DENMAN RD	60	Proceeding in lane				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
735113	07/12/2010	Tue	03:30	10 m E	TARAKAN AVE	TJN	STR	Fine	Dry	60	2	CAR	M17	W in SYDNEY ST	55	Proceeding in lane	I	0	1	F
E42576624					Darkness	DCA : 703		Left off cway into object				DTR		W in SYDNEY ST		Parked				
Hunter Region				**Muswellbrook LGA**		**Denman**			**Denman Rd**											
795751	03/02/2011	Thu	06:30	Unk Unk	UNKNOWN UK	2WY	CRV	Fine	Dry	100	1	4WD	M33	S in DENMAN RD	100	Proceeding in lane	N	0	0	
E43344572					Dawn	DCA : 804 R		Off left bend into obj				Fence								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
746597	26/03/2011	Sat	18:45	1 km W	BENGALLA RD	2WY	STR	Fine	Dry	100	1	CAR	F17	W in DENMAN RD	100	Proceeding in lane	I	0	1	S
E636997090					Darkness	DCA : 704		Right off cway into obj				Tree/bush								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Denman Rd**											
750349	19/04/2011	Tue	07:08	at	EDDERTON RD	TJN	STR	Fog or mist	Wet	100	1	TRK	M23	N in EDDERTON RD	70	Proceeding in lane	I	0	1	
E43940617					Dawn	DCA : 709		Off end cway or T junct				Drain/culvert								
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Sydney St**											
749961	21/04/2011	Thu	13:45	20 m E	MITCHELL ST	2WY	STR	Fine	Dry	60	3	CAR	M37	W in SYDNEY ST	50	Proceeding in lane	N	0	0	
E46275289					Daylight	DCA : 301		Same - Rear end				4WD	M41	W in SYDNEY ST	0	Wait turn right				
												CAR	F18	W in SYDNEY ST	0	Stationary				
Hunter Region				**Muswellbrook LGA**		**Muswellbrook**			**Bengalla Rd**											
795974	22/06/2011	Wed	14:45	8 m N	DENMAN RD	TJN	STR	Fine	Dry	100	1	ATKR	M40	W in DENMAN RD	30	Turning right	I	0	1	S
E45264428					Daylight	DCA : 707 L		Right turn												

Report Totals: Total Crashes: 45 Fatal Crashes: 0 Injury Crashes: 24 Killed: 0 Injured: 31

Crashid dataset Denman Road: Golden Highway to New England Highway, Muswellbrook - 1/10/2006 to 30/9/2011

Note: Ordered by: Crash Date.

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