

APPENDIX R

TRAFFIC AND TRANSPORT IMPACT ASSESSMENT

MT ARTHUR COAL CONSOLIDATION PROJECT

TRAFFIC & TRANSPORT IMPACT ASSESSMENT

Prepared by:

HANSEN BAILEY
Level 15
215 Adelaide St
Brisbane QLD 4000

21 August 2009

For:

HUNTER VALLEY ENERGY COAL PTY LTD
Thomas Mitchell Drive
Private Mail Bag 8
Muswellbrook NSW 2333

TABLE OF CONTENTS

1	INTRODUCTION	1
2	ROAD TRAFFIC.....	3
2.1	EXISTING ROAD NETWORK.....	3
2.1.1	Location.....	3
2.1.2	Thomas Mitchell Drive.....	3
2.1.3	Denman Road	3
2.1.4	Denman Road / Thomas Mitchell Drive Intersection	3
2.1.5	New England Highway	4
2.1.6	New England Highway / Thomas Mitchell Drive Intersection	4
2.1.7	Mt Arthur Coal Access Road	4
2.1.8	Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection	5
2.1.9	Bayswater No. 2 Access Road	5
2.2	EXISTING ROAD TRAFFIC VOLUMES	5
2.3	EXISTING ROAD ACCIDENT STATISTICS.....	7
2.4	PREDICTED BACKGROUND ROAD TRAFFIC VOLUMES	9
2.4.1	Approved Mt Arthur Coal Projects	9
2.4.2	Other Traffic-Generating Projects	10
2.4.3	Predicted Background Traffic Volumes	11
2.5	PREDICTED PROJECT TRAFFIC VOLUMES.....	14
2.5.1	Introduction.....	14
2.5.2	Construction Phase Traffic Volumes	15
2.5.3	Operational Phase Traffic Volumes.....	16
2.6	IMPACT ON ROAD TRAFFIC VOLUMES.....	17
2.7	IMPACT ON LEVEL OF SERVICE	19
2.8	IMPACT ON INTERSECTIONS.....	21
2.8.1	Introduction.....	21
2.8.2	Denman Road / Thomas Mitchell Drive Intersection	22
2.8.3	New England Highway / Thomas Mitchell Drive Intersection	23
2.8.4	Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection	24
2.8.5	Night-time Safety Audit of Intersections	25
2.9	IMPACT ON ROAD SAFETY	26
2.10	IMPACTS DUE TO BLASTING.....	26
2.11	PROPOSED EDDERTON ROAD REALIGNMENT	27
2.11.1	Existing Edderton Road.....	27
2.11.2	Proposed Realignment.....	27
3	RAIL TRAFFIC.....	29
3.1	EXISTING RAIL TRAFFIC	29
3.2	PROJECT COAL TRANSPORT	29

3.3	COAL TRANSPORT IMPACTS	30
4	SUMMARY AND MITIGATION	31
4.1	SUMMARY OF IMPACTS	31
4.2	IMPACT MANAGEMENT AND MITIGATION MEASURES	32

LIST OF TABLES

Table 1	2008 Traffic Count Data
Table 2	Road Accident Statistics 2002 to 2008
Table 3	Approved Future Traffic-Generating Developments in the Vicinity of the Project
Table 4	Predicted 2011 Background Traffic Volumes*
Table 5	Predicted 2014 Background Traffic Volumes*
Table 6	Predicted 2019 Background Traffic Volumes*
Table 7	Predicted Project Construction Phase Traffic Volumes (2011)
Table 8	Predicted Project Operations Phase Traffic Volumes (2014)
Table 9	Predicted 2011 Traffic Volumes
Table 10	Predicted 2014 Traffic Volumes
Table 11	Predicted 2011 Levels of Service
Table 12	Predicted 2014 Levels of Service
Table 13	Intersection Level of Service Performance Categories
Table 14	Denman Road / Thomas Mitchell Drive Intersection SIDRA Analysis Summary of 2011, 2014 and 2019 Traffic Volumes for Existing Intersection
Table 15	New England Highway / Thomas Mitchell Drive Intersection SIDRA Analysis Summary of 2011 and 2019 Traffic Volumes for Existing Intersection
Table 16	Thomas Mitchell Drive / Mt Arthur Coal Access Road SIDRA Analysis Summary of 2011 and 2019 Traffic Volumes for Existing Intersection
Table 17	Edderton Road Realignment Options

LIST OF FIGURES

Figure 1	Regional Transport Network
----------	----------------------------

LIST OF PLATES

Plate 1	Denman Road / Thomas Mitchell Drive Intersection (looking north along Denman Road)
Plate 2	New England Highway / Thomas Mitchell Drive Intersection (looking north along the New England Highway)
Plate 3	Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection (looking north along Thomas Mitchell Drive)

LIST OF APPENDICES

Appendix A	Intersection Performance Assessment
------------	-------------------------------------

MT ARTHUR COAL CONSOLIDATION PROJECT TRAFFIC & TRANSPORT IMPACT ASSESSMENT

for Hunter Valley Energy Coal

1 INTRODUCTION

Hunter Valley Energy Coal Pty Ltd, a wholly owned subsidiary of BHP Billiton, operates the Mt Arthur Coal Complex (Mt Arthur Coal). The Mt Arthur Coal Complex includes the combined operations of the Mt Arthur North Mine, the Bayswater No. 2 Mine, Bayswater No. 3 Mine, South Pit Extension and the Mt Arthur Underground (MAU) Project as well as the Rail Loading Facility. The Mt Arthur Coal Complex is located south-west of Muswellbrook, off Thomas Mitchell Drive in the Muswellbrook Shire Council (MSC) Local Government Area (LGA) in the Upper Hunter Valley of NSW.

The Mt Arthur Coal Complex currently has approval to produce up to 28 Million tonnes per annum (Mtpa) of Run-of-Mine (ROM) coal, of which 8 Mtpa is from underground mining methods.

HVEC is applying to the Minister for Planning for a new Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to gain a single, contemporary planning approval for its open cut operations and the mining of additional areas within its current Mining Leases (ML) (the Project). The Project Application Boundary (EA Boundary) is shown on Figure 1 and is consistent with the Project Approval area for the MAU.

The Project continues all aspects of Mt Arthur Coal's current activities and specifically, seeks approval for the following:

- Consolidation of all of Mt Arthur Coal's open cut mining related planning approvals into one contemporary Project Approval;
- Extension of the mine footprint to uncover additional coal reserves within the current MLs;
- Increasing the Mt Arthur Coal Complex approved production levels by 8 Mtpa up to 36 Mtpa ROM coal. This will be achieved by;
 - o Increasing open cut coal production by up to 8 Mtpa; and
 - o Having the flexibility to increase either open cut or underground production by an additional 4 Mtpa if the maximum production from either underground or open cut methods is not being met (total to not exceed 36 Mtpa).
- Relocation of a section of Edderton Road in approximately 2019;

- Upgrading the existing Mt Arthur Coal, Coal Handling and Preparation Plant (CHPP) to process up to 36 Mtpa of ROM coal and allow the inclusion of an ultra-fines coal circuit to re-process fines which will facilitate increased resource recovery and reduce water demand;
- Increasing the approved rail haulage capacity (in line with the increased coal production) from 19 Mtpa to 27 Mtpa product coal, and the construction of a second rail loading facility and associated conveyor system;
- Modifications to existing infrastructure (such as workshop and bath house), construction of additional ROM coal hoppers and the extension of ROM and product coal stockpiles; and
- A total workforce of approximately 2,600 at peak production, which represents an increase of approximately 1,610 from current staffing levels and an estimated additional 720 positions directly attributable to the Mt Arthur Coal Consolidation Project.

No changes to the mining method or hours of operation are proposed, although a gradual increase in the mobile equipment fleet will be required.

This report presents the results of a road traffic and coal transport impact assessment for the Project. Section 2 describes the roads and intersections in the vicinity of the Mt Arthur Coal Complex and the impacts upon them predicted due to potential increases in road traffic due to the Project. Section 3 describes the existing Mt Arthur Coal rail network and the impact of increased coal transport due to the proposed increase in coal production. Section 4 provides a summary of the road traffic and coal transport impacts and proposed management measures.

2 ROAD TRAFFIC

2.1 EXISTING ROAD NETWORK

2.1.1 Location

The Mt Arthur Coal Complex is located approximately 5 km south-west of Muswellbrook and approximately 120 km north-west of Newcastle, in New South Wales. The regional road network in the vicinity of the Project is shown on Figure 1. Vehicular access to the site is via the private Mt Arthur Coal Access Road which runs south off Thomas Mitchell Drive. Thomas Mitchell Drive runs between the New England Highway (to the east) and Denman Road (to the west). Existing local traffic is typical of a mixed rural-mining area.

2.1.2 Thomas Mitchell Drive

Thomas Mitchell Drive is a two lane 7 m wide sealed local road under the jurisdiction of the Muswellbrook Shire Council (MSC). At its eastern end it intersects the New England Highway approximately 10 km south-east of Muswellbrook. At its north-western end it intersects Denman Road approximately four km south-west of Muswellbrook (Figure 1).

Thomas Mitchell Drive provides access to the Mt Arthur Coal Complex, Drayton Mine, the Muswellbrook Industrial Estate and smaller local roads and private properties. It also provides an access route for some traffic associated with the Bengalla Mine and enables vehicles travelling between Denman Road and the New England Highway to bypass the township of Muswellbrook. The speed limit on Thomas Mitchell Drive is 100 km per hour.

2.1.3 Denman Road

Denman Road is a two lane 7 m wide sealed state road under the jurisdiction of the NSW Roads and Traffic Authority (RTA) but maintained by the MSC. It connects the New England Highway at Muswellbrook with the township of Denman to the south-west. The speed limit on Denman Road is 100 km per hour (Figure 1).

2.1.4 Denman Road / Thomas Mitchell Drive Intersection

The intersection of Denman Road and Thomas Mitchell Drive was upgraded approximately five years ago to cater for projected traffic volumes from mining operations in the area and the proposed Mount Pleasant Project.

The intersection has a T junction configuration and the following intersection turning movements (Plate 1):

- A designated deceleration lane on Denman Road for vehicles decelerating to turn left from Denman Road into Thomas Mitchell Drive;
- A designated acceleration lane for vehicles turning left from Thomas Mitchell Drive into Denman Road; and
- A type B rural right turn treatment for vehicles turning right from Denman Road into Thomas Mitchell Drive, which provides sufficient width to permit northbound vehicles to pass a stationery vehicle waiting to turn.

2.1.5 New England Highway

The New England Highway is a major state-controlled road under the jurisdiction of the RTA. It is a two lane, two-way sealed road with periodic passing lanes. It has a speed limit of 100 km per hour outside urban areas.

2.1.6 New England Highway / Thomas Mitchell Drive Intersection

The intersection of the New England Highway and Thomas Mitchell Drive has a T junction configuration and the following intersection turning movements (Plate 2):

- A designated deceleration lane on the New England Highway for vehicles turning left into Thomas Mitchell Drive;
- A designated right turn waiting lane on the New England Highway for vehicles turning right into Thomas Mitchell Drive; and
- Separate left and right turn lanes on Thomas Mitchell Drive for vehicles waiting to turn onto the New England Highway (northbound and southbound).

This intersection was upgraded approximately six years ago. Observations of existing traffic movements at the intersection during peak hour confirm that the Level of Service (LOS) of the intersection is already low. This is particularly evident with trucks turning right onto the New England Highway from Thomas Mitchell Drive being forced to accept gaps in through traffic which are less than desirable.

2.1.7 Mt Arthur Coal Access Road

The Mt Arthur Coal Access Road is a private access road located on crown land. It intersects Thomas Mitchell Drive approximately five km south-east of the Denman Road intersection.

2.1.8 Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection

The intersection of Thomas Mitchell Drive and the Mt Arthur Coal Access Road has a T junction configuration and the following intersection turning movements (Plate 3):

- A designated deceleration lane on Thomas Mitchell Drive for vehicles turning left into Mt Arthur Coal Access Road;
- A designated right turn waiting lane on Thomas Mitchell Drive for vehicles turning right into Mt Arthur Coal Access Road; and
- Pavement widening on the eastern side of Thomas Mitchell Drive to enable vehicles travelling eastbound on Thomas Mitchell Drive to pass a decelerating or stationary vehicle turning right into the Mt Arthur Coal Access Road.

2.1.9 Bayswater No. 2 Access Road

The Bayswater No. 2 Access Road is a private road which intersects Thomas Mitchell Drive approximately 2 km south of the Mt Arthur Coal Access Road intersection. It is a private road used by only a small portion of the Mt Arthur Coal workforce.

2.2 EXISTING ROAD TRAFFIC VOLUMES

As part of this assessment a traffic volume count was undertaken on Thomas Mitchell Drive, Denman Road, Mt Arthur Coal Access Road and Edderton Road from 31 October 2008 to 6 November 2008. The survey locations are shown on Figure 1 and the average weekday traffic volumes recorded during this survey are summarised in Table 1.

Also included in Table 1 is the RTA's currently available average annual daily traffic (AADT) data for the New England Highway at the two survey locations closest to the Project.

Table 1
2008 Traffic Count Data

Road	Location	Location	Direction	Daily Traffic (vehicles per day)		
				LV ⁽¹⁾	HV ⁽²⁾	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	T7	Eastbound (from Mt Arthur Coal)	627	70	697
			Westbound (to Mt Arthur Coal)	636	71	707
Thomas Mitchell Drive	At Denman Road intersection	T2	Eastbound	1,919	292	2,211
			Westbound	1,837	321	2,158
	At New England Highway intersection	T8	Eastbound	1,062	199	1,261
			Westbound	944	340	1,284
Denman Road	North of Thomas Mitchell Drive intersection	T1	Northbound	3,006	371	3,377
			Southbound	2,986	393	3,379
	South of Thomas Mitchell Drive intersection	T3	Northbound	1,668	296	1,964
			Southbound	1,624	356	1,980
New England Highway	Southern boundary of Muswellbrook	05.244 ⁽³⁾	Northbound	5,121	922	6,043 ⁽⁴⁾
			Southbound	5,276	949	6,225 ⁽⁴⁾
	Ravensworth	05.037 ⁽³⁾	Northbound	5,171	931	6,102 ⁽⁴⁾
			Southbound	5,109	919	6,028 ⁽⁴⁾
Edderton Road	South of Denman Rd intersection	T6	Northbound	302	63	365
			Southbound	312	55	367

(1) LV = Light vehicles, Austroads Classes 1 & 2 (cars & cars with trailers)

(2) HV = Heavy vehicles, Austroads Classes 3 and above (trucks – rigid and articulated)

(3) Indicates RTA Vehicle Survey Station Number

(4) RTA AADT (average annual daily traffic volumes)

Traffic volumes on the Bayswater No. 2 Access Road were not counted as part of this survey. Provision for additional vehicles that access the Mt Arthur Coal Complex via this road has been made in current traffic volumes used for prediction of background traffic volumes on the Mt Arthur Coal Access Road in future years, although a proportion of this traffic may continue to use Bayswater No. 2 Access Road to access the site.

Due to its minor nature, traffic volumes entering the site from Edderton Road were not counted as part of this survey. Any traffic entering the Mt Arthur Coal Complex from Edderton Road (as a result of the Project) will remain negligible with intermittent occurrences only required for access to equipment shutdown and/or construction activities.

2.3 EXISTING ROAD ACCIDENT STATISTICS

The accident statistics on the road network in the vicinity of the Project, for the period from 2002 to 2008, were obtained from the RTA. A summary of these is provided in Table 2.

The statistics indicate that few accidents have occurred on the road network in the vicinity of the Project. There were eight accidents recorded on Thomas Mitchell Drive, west of the point 500 m from the intersection with the New England Highway, during the seven year period between 2002 and 2008. Of these accidents three occurred at the Mt Arthur Coal Access Road intersection, two occurred approximately 600 m from the New England Highway intersection, one occurred approximately 4 km west of the New England Highway intersection and two occurred near Blakefield Road (approximately 2 km south of Denman Road). Of the accidents at the Mt Arthur Coal Access Road intersection one involved a rear-end collision between two cars on the Mt Arthur Coal Access Road, another accident involved a car travelling north on Thomas Mitchell Drive hitting a car turning out from the Mt Arthur Coal Access Road and the other involved a single vehicle hitting straying stock on the road at night time. Of the eight accidents on Thomas Mitchell Drive during the seven years there were four injuries and no fatalities.

A more detailed examination of the accident data for the New England Highway / Thomas Mitchell Drive intersection revealed that of the 19 accidents recorded in the vicinity of the intersection during the period, ten involved speed and three involved driver fatigue. Two of the accidents occurred within 10 m of the intersection and four accidents involved more than one vehicle. No fatalities occurred at the intersection during the period.

A total of 34 accidents were recorded on Denman Road, including the Thomas Mitchell Drive intersection, during the seven year period between 2002 and 2008. A more detailed examination of the accident data found that these were distributed along the full length of the road, between Denman and Muswellbrook, and that speed or fatigue was a factor in 13 accidents. Almost 80% of the recorded accidents involved single vehicles hitting animals (cattle or wildlife) or stationary objects on the side of the road (guardrail). The single fatality during this period occurred in 2003 when an articulated truck impacted a tree beside the road in wet weather. No other vehicles were involved.

Similarly, ten of the 12 accidents which occurred on Edderton Road during the seven year period involved a single vehicle hitting an animal, drain or pole. The single fatality during this period occurred in 2005, 2 km south of the Denman Road intersection, when a car impacted a utility pole. No other vehicles were involved.

Table 2
Road Accident Statistics 2002 to 2008

Location	Year	Number of Accidents ⁽¹⁾			
		Degree of Injury			Total
		Non-casualty	Injury	Fatality	
Thomas Mitchell Drive	2002	0	0	0	0
	2003	0	0	0	0
	2004	2	1	0	3
	2005	0	1	0	1
	2006	0	0	0	0
	2007	1	0	0	1
	2008 ⁽²⁾	1	2	0	3
Intersection of New England Highway & Thomas Mitchell Drive ⁽³⁾	2002	1	0	0	1
	2003	0	0	0	0
	2004	2	3	0	5
	2005	3	1	0	4
	2006	1	0	0	1
	2007	1	3	0	4
	2008 ⁽²⁾	4	0	0	4
Intersection of Denman Road & Thomas Mitchell Drive ⁽²⁾	2002	0	0	0	0
	2003	1	0	1	2
	2004	0	0	0	0
	2005	0	0	0	0
	2006	0	0	0	0
	2007	0	0	0	0
	2008 ⁽²⁾	0	0	0	0
Denman Road	2002	0	0	0	0
	2003	0	2	0	2
	2004	5	3	0	8
	2005	2	1	0	3
	2006	2	1	0	3
	2007	4	4	0	8
	2008 ⁽²⁾	3	5	0	8
Edderton Road	2002	1	1	0	2
	2003	1	0	0	1
	2004	0	0	0	0
	2005	0	1	1	2
	2006	2	1	0	3
	2007	0	2	0	2
	2008 ⁽²⁾	0	2	0	2

Location	Year	Number of Accidents ⁽¹⁾			
		Degree of Injury			Total
		Non-casualty	Injury	Fatality	
Intersection of Denman Road & Edderton Road ⁽²⁾	2003	0	0	0	0
	2004	0	0	0	0
	2005	1	0	0	1
	2006	0	0	0	0
	2007	0	0	0	0
	2008 ⁽²⁾	0	0	0	0

(1) Accident data provided by the RTA on 19 December 2008 and 3 June 2009.

(2) Intersections include lengths of adjoining roads within a 500 m radius of the intersections.

2.4 PREDICTED BACKGROUND ROAD TRAFFIC VOLUMES

2.4.1 Approved Mt Arthur Coal Projects

Mt Arthur Coal has approval for expansion of mining operations to 28 Mtpa ROM coal production, of which 20 Mtpa is from open cut mining. The predicted increase in traffic due to expansion of open cut mining operations has been estimated by interpolating existing traffic volumes on the Mt Arthur Coal Access Road for 2008 operations for which the workforce was 990 fulltime equivalent employees and annual ROM coal production was 13.9 Mtpa.

Mt Arthur Coal was granted approval for the Mt Arthur Coal Underground Project (MAU) in December 2008, the construction of which will result in increased traffic volumes on the surrounding road network, with access to the MAU via the Mt Arthur Coal Access Road. The maximum predicted operational workforce for the MAU is approximately 300 employees for 21 years following construction.

The predicted increase in traffic volumes due to the MAU have been obtained from the approved *Mt Arthur Coal Proposed Underground Project Environmental Assessment* (MAU EA) (Umwelt 2008) and are included in the predicted background traffic volumes summarised in Section 2.4.3.

2.4.2 Other Traffic-Generating Projects

At the time this assessment was undertaken a number of other mining projects were at various stages of approval and development in the area south and west of Muswellbrook. These projects range from minor extensions to existing mines, to new mine developments. The current status and the predicted impacts of these projects, in the event that they are developed, are summarised in Table 3.

Table 3
Approved Future Traffic-Generating Developments in the Vicinity of the Project

Project	Location / Access	Approval Status	Project Details / Traffic Generation
Mount Pleasant Project	Bengalla Link Road / Denman Road	Development consent granted in 1999. Currently undeveloped.	Peak operations workforce of 380 employees predicted in Year 13 ⁽¹⁾ . (Assuming a 2012 start, the earliest this workforce could be achieved is 2024.) The project has not proceeded to date and no public announcement has been made regarding commencement.
Drayton Mine Extension	Thomas Mitchell Drive	Approved February 2008.	Predicted workforce increase of 59 employees by Year 5 of operations. ⁽²⁾ Maximum approved total operational Drayton workforce of 388 persons.
Bengalla Mine Wantana Extension	Bengalla Link Road / Thomas Mitchell Drive	Approved July 2008.	Maximum approved total operational Bengalla workforce of 400 employees. ⁽³⁾
Mangoola Mine (formerly Anvil Hill)	Wybong Road	Approved June 2007.	Predicted workforce of 240 employees. ⁽⁴⁾

(1) *Mount Pleasant Mine Environmental Impact Statement (1997).*

(2) *Drayton Mine Extension Environmental Assessment (2007).*

(3) *Bengalla Mine Wantana Extension Statement of Environmental Effects (2007).*

(4) *Anvil Hill Project Environmental Assessment (2006).*

The proposed Drayton and Bengalla Wantana Extensions will generate additional traffic on the surrounding road network. Also, following completion of construction in 2009, the Bengalla Link Road extension will connect the existing Bengalla Link Road to Wybong Road providing an access route to the proposed Mangoola Mine (formerly named Anvil Hill Mine) and directing future traffic generated by that project onto Denman Road and the road network in the vicinity of the Mt Arthur Coal Complex. On this basis, the traffic predicted to be generated by all three of these projects has been considered in the prediction of future background traffic volumes on the surrounding road network.

Approval for the Mount Pleasant Project was granted in 1999, however construction has not commenced to date. It is not clear whether, and if so when, this project will proceed. In the event that it does proceed the *Mount Pleasant Mine EIS* (1997) indicates that the maximum operations workforce of 380 employees will not be present on site until Year 13 which, allowing for construction, could not be earlier than 2024 (current development consent expires in 2017). The *Mount Pleasant Mine EIS* predicts this will increase traffic volumes on the road network in the vicinity of the Mt Arthur Coal Complex as follows:

- Bengalla Link Road – 408 vehicles per day (vpd);
- Denman Road (north-east of Bengalla Link Road) – 416 vpd;
- Denman Road (south-west of Bengalla Link Road) – 16 vpd;
- Thomas Mitchell Drive – 186 vpd; and
- New England Highway (south of Thomas Mitchell Drive) – 187 vpd.

Due to the uncertainty regarding this project these traffic volumes have not been included in the background traffic volumes predicted for, and used in, this traffic assessment, which is conservative as it proportionately increases the relative impacts of this Project.

Increases in traffic volumes due to other proposed land use changes in the area, including extension of the Muswellbrook Industrial Estate and residential subdivision developments in the area, are more minor in nature and are adequately accounted for in annual growth allowances applied to background traffic volumes.

2.4.3 Predicted Background Traffic Volumes

As described in the following sections of this report, the Project will have maximum impact on road traffic volumes in years 2011 and 2014. Therefore, to enable worst-case assessment of the impacts of the Project on the surrounding road network, the background traffic volumes on the road network have been predicted for these years. Traffic volumes for 2019 have also been predicted to address the RTA requirement for 10 year traffic growth predictions.

The background traffic volumes have been calculated by adding predicted traffic generation due to approved Mt Arthur Coal projects (Section 2.4.1) to the recorded 2008 traffic count data, factoring these volumes up (or down) by an average annual growth factor (which varies depending on the road) and adding the traffic volumes predicted to be generated by other approved developments in the area such as the Mangoola Mine, Drayton Extension and Bengalla Wantana Extension (Section 2.4.2).

The average annual growth factors applied to the roads in the vicinity of the Project were advised by the RTA and are as follows:

- 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%.

The resulting predicted background traffic volumes on the surrounding road network for 2011, 2014 and 2019 are summarised in Table 4, Table 5 and Table 6.

Table 4
Predicted 2011 Background Traffic Volumes*

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound (from Mt Arthur Coal)	1,333	131	1,464
		Westbound (to Mt Arthur Coal)	1,348	132	1,480
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	2,487	338	2,825
		Westbound	2,396	369	2,765
	East of Mt Arthur Coal Access Rd	Eastbound	1,445	254	1,699
		Westbound	1,322	404	1,726
Denman Road	North of Thomas Mitchell Drive	Northbound	3,781	427	4,208
		Southbound	3,763	450	4,213
	South of Thomas Mitchell Drive	Northbound	2,018	337	2,355
		Southbound	1,970	401	2,371
New England Highway	Southern boundary of Muswellbrook	Northbound	5,174	929	6,103
		Southbound	5,329	957	6,286
	Ravensworth	Northbound	5,361	952	6,313
		Southbound	5,298	941	6,239

(* includes approved Mt Arthur Coal projects & other traffic-generating developments)

Table 5
Predicted 2014 Background Traffic Volumes*

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound (from Mt Arthur Coal)	1,333	131	1,464
		Westbound (to Mt Arthur Coal)	1,348	132	1,480
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	2,612	357	2,969
		Westbound	2,515	390	2,905
	East of Mt Arthur Coal Access Rd	Eastbound	1,514	267	1,781
		Westbound	1,383	426	1,809
Denman Road	North of Thomas Mitchell Drive	Northbound	3,976	451	4,427
		Southbound	3,957	476	4,433
	South of Mitchell Drive	Northbound	2,127	356	2,483
		Southbound	2,077	424	2,501
New England Highway	Southern boundary of Muswellbrook	Northbound	5,205	935	6,140
		Southbound	5,361	963	6,324
	Ravensworth	Northbound	5,256	933	6,189
		Southbound	5,194	922	6,116

(* includes approved Mt Arthur Coal projects & other traffic-generating developments)

Table 6
Predicted 2019 Background Traffic Volumes*

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound (from Mt Arthur Coal)	1,333	131	1,464
		Westbound (to Mt Arthur Coal)	1,348	132	1,480
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	2,837	391	3,228
		Westbound	2,731	427	3,158
	East of Mt Arthur Coal Access Rd	Eastbound	1,638	290	1,929
		Westbound	1,493	466	1,959
Denman Road	North of Thomas Mitchell Drive	Northbound	4,329	494	4,823
		Southbound	4,307	522	4,829
	South of Thomas Mitchell Drive	Northbound	2,322	391	2,713
		Southbound	2,267	466	2,733

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
New England Highway	Southern boundary of Muswellbrook	Northbound	5,257	944	6,201
		Southbound	5,415	972	6,387
	Ravensworth	Northbound	5,085	902	5,987
		Southbound	5,024	892	5,916

(* includes approved Mt Arthur Coal projects & other traffic-generating developments)

2.5 PREDICTED PROJECT TRAFFIC VOLUMES

2.5.1 Introduction

It is proposed that construction of the Project will commence in 2010. Proposed construction activities which will potentially impact road traffic volumes include the following:

- Extension of the mine footprint and increase in ROM coal production;
- Upgrade of the existing CHPP;
- Modification of existing infrastructure (administration offices, bathhouses, workshops and car parks); and
- Construction of a second rail loading facility and conveyor system.

The Project's construction phase is estimated to employ a maximum construction workforce of 240 fulltime equivalent employees around 2011. The Project will progressively commence operations from 2012 and the Mt Arthur Coal Complex is predicted to reach maximum coal production of 36 Mtpa ROM by 2014. By that time the total Mt Arthur Coal workforce is estimated to be 2,600 employees including the 720 additional fulltime equivalent employees due to this Project.

On this basis the critical years for assessment of the Project's traffic-generation impacts are 2011 and 2014, when the additional traffic volumes generated by construction and operations respectively will be highest compared with background traffic volumes on the surrounding road network. From 2015 onward, the background traffic volumes will increase relative to Project-generated traffic making the impacts of the Project less significant.

The following assumptions regarding Project workforce and other traffic were made during assessment:

- All employees and contractors associated with the operation of the Project will access the site using the existing Mt Arthur Coal Access Road;
- Existing workforce carpooling arrangements will continue with approximately 85 vehicles travelling to and from site for every 100 employees;
- Shift arrangements will remain substantially unchanged;
- The relative proportion of workforce residential locations will remain approximately as stated in the MAU EA; and
- The maximum percentage of the total Project workforce that will travel to site on a weekday is 70%.

The Mt Arthur Coal Complex currently operates 24 hours per day, 7 days per week. The management and administration staff which comprises approximately 25% of the existing workforce, typically work weekdays starting between 6.30 and 8.00 am and finishing between 3.30 and 6.00 pm. The remainder of the workforce is divided into two shifts – day-time shift, which commences at 6.30 am, and night-time, which commences at 6.30 pm.

The MAU project will introduce a third shift per day, however that workforce will operate independent of the proposed shift arrangements for this Project, which will be based on those for the existing operation.

2.5.2 Construction Phase Traffic Volumes

The construction workforce will peak at 240 fulltime equivalent employees in 2011 and generate additional light vehicle traffic to and from the site. In addition to this workforce, equipment and materials will be required and an allowance of 10 daily additional heavy vehicle movements to and from site has been made for this. Therefore the worst-case weekday traffic volumes predicted to occur during construction of the Project are 142 light vehicles and 10 heavy vehicles (each way), distributed on the existing road network as summarised in Table 7.

Table 7
Predicted Project Construction Phase Traffic Volumes (2011)

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound (from Mt Arthur Coal)	142	10	152
		Westbound (to Mt Arthur Coal)	142	10	152
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	93	7	100
		Westbound	93	7	100
	East of Mt Arthur Coal Access Rd	Eastbound	49	3	52
		Westbound	49	3	52
Denman Road	North of Thomas Mitchell Drive	Northbound	84	5	89
		Southbound	84	5	89
	South of Thomas Mitchell Drive	Northbound	9	2	11
		Southbound	9	2	11
New England Highway	Southern boundary of Muswellbrook	Northbound	0	0	0
		Southbound	0	0	0
	Ravensworth	Northbound	49	3	52
		Southbound	49	3	52

2.5.3 Operational Phase Traffic Volumes

The operations workforce required for the Project will peak at 720 fulltime equivalent employees from 2014 onward. In addition to traffic generated by this workforce, traffic will be generated by visitors and service and delivery vehicles travelling to the site with mining equipment, fuel, spare parts and other supplies.

A maximum daily allowance of the following has been made for such traffic:

- Visitors - 10 additional light vehicles to and from site daily; and
- Service and delivery vehicles - 10 additional light vehicles and 20 additional heavy vehicles to and from site daily.

Therefore, the worst-case weekday traffic volumes predicted to occur once full operation of the Project is reached, are 448 light vehicles and 20 heavy vehicles (each way), distributed on the existing road network as summarised in Table 8.

Table 8
Predicted Project Operations Phase Traffic Volumes (2014)

Road	Location	Direction	Daily Traffic (vehicles per day)		
			LV	HV	Total
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound (from Mt Arthur Coal)	448	20	468
		Westbound (to Mt Arthur Coal)	448	20	468
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	291	13	304
		Westbound	291	13	304
	East of Mt Arthur Coal Access Rd	Eastbound	157	7	164
		Westbound	157	7	164
Denman Road	North of Thomas Mitchell Drive	Northbound	264	9	273
		Southbound	264	9	273
	South of Thomas Mitchell Drive	Northbound	27	4	31
		Southbound	27	4	31
New England Highway	Southern boundary of Muswellbrook	Northbound	0	0	0
		Southbound	0	0	0
	Ravensworth	Northbound	157	7	164
		Southbound	157	7	164

2.6 IMPACT ON ROAD TRAFFIC VOLUMES

The impact of the Project on the surrounding road traffic volumes has been assessed for years 2011 and 2014, which are the two years in which the Project's impact will be greatest compared with background traffic volumes.

Table 9 summarises the total peak weekday traffic volumes and percentage of heavy vehicles (%HV) predicted on the surrounding road network in 2011 for two scenarios, without the Project (background) and with the Project. It shows that the Project's greatest impact on the adjacent road network traffic volumes will be on Thomas Mitchell Drive, between the Mt Arthur Coal Access Road and Denman Road intersections, where the traffic volumes have been predicted to increase by up to a maximum of 3.6%.

Table 9
Predicted 2011 Traffic Volumes

Road	Location	Direction	Without Project		With Project		Change
			Total Traffic	% HV	Total Traffic	% HV	Total Traffic
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound	1,464	8.9	1,616	8.7	10.4%
		Westbound	1,480	8.9	1,632	8.7	10.3%
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	2,825	12.0	2,925	11.8	3.5%
		Westbound	2,765	13.3	2,865	13.1	3.6%
	East of Mt Arthur Coal Access Rd	Eastbound	1,699	14.9	1,751	14.7	3.1%
		Westbound	1,726	23.4	1,778	22.9	3.0%
Denman Road	North of Thomas Mitchell Drive	Northbound	4,208	10.1	4,297	10.0	2.1%
		Southbound	4,213	10.7	4,302	10.6	2.1%
	South of Thomas Mitchell Drive	Northbound	2,355	14.3	2,366	14.3	0.4%
		Southbound	2,371	16.0	2,382	16.9	0.4%
New England Highway	Southern boundary of Muswellbrook	Northbound	6,103	15.2	6,103	15.2	0%
		Southbound	6,286	15.2	6,286	15.2	0%
	Ravensworth	Northbound	6,313	15.1	6,365	15.0	0.8%
		Southbound	6,239	15.1	6,291	15.0	0.9%

Table 10 summarises the total peak weekday traffic volumes and percentage of heavy vehicles (%HV) predicted on the surrounding road network in 2014 for two scenarios, without the Project (background) and with the Project. It shows that the Project's greatest impact on the adjacent road network traffic volumes will be on Thomas Mitchell Drive, where the traffic volumes have been predicted to increase by up to a maximum of 10.5% and 9.2% west and east of the Mt Arthur Coal Access Road respectively.

Traffic volumes on Denman Road between Thomas Mitchell Drive and Muswellbrook may also increase by up to 6.2% with the Project in 2014.

Table 10
Predicted 2014 Traffic Volumes

Road	Location	Direction	Without Project		With Project		Change
			Total Traffic	% HV	Total Traffic	% HV	Total Traffic
Mt Arthur Coal Access Road	Thomas Mitchell Drive intersection	Eastbound	1,464	8.9	1,932	7.8	32%
		Westbound	1,480	8.9	1,948	7.8	31%
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	Eastbound	2,969	12.0	3,273	11.3	10.3%
		Westbound	2,905	13.4	3,209	12.5	10.5%
	East of Mt Arthur Coal Access Rd	Eastbound	1,781	15.0	1,945	14.1	9.2%
		Westbound	1,809	23.5	1,973	21.9	9.1%
Denman Road	North of Thomas Mitchell Drive	Northbound	4,427	10.2	4,700	9.8	6.2%
		Southbound	4,433	10.7	4,706	10.3	6.2%
	South of Thomas Mitchell Drive	Northbound	2,483	14.1	2,514	14.3	1.2%
		Southbound	2,501	17.0	2,532	16.9	1.2%
New England Highway	Southern boundary of Muswellbrook	Northbound	6,140	15.2	6,140	15.2	0%
		Southbound	6,324	15.2	6,324	15.2	0%
	Ravensworth	Northbound	6,189	15.1	6,353	14.8	2.6%
		Southbound	6,116	15.1	6,280	14.8	2.7%

For both years assessed (2011 and 2014) the proportion of heavy vehicles using the road network, compared with total road traffic volumes, will be less with the Project.

2.7 IMPACT ON LEVEL OF SERVICE

The “*Level of Service*” is defined in the Austroads (1988) *Guide to Traffic Engineering Practice Part 2* as a qualitative measure of the operational conditions within a traffic stream as perceived by motorists and passengers. The categories generally describe the conditions in terms of factors including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. There are six levels of service ranging from A to F. Level A represents the best operating condition of free flow, virtually unaffected by the presence of other vehicles, while Level F represents the worst operating condition with forced or break-down flow.

The predicted total daily traffic volumes and level of service (LOS) on the surrounding road network in 2011, for the two scenarios without the Project (background) and with the Project, are summarised in Table 11. It shows that the predicted increase in traffic volumes on the adjacent road network will not cause any change to the LOS experienced by road users.

Table 11
Predicted 2011 Levels of Service

Road	Location	Without Project		With Project		Change in LOS
		AWT	LOS	AWT	LOS	
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	5,590	D	5,790	D	No change
	East of Mt Arthur Coal Access Rd	3,425	C	3,529	C	No change
Denman Road	North of Thomas Mitchell Drive	8,421	D	8,599	D	No change
	South of Thomas Mitchell Drive	4,726	B	4,748	B	No change
New England Highway	Southern boundary of Muswellbrook	12,389	D	12,389	D	No change
	Ravensworth	12,552	D	12,656	D	No change

(AWT = average weekday traffic and represents the combined traffic volumes in both directions)

The predicted total daily traffic volumes and LOS on the surrounding road network in 2014, for the two scenarios without the Project (background) and with the Project, are summarised in Table 12. It shows that the predicted increase in traffic volumes on the adjacent road network will not cause any change to the LOS experienced by road users, except on Thomas Mitchell Drive between the Mt Arthur Coal Access Road and Denman Road, where the LOS will change from D to E with the Project.

Table 12
Predicted 2014 Levels of Service

Road	Location	Without Project		With Project		Change in LOS
		AWT	LOS	AWT	LOS	
Thomas Mitchell Drive	West of Mt Arthur Coal Access Rd	5,874	D	6,482	E	D to E
	East of Mt Arthur Coal Access Rd	3,590	C	3,918	C	No change
Denman Road	North of Thomas Mitchell Drive	8,860	D	9,406	D	No change
	South of Thomas Mitchell Drive	4,984	B	5,046	B	No change
New England Highway	Southern boundary of Muswellbrook	12,464	D	12,464	D	No change
	Ravensworth	12,305	D	12,633	D	No change

(AWT = average weekday traffic and represents the combined traffic volumes in both directions)

2.8 IMPACT ON INTERSECTIONS

2.8.1 Introduction

An investigation of the following key intersections which may be impacted by Project-generated traffic has been undertaken as part of this assessment (Appendix A):

- Denman Road / Thomas Mitchell Drive intersection;
- New England Highway / Thomas Mitchell Drive intersection; and
- Thomas Mitchell Drive / Mt Arthur Coal Access Road intersection.

The predicted future weekday traffic volumes summarised in Section 2.6 (background and with the Project) were broken down into morning (AM) and afternoon (PM) peak hour traffic movements at these intersections, based on existing turning movement distributions, so that further simulation of the intersection performance could be undertaken.

The SIDRA traffic engineering software package was used to determine the LOS for each turning movement and the intersection as a whole, for each intersection in 2011 and 2019. SIDRA is an analytical traffic evaluation tool that is used in the design and evaluation of intersections to assess intersection capacity, level of service and performance.

For this intersection assessment, Year 2019 was generally assessed in lieu of 2014 following preliminary assessment of the existing two Thomas Mitchell Drive intersections which indicated that both intersections will perform poorly in 2011, even without the Project. Results for the 2019 assessment, based on the same project-generated traffic as 2014 plus higher background traffic volumes, give a more relevant indication of long-term volumes and intersection performance, in accordance with RTA assessment requirements.

The LOS at an intersection is based on the average delay per vehicle and can be applied to both an individual movement and a full intersection. Levels of service are ranked from A to E. The delay times used in the determination of LOS can vary. The delay times used by the RTA, and referred to in the following sections and the corresponding detailed reports in Appendix A, are stated in Table 4.2 of the RTA's *"Guide to Traffic Generating Developments"* and are summarised in Table 13.

Table 13
Intersection Level of Service Performance Categories

Level of Service	Average Delay per vehicle (seconds)	Description
A	Delay less than 14	Good
B	Delay between 15 and 28	Acceptable
C	Delay between 29 and 42	Satisfactory
D	Delay between 43 and 56	Near capacity
E	Delay between 57 and 70	At capacity
F	Delay greater than 70	Unsatisfactory

Source: RTA "Guide to Traffic Generating Developments" (2002)

A SIDRA analysis of the Denman Road / Bengalla Link Road intersection was not undertaken as part of this assessment. There is currently no through-traffic using Bengalla Link Road which terminates at Bengalla Mine. With the completion of the Bengalla Link Road extension, there may be an increase in traffic travelling to and from Denman Road from areas to the north-west.

This traffic assessment has predicted that the volume of traffic on Denman Road immediately south of Thomas Mitchell Drive, will increase by a maximum of 31 vehicles (1.2%) with the Project, for the worst-case scenario in 2014, and the volume of Project-generated traffic which is likely to use the Bengalla Link Road is expected to be negligible. Therefore the impact of the Project on the capacity of the Denman Road / Bengalla Link Road intersection will be negligible.

2.8.2 Denman Road / Thomas Mitchell Drive Intersection

The results of the SIDRA analysis for this intersection indicate that the critical turning movement is a right turn movement from Thomas Mitchell Drive to Denman Road. The average delay periods and 95th percentile queue lengths for this critical movement, without and with the Project, in 2011, 2014 and 2019 are summarised in Table 14 and further detailed in Appendix A. (The 95th percentile queue length represents the maximum queue length experienced by 95% of the vehicles making the turning movement).

Table 14
Denman Road / Thomas Mitchell Drive Intersection
SIDRA Analysis Summary of 2011, 2014 and 2019 Traffic Volumes for Existing
Intersection

Year	With or without Project	Average delay (seconds)		Level of service		95% Back of Queue (m)	
		AM	PM	AM	PM	AM	PM
2011	Without Project	23	34	B	C	28	88
	With Project	24	38	B	C	31	101
2014	Without Project	29	39	C	C	33	101
	With Project	32	45	C	D	44	117
2019	Without Project	32	56	C	D	36	133
	With Project	37	109	C	F	49	230

(for critical right turn movement from Thomas Mitchell Drive)

The LOS results tabulated indicate that the existing intersection configuration will perform with a 'satisfactory' LOS in 2011 both without and with the proposed Project. Therefore the analysis was extended to 2014 to determine the intersection performance when the Project becomes fully operational. By 2019, the LOS of the intersection is predicted to be on the 'capacity' / 'near capacity' threshold without the Project, and predicted to be 'unsatisfactory' with the Project.

The SIDRA analysis has been extended to assess the intersection following upgrade to a full seagull and the corresponding predicted LOS of the upgraded intersection with the Project is 'acceptable'. The full results of this SIDRA analysis, including predicted delay periods, are provided in Appendix A.

2.8.3 New England Highway / Thomas Mitchell Drive Intersection

The results of the SIDRA analysis for this intersection indicate that the critical turning movement is a right turn movement from Thomas Mitchell Drive to the New England Highway. The average delay periods and 95th percentile queue lengths for this critical movement, without and with the Project, in 2011 and 2019 are summarised in Table 15 and further detailed in Appendix A.

Table 15
New England Highway / Thomas Mitchell Drive Intersection
SIDRA Analysis Summary of 2011 and 2019 Traffic Volumes for Existing Intersection

Year	With or without Project	Average delay (seconds)		Level of service		95% Back of Queue (m)	
		AM	PM	AM	PM	AM	PM
2011	Without Project	56	42	D	C	57	41
	With Project	97	68	F	E	103	71
2019	Without Project	286	124	F	F	221	102
	With Project	600	332	F	F	417	293

(for critical right turn movement from Thomas Mitchell Drive)

The LOS results tabulated indicate that the existing intersection configuration will perform on the LOS threshold of 'satisfactory' and 'near capacity' in 2011, even without the proposed Project. The LOS is predicted to be 'unsatisfactory' with the Project in 2011. Without upgrade, the intersection would be performing 'unsatisfactory' by 2019 without or with the Project.

As noted in Section 2.1.6, observations of existing traffic movements at the intersection during peak hour confirm that the LOS of the intersection is already low. This is particularly evident with trucks turning right onto the New England Highway from Thomas Mitchell Drive being forced to accept gaps in through traffic which are less than desirable.

The SIDRA analysis has been extended to assess the intersection following upgrade. The corresponding predicted LOS with the Project, in both 2011 and 2019, is 'acceptable'. The full results of this SIDRA analysis, including predicted delay periods, are provided in Appendix A.

2.8.4 Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection

The results of the SIDRA analysis for this intersection indicate that the critical turning movement is a right turn movement from the Mt Arthur Coal Access Road to Thomas Mitchell Drive. The average delay periods and 95th percentile queue lengths for this critical movement, without and with the Project, in 2011 and 2019 are summarised in Table 16 and further detailed in Appendix A.

Table 16
Thomas Mitchell Drive / Mt Arthur Coal Access Road
SIDRA Analysis Summary of 2011 and 2019 Traffic Volumes for Existing Intersection

Year	With or without Project	Average delay (seconds)		Level of service		95% Back of Queue (m)	
		AM	PM	AM	PM	AM	PM
2011	Without Project	9	9	A	A	0	0
	With Project	9	9	A	A	0	0
2019	Without Project	9	9	A	A	0	0
	With Project	9	9	A	A	0	0

(for critical right turn movement from Thomas Mitchell Drive)

The results indicate that the existing intersection configuration will operate well in 2011 and 2019, with and without the proposed Project.

2.8.5 Night-time Safety Audit of Intersections

The Project Approval conditions for the Mt Arthur Coal South Pit Extension required that a night-time road safety audit be undertaken for the Denman Road / Thomas Mitchell Drive intersection and the New England Highway / Thomas Mitchell Drive intersection. The necessary inspections were undertaken in October and November 2008 and the findings were documented in the *Mt Arthur Coal Mine Thomas Mitchell Drive Road Safety Audit* (January 2009) prepared by Northern Transport Planning and Engineering on behalf of Mt Arthur Coal.

This audit report summarised the road environment and identified any major deficiencies in road signage and pavement markings at the two intersections. The audit concluded that identified deficiencies have the potential to impact the readability of the intersections and that the combination of these deficiencies and driver fatigue may potentially contribute toward a reduction in road safety at these intersections. The audit recommended a full review of signposting and delineations at both intersections in order to ensure that they meet standard requirements. It specifically recommended that the speed limit on Thomas Mitchell drive on the western approach to the New England Highway intersection, should be reduced from 100 kph to 80 kph, and that advance direction and intersection direction signposting be provided in accordance with normal standards. The responsibility for such work lies with the RTA and MSC. A copy of the report was provided to RTA and MSC.

2.9 IMPACT ON ROAD SAFETY

As noted in Section 2.3, a review of road accident statistics for the surrounding network indicates that there are no recurring traffic accident trends in the vicinity of the Project.

This assessment has noted that there will be an increase in total road traffic volumes due to the Project. It has also determined that the existing Thomas Mitchell Drive / Denman Road intersection and Thomas Mitchell Drive / New England Highway intersection will require upgrade by 2011, even without additional traffic volumes due to the Project, in order to maintain a satisfactory level of service.

2.10 IMPACTS DUE TO BLASTING

All blasting at the Mt Arthur Coal Complex is undertaken in accordance with Mt Arthur Coal's existing *Blast Management Plan*, which prescribes the system for monitoring, assessment, impact mitigation and reporting of blasting activities.

From 2009 onward, blasting operations associated with existing approved open cut operations will include blasting within 500 m of Denman Road, and subsequently require temporary closure of parts of Denman Road between the Thomas Mitchell Drive and Edderton Road intersections. Road closures are likely to occur approximately three times per week for periods of several weeks at a time, up to a maximum of approximately 120 closures per year.

Any temporary road closures will be undertaken in accordance with Mt Arthur Coal's *Denman Road Closure Management Plan* (2007) which has been prepared in consultation with the RTA, MSC and NSW Department of Planning. It is envisaged that closures of Denman Road will occur for a period of approximately 10 to 15 minutes and generally only on weekdays between 9 am and 5 pm. The potential impacts that may result from temporary road closures during blasting include the following:

- Disruption to road traffic flows;
- Longer local trip durations for through traffic;
- Impacts on emergency services; and
- Temporary access restrictions for residents to local properties along sections of closed roads.

The *Denman Road Closure Management Plan* forms part of the Mt Arthur Coal Environmental Management System and provides a framework to coordinate safe and efficient road closures by:

- Ensuring safety and protection of potentially affected persons and property;
- Minimising road closure periods;

- Minimising potential impacts on road users, local residents and businesses;
- Notifying relevant stakeholders in advance of temporary road closures; and
- Ensuring that emergency service activities are not restricted by road closures.

Mt Arthur Coal also has existing approval and will undertake temporary closure of Edderton Road when blasting operations require blasting within 500 m of Edderton Road.

2.11 PROPOSED EDDERTON ROAD REALIGNMENT

2.11.1 Existing Edderton Road

Edderton Road is a rural road which intersects Denman Road approximately 10 km south-west of Muswellbrook. It is approximately 14.8 km long and has a speed limit of 100 km per hour. It has a 14 tonne load limit, restricting use by vehicles weighing more than that from using Edderton Road. This is enforced by the MSC in order to extend the life of the road pavement.

Edderton Road joins Denman Road, at the north, to the Golden Highway, at the south. The time taken to travel on Edderton Road, from Denman Road to the Golden Highway, is approximately 10 minutes, corresponding to an average travel speed of 90 km per hour.

As part of the traffic volume count undertaken for this traffic assessment in 2008 (refer Section 2.2) the average weekday traffic volumes recorded on Edderton Road, just south of the Denman Road intersection, were as follows:

- Northbound – 365 vehicles (302 light vehicles, 63 heavy vehicles); and
- Southbound – 367 vehicles (312 light vehicles, 55 heavy vehicles).

In accordance with the load limit on Edderton Road, the majority of heavy vehicles counted were Austroads class 3 (average of 46 vpd northbound and 39 vpd southbound) with some class 4 (average of 10 vpd northbound and 9 vpd southbound) and a few class 5 to 9 vehicles. No vehicles in classes 10 or above were counted during the survey period (classes 3, 4 and 5 include non-articulated trucks with two, three and four axles respectively).

2.11.2 Proposed Realignment

The traffic volumes on Edderton Road are not predicted to be impacted by the Project as only a small amount of Project-generated traffic will travel to and from the site on Denman Road south of the Thomas Mitchell Drive intersection and the number of these vehicles which may use Edderton Road is expected to be negligible.

The Project includes the realignment of the northern part of Edderton Road in (approximately) 2019. The two proposed Edderton Road realignment options are shown on Figure 1 and include realignment of both a portion of the Edderton Road and relocation of the Denman Road / Edderton Road intersection. These options are as follows:

- Option 1 – relocation of approximately 5 km of Edderton Road outside of ML 1358 and the existing approved open cut mining disturbance area; and
- Option 2 – relocation of approximately 6 km of Edderton Road to the alignment initially proposed in the *Bayswater 3 EIS* and also presented in the *MAU EA*.

The two potential realignment options have been proposed with consideration of the local topography, economic feasibility, and provision of buffer zones, to provide sufficient flexibility in road design in order to address issues which may potentially arise during the detailed design phase.

The increase in road length and the calculated change in travel times for vehicles using Edderton Road have been assessed for both realignment options and are summarised in Table 17.

Table 17
Edderton Road Realignment Options

Detail	Option 1	Option 2
Length of realignment	5.4 km	6.2 km
Average travel speed on realignment	90 km/hr	70 km/hr
Travel time from Denman Road to end of realignment*	3.6 minutes	5.3 minutes
Increase in travel time when travelling on Edderton Road (toward Golden Highway) from Muswellbrook direction	1.3 minutes	3.0 minutes
Decrease in travel time when travelling on Edderton Road (toward Golden Highway) from Denman direction	1.7 minutes	0

(* based on average travel speed stated for the realignment option)

The design of the proposed Edderton Road realignment and subsequent relocation, and reconstruction of the Denman Road / Edderton Road intersection, will be undertaken in consultation with the RTA and the MSC. The design of the proposed new Denman Road / Edderton Road intersection will be of a similar standard to the existing intersection. All design and construction work associated with the realignment will be undertaken in accordance with applicable design guidelines and standards.

3 RAIL TRAFFIC

3.1 EXISTING RAIL TRAFFIC

Mt Arthur Coal currently produces coal for both export and domestic markets. Export coal is loaded onto trains via the Rail Loading Facility and railed to the Port of Newcastle via the Antiene Rail Spur and the Main Northern Railway Line (Figure 1) in accordance with the Development Consent Conditions for the Rail Loading Facility and Rail Loop (DA 105-04-00). Mt Arthur Coal currently has approval for the rail transport of up to 19 Mtpa coal and, in accordance with the MAU Project Approval (06_0091), approval for a maximum of 24 train movements per day from the Mt Arthur Coal Complex on the Antiene Rail Spur, except under an agreement with Drayton Mine to use some of Drayton Mine's approved train movements.

Coal for domestic use is transported via conveyor directly to Macquarie Generation's Bayswater Power Station.

3.2 PROJECT COAL TRANSPORT

All coal produced by the Project will either continue to be conveyed directly to Macquarie Generation's Bayswater Power Station or exported to the Port of Newcastle, using the existing rail network. No coal will be hauled on public roads except in the case of an emergency.

This application includes the construction and operation of a second train loading facility and associated conveyor system, and to increase the approved product coal rail volume from 19 Mtpa to 27 Mtpa. (One rail movement represents one train, travelling to or from the Rail Loading Facility, with one arrival and subsequent departure comprising a total of two movements).

The maximum approved number of daily rail movements to and from the Mt Arthur Coal Complex with the Project will not increase from the currently approved level of 24 rail movements per day. At peak production, the daily average rail movements will be 22, assuming 7,000 tonne capacity trains (based on average 2008 rail volumes). However the proposed increase in total coal haulage will result in an increase in the number of days per year when rail movements will be up to the maximum number of 24 rail movements per day.

3.3 COAL TRANSPORT IMPACTS

Mt Arthur Coal is currently consulting with Australian Rail Track Corporation (ARTC) regarding approval for haulage of additional coal generated by the Project. There will be no increase in the maximum number of daily rail movements to and from the Mt Arthur Coal Complex required for the Project. Any additional train movements resulting from transport of additional coal produced by the Project will be undertaken in accordance with existing development consents.

Previous assessments have identified potential impacts for road users where Antiene Railway Station Road crosses the Antiene Rail Spur Line. The current signalling system on the spur line results in coal trains waiting for a signal to proceed, sometimes blocking the level crossing road access on Antiene Railway Station Road, and potentially causing inconvenience to road users (Figure 1).

Mt Arthur Coal has recognised that the increase in train movements associated with the Project has the potential to increase the frequency of trains blocking the crossing. There are a number of organisations that are relevant to this issue including Anglo Coal (the lessee of the Antiene Rail Spur Line), MSC (roads authority for Antiene Railway Station Road), Macquarie Generation (operator of an adjacent rail unloading facility and owner of the land on which the crossing is currently located), the ARTC and Mt Arthur Coal as a user of the Antiene Rail Spur Line. Mt Arthur Coal will continue to implement rail management measures to minimise inconvenience to users of this road.

4 SUMMARY AND MITIGATION

4.1 SUMMARY OF IMPACTS

The traffic impacts predicted due to the Project are summarised as follows:

- A maximum increase in road traffic volumes attributable to the Project in 2011 of:
 - o 3.6% on Thomas Mitchell Drive, between the Mt Arthur Coal Access Road and Denman Road;
 - o 3.1% on Thomas Mitchell Drive, between the Mt Arthur Coal Access Road and New England Highway;
 - o 2.1% on Denman Road north of Thomas Mitchell Drive;
 - o 0.4% on Denman Road south of Thomas Mitchell Drive;
 - o 0% on the New England Highway north of Thomas Mitchell Drive;
 - o 0.9% on the New England Highway south of Thomas Mitchell Drive.
- A maximum increase in road traffic volumes attributable to the Project in 2014 of:
 - o 10.5% on Thomas Mitchell Drive, between the Mt Arthur Coal Access Road and Denman Road;
 - o 9.2% on Thomas Mitchell Drive, between the Mt Arthur Coal Access Road and New England Highway;
 - o 6.2% on Denman Road north of Thomas Mitchell Drive;
 - o 1.2% on Denman Road south of Thomas Mitchell Drive;
 - o 0% on the New England Highway north of Thomas Mitchell Drive;
 - o 2.7% on the New England Highway south of Thomas Mitchell Drive.
- No change in the predicted level of service on the road network in 2011 due to the Project.
- No change in the predicted level of service on the road network in 2014 due to the Project except on Thomas Mitchell Drive west of the Mt Arthur Coal Access Road.
- No change in the level of service of the Thomas Mitchell Drive / Mt Arthur Coal Access Road intersection predicted in 2011 or 2019 due to the Project.
- The LOS of the existing Thomas Mitchell Drive / Denman Road intersection is predicted to be operating 'satisfactory' with the Project in 2011, but the intersection is predicted to be operating at 'near capacity' for the critical right turn movement without the Project and 'unsatisfactory' with the Project in 2019.
- The LOS of the existing Thomas Mitchell Drive / New England Highway intersection is predicted to be operating 'near capacity' for the critical right turn movement by 2011 without the Project and with the Project. By 2019, the intersection is predicted to be operating 'unsatisfactory' without the Project.
- Continued short-term temporary closures of sections of Denman and Edderton Roads due to blasting.

- Potential increase in travel time of between 1 minute 20 seconds, up to 3 minutes, for vehicles travelling from Muswellbrook to the Golden Highway via the realigned Edderton Road.
- Reduction or no change in travel time for vehicles travelling from Denman to the Golden Highway via Edderton Road.
- An increase in quantity of coal to be railed on the Antiene Rail Spur Line and the Main Northern Railway Line, but no increase in the number of approved daily rail movements.

4.2 IMPACT MANAGEMENT AND MITIGATION MEASURES

The two major public road intersections used by traffic travelling to and from the mine via Thomas Mitchell Drive are the Denman Road and New England Highway intersections. Both of these intersections have been upgraded in recent years to increase capacity, decrease delay times and improve safety. However SIDRA analysis has indicated that both intersections may require further upgrade due to predicted additional traffic as a result of the Project. The New England Highway / Thomas Mitchell Drive intersection is operating at 'near capacity' now and will require upgrade by 2011. The Denman Road / Thomas Mitchell Drive intersection will require upgrade to a full seagull by 2019. Mt Arthur Coal will consult with the MSC and RTA regarding potential upgrade of these intersections.

As a significant impact is predicted on Thomas Mitchell Drive as described in Section 4.1, Mt Arthur Coal will consult with MSC regarding contributions toward the maintenance of this road, proportionate to the projected increase in traffic as a result of the Project.

Any road closures which will be required as part of this Project will be undertaken in accordance with the approved *Denman Road Closure Management Plan (2007)* and any subsequent updates to it.

The design of the proposed Edderton Road realignment and subsequent relocation, and reconstruction of the Denman Road / Edderton Road intersection, will be undertaken in consultation with the RTA and the MSC. All design and construction work associated with the realignment will be undertaken in accordance with applicable design guidelines and standards.

The following ongoing traffic management measures will also be continued:

- Consultation with the RTA and other local authorities as necessary prior to the movement of oversized loads on public roads;
- Continued encouragement of car-pooling amongst the mine workforce; and

- Continued implementation of all reasonable and feasible measures to minimise blockage of the Antiene Railway Station Road at the Antiene Spur Line level crossing.

*

*

*

for
HANSEN BAILEY

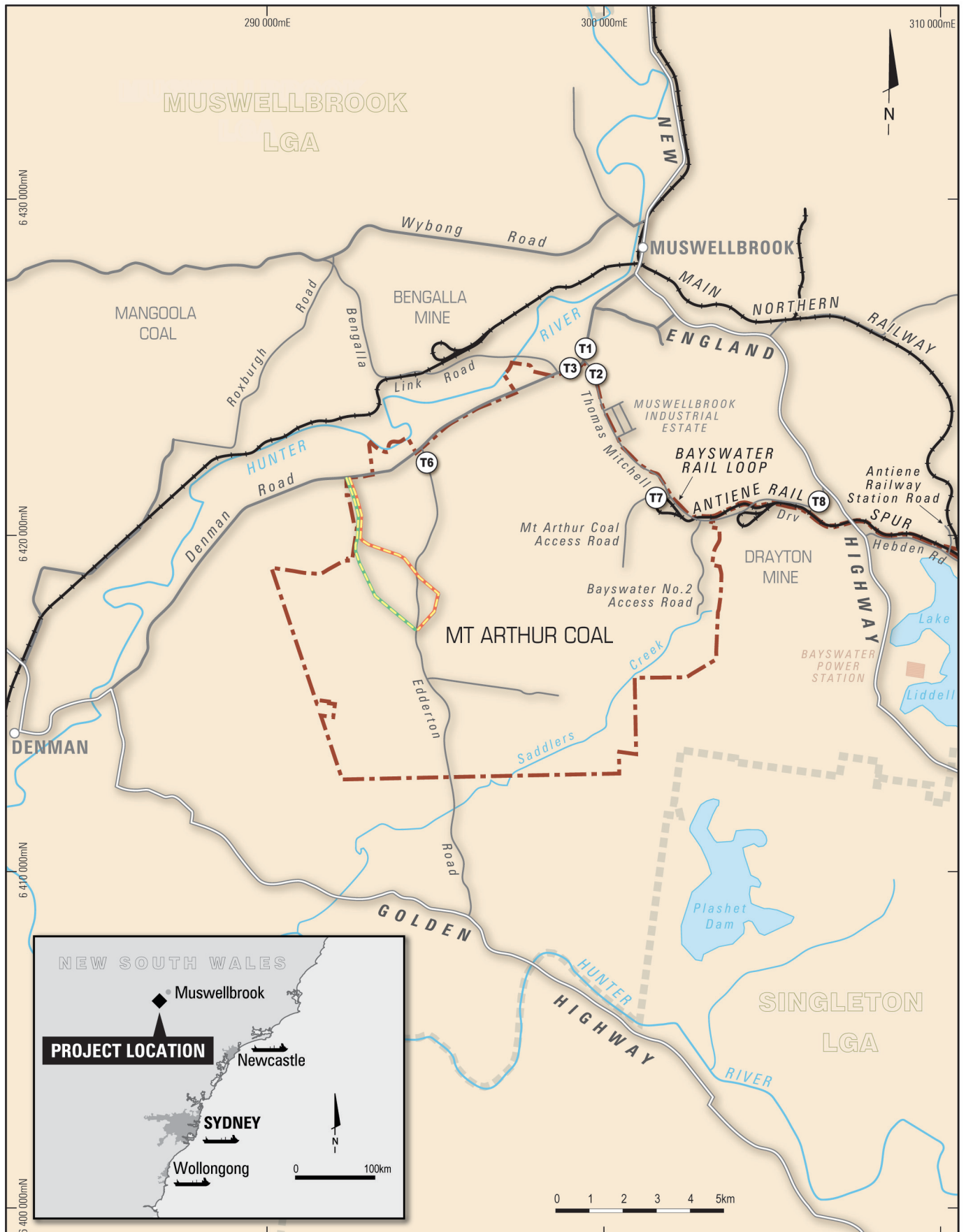


Juliet Bates
Senior Civil Engineer



Peter Hansen
Director

FIGURES



- Mt Arthur Coal Consolidation Project EA Boundary
- Local Government Area Boundary
- Roads
- Railways
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2
- T1 Traffic Count Locations

Hansen Bailey



MT ARTHUR COAL

Regional Transport Network

Filename: MN400 - Regional Transport Network - 0409.ai

Date: 11.08.2009

Drawn by: GreenpondTSG

Scale: N/A

Figure
1

PLATES



Plate 1
Denman Road / Thomas Mitchell Drive Intersection
(looking north along Denman Road)



Plate 2
New England Highway / Thomas Mitchell Drive Intersection
(looking north along the New England Highway)



Plate 3
Thomas Mitchell Drive / Mt Arthur Coal Access Road Intersection
(looking north along Thomas Mitchell Drive)

APPENDIX A

Intersection Analysis



ABN: 79 056 088 629

Mt Arthur Coal

Intersection Performance Assessment

Thomas Mitchell Drive / New England Highway

Denman Road / Thomas Mitchell Drive

Mt Arthur Coal Access Rd / Thomas Mitchell Drive

Prepared by

Northern Transport Planning and Engineering Pty Ltd

August 2009

081539

1 INTRODUCTION

NTPE has been commissioned to undertake an assessment of the performance of the following three intersections based on predicted future traffic flows.

- Mt Arthur Coal Access Road / Thomas Mitchell Drive
- Thomas Mitchell Drive / Denman Road
- Thomas Mitchell Drive / New England Highway

2 PREDICTED FUTURE TRAFFIC FLOWS

Predicted daily traffic flows were derived by Hansen Bailey based on existing traffic flows and predicted future development at the Mt Arthur Coal and other known developments within the surrounding area.

These traffic flows were subsequently adjusted to allow both AM and PM peak hour traffic flows to be assessed.

Total predicted traffic flows with the proposed further expansion in the Mt Arthur Coal are detailed below in Table 2-1 and Table 2-2:

Table 2-1: Predicted Traffic flows with full development

Mt Arthur Coal Access/Thomas Mitchell Dr		2011				2014				2019			
		AM		PM		AM		PM		AM		PM	
		Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Western Approach	Thru	197	34	207	32	210	37	207	32	210	37	220	34
	Right	126	9	53	5	174	12	53	5	174	12	72	7
Southern Approach	Left	52	8	125	17	72	9	125	17	72	9	173	20
	Right	33	4	78	10	43	5	78	10	43	5	104	11
Eastern Approach	Left	79	11	33	5	104	12	33	5	104	12	43	6
	Thru	205	31	201	35	222	34	201	35	222	34	213	37
Denman Rd/Thomas Mitchell													
Western Approach	Thru	90	4	191	13	118	8	205	14	130	8	229	15
	Right	59	5	34	19	62	6	34	19	62	6	35	20
Southern Approach	Left	65	12	49	9	68	14	49	9	68	14	50	10
	Right	144	26	317	24	163	26	317	24	163	26	336	24
Eastern Approach	Left	380	29	118	27	398	30	118	27	398	30	136	28
	Thru	155	12	129	16	188	16	138	17	209	18	153	19
Thomas Mitchell Dr/New England Hwy													
Western Approach	Thru	218	55	244	51	236	59	264	55	266	67	298	63
	Right	35	1	6	1	36	1	6	1	36	1	6	1
Southern Approach	Left	36	3	26	0	37	3	26	0	37	3	26	0
	Right	122	40	133	29	135	42	133	29	135	42	143	30
Eastern Approach	Left	64	28	64	26	77	30	64	26	77	30	74	27
	Thru	262	52	319	45	283	57	346	48	319	64	390	55

Table 2-2: Predicted Traffic flows without Extra Mt Arthur development

Mt Arthur Coal Access/Thomas Mitchell Dr		2011				2014				2019			
		AM		PM		AM		PM		AM		PM	
		Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Western Approach	Thru	197	34	207	32	210	37	207	32	210	37	220	34
	Right	126	9	53	5	174	12	53	5	174	12	72	7
Southern Approach	Left	52	8	125	17	72	9	125	17	72	9	173	20
	Right	33	4	78	10	43	5	78	10	43	5	104	11
Eastern Approach	Left	79	11	33	5	104	12	33	5	104	12	43	6
	Thru	205	31	201	35	222	34	201	35	222	34	213	37
Denman Rd/Thomas Mitchell													
Western Approach	Thru	90	4	191	13	118	8	205	14	130	8	229	15
	Right	59	5	34	19	62	6	34	19	62	6	35	20
Southern Approach	Left	65	12	49	9	68	14	49	9	68	14	50	10
	Right	144	26	317	24	163	26	317	24	163	26	336	24
Eastern Approach	Left	380	29	118	27	398	30	118	27	398	30	136	28
	Thru	155	12	129	16	188	16	138	17	209	18	153	19
Thomas Mitchell Dr/New England Hwy													
Western Approach	Thru	218	55	244	51	236	59	264	55	266	67	298	63
	Right	35	1	6	1	36	1	6	1	36	1	6	1
Southern Approach	Left	36	3	26	0	37	3	26	0	37	3	26	0
	Right	122	40	133	29	135	42	133	29	135	42	143	30
Eastern Approach	Left	64	28	64	26	77	30	64	26	77	30	74	27
	Thru	262	52	319	45	283	57	346	48	319	64	390	55

3 SIDRA ANALYSIS

The simulation model SIDRA has been used to assess the current performance of the following three intersections

- Mt Arthur Coal Access Road / Thomas Mitchell Drive
- Thomas Mitchell Drive / Denman Road
- Thomas Mitchell Drive / New England Highway

SIDRA determines the level of service for each movement and for the overall intersection. This assessment has been carried out for year 2011 to review the initial impact of the proposed development. A further analysis has been carried out for year 2019 to comply with RTA requirements for the assessment of intersection performance in ten years time.

Level of Service at an intersection is based on the average delay per vehicle and can be applied to both an individual movement and the entire intersection. The concept is the same for both signalised and unsignalised intersections. Levels of service are ranked for A to F as summarised below in Table 3-1.

Table 3-1: Intersection Level of Service Performance Categories

RTA NSW	Control Delay per Vehicle (sec)	
Level of Service	All Intersection Types	Description
A	$D \leq 14.5$	Good
B	$14.5 < d \leq 28.5$	Acceptable
C	$28.5 < d \leq 42.5$	Satisfactory
D	$42.5 < d \leq 56.5$	At Near Capacity
E	$56.5 < d \leq 70.5$	At Capacity
F	$70.5 < d$	Unsatisfactory

The RTA NSW LOS criteria detailed in Table 3-1 have been used in the following SIDRA analysis.

4 SIDRA RESULTS

A full report of the SIDRA Results derived for the three intersections are attached in Appendices' A, B, C, D and E as detailed below:

Thomas Mitchell Dr/New England Hwy	2011 With and Without Development	Appendix A
	2019 With and Without Development	Appendix B
Denman Road/Thomas Mitchell Dr	2011 With and Without Development	Appendix C
	2019 With and Without Development	Appendix D
Mt Arthur Coal Access/Thomas Mitchell Dr	2011 and 2019 With and Without Development	Appendix E

A summary of these results are presented below:

Thomas Mitchell Dr/New England Hwy

Critical Turning Movement			Right Turn from Thomas Mitchell Dr to New England Highway					
			Average Delays		Level of Service		95% Back of Queue (m)	
			AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development	96.8	68	F	E	103	71
		Without Development	55.9	42.3	D	C	57	41
	2019	With Development	600.1	331.6	F	F	417	293
		Without Development	286.2	123.5	F	F	221	102
Upgraded to Full Seagull	2011	With Development	22.7	20	B	B	30	25
		Without Development	20.2	17.9	B	B	24	19
	2019	With Development	27.3	26.2	B	B	36	34
		Without Development	23.4	21.5	B	B	31	23

Discussion

These results show that the intersection performance will be unsatisfactory in 2011 with the additional traffic generated by the proposed development. LOS F and E are reported for the AM and PM peak respectively.

These results also show that the intersection performance will be unsatisfactory in year 2019 both with and without the proposed development, with LOS F being reported for both the AM and PM peak.

Upgrading this intersection to provide a full Seagull will see the intersection perform well through to year 2019.

Denman Road / Thomas Mitchell Dr

Critical Turning Movements			Right Turn from Thomas Mitchell Dr to Denman Road					
			Average Delays		Level of Service		95% Back of Queue (m)	
			AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development	24.4	37.6	B	C	31	101
		Without Development	23.4	33.6	B	C	28	88
	2014	With Development	32.3	45.4	C	D	44	117
		Without Development	28.5	39.3	C	C	33	101
	2019	With Development	36.7	108.6	C	F	49	230
		Without Development	31.6	56.2	C	D	36	133
Upgraded to Full Seagull	2011	With Development	19.7	17.4	B	B	25	51
		Without Development	19	16.7	B	B	23	47
	2019	With Development	24	20.3	B	B	34	63
		Without Development	22	18	B	B	26	51

Discussion

These results show that the intersection performance will be satisfactory in year 2011. A further SIDRA analysis indicates that the existing intersection will also be acceptable in year 2014. However by 2019 the intersection will fail with LOS F reported for the PM peak.

Upgrading this intersection to provide a full Seagull will see the intersection perform well through to year 2019.

Mt Arthur Mine Access/Thomas Mitchell Drive

Critical Turning Movements			Right Turn from Mine Access Road to Thomas Mitchell Dr					
			Average Delays		Level of Service		95% Back of Queue (m)	
			AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development	8.7	8.7	A	A	0	0
		Without Development	8.8	8.8	A	A	0	0
	2019	With Development	8.7	8.7	A	A	0	0
		Without Development	8.8	8.8	A	A	0	0

Discussion

The existing intersection layout will perform well both with and without the proposed development in year 2011 and 2019. The SIDRA results show that there is virtually no change in the performance of the intersection with or without the additional traffic generated by the new development.

5 RECOMMENDATION

The following intersection upgrade works are recommended based on this assessment of intersection performance using predicted traffic flows derived to represent the contribution of the various projects expected to be in full operation by year 2014.

Thomas Mitchell Drive / New England Highway Upgrade to Full Seagull

Denman Road/ Thomas Mitchell Dr Upgrade to Full Seagull

New England Hwy / Thomas Mitchell Drive

Critical Turning Movement				Right Turn from Thomas Mitchell Dr to New England Highway					
				Average Delays		Level of Service		95% Back of Queue (m)	
				AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development		96.8	68	LOS F	LOS F	103	71
		Without Development		55.9	42.3	LOS F	LOS E	57	41
	2019	With Development		600.1	331.6	LOS F	LOS F	417	293
		Without Development		286.2	123.5	LOS F	LOS F	221	102
Upgraded to Full Seagull	2011	With Development		22.7	20	LOS C	LOS C	30	25
		Without Development		20.2	17.9	LOS C	LOS C	24	19
	2019	With Development		27.3	26.2	LOS D	LOS D	36	34
		Without Development		23.4	21.5	LOS D	LOS D	31	23

New England Highway / Thomas Mitchell Drive

2011 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	92	30.4	0.060	9.3	LOS A	0	0.00	0.67	49.0
2	T	314	16.6	0.178	0.0	LOS A	0	0.00	0.00	60.0
Approach		406	19.7	0.178	2.1	LOS A		0.00	0.15	57.1
New England Hwy (Sthb)										
8	T	273	20.1	0.158	0.0	LOS A	0	0.00	0.00	60.0
9	R	36	2.8	0.040	10.3	LOS B	1	0.47	0.70	46.8
Approach		309	18.1	0.158	1.2	LOS A	1	0.05	0.08	58.1
Thomas Mitchell Dr										
10	L	39	7.7	0.053	10.9	LOS B	2	0.45	0.72	46.4
12	R	162	24.7	0.959	96.8	LOS F	103	0.99	1.77	16.5
Approach		201	21.4	0.958	80.1	LOS F	103	0.88	1.56	18.8
All Vehicles		916	19.5	0.959	18.9	Not Applicable	103	0.21	0.44	39.7

2011 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	79	25.3	0.050	9.1	LOS A	0	0.00	0.67	49.0
2	T	314	16.6	0.178	0.0	LOS A	0	0.00	0.00	60.0
Approach		393	18.3	0.178	1.8	LOS A		0.00	0.13	57.4
New England Hwy (Sthb)										
8	T	273	20.1	0.158	0.0	LOS A	0	0.00	0.00	60.0
9	R	36	2.8	0.039	10.2	LOS B	1	0.46	0.69	47.0
Approach		309	18.1	0.158	1.2	LOS A	1	0.05	0.08	58.1
Thomas Mitchell Dr										
10	L	39	7.7	0.052	10.8	LOS B	2	0.44	0.71	46.5
12	R	149	21.5	0.805	55.9	LOS F	57	0.94	1.37	23.8
Approach		188	18.6	0.803	46.5	LOS E	57	0.84	1.23	26.5
All Vehicles		890	18.3	0.805	11.1	Not Applicable	57	0.20	0.35	46.2

New England Highway / Thomas Mitchell Drive

2011 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	90	28.9	0.058	9.2	LOS A	0	0.00	0.67	49.0
2	T	364	12.4	0.202	0.0	LOS A	0	0.00	0.00	60.0
Approach		454	15.6	0.202	1.8	LOS A		0.00	0.13	57.4
New England Hwy (Sthb)										
8	T	295	17.3	0.168	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.009	11.3	LOS B	0	0.50	0.67	46.2
Approach		302	17.2	0.168	0.3	LOS A	0	0.01	0.02	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.035	10.7	LOS B	1	0.46	0.71	46.4
12	R	162	17.9	0.876	68.0	LOS F	71	0.96	1.52	21.0
Approach		188	15.4	0.877	60.1	LOS F	71	0.89	1.41	22.7
All Vehicles		944	16.1	0.876	12.9	Not Applicable	71	0.18	0.35	44.5

2011 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	76	22.4	0.047	9.0	LOS A	0	0.00	0.67	49.0
2	T	364	12.4	0.202	0.0	LOS A	0	0.00	0.00	60.0
Approach		440	14.1	0.202	1.6	LOS A		0.00	0.12	57.8
New England Hwy (Sthb)										
8	T	295	17.3	0.168	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.009	11.2	LOS B	0	0.48	0.66	46.4
Approach		302	17.2	0.168	0.3	LOS A	0	0.01	0.02	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.035	10.6	LOS B	1	0.45	0.71	46.4
12	R	148	13.5	0.708	42.3	LOS E	41	0.91	1.23	27.9
Approach		174	11.5	0.709	37.6	LOS E	41	0.84	1.15	29.6
All Vehicles		916	14.6	0.708	8.0	Not Applicable	41	0.16	0.28	49.4

New England Highway / Thomas Mitchell Drive

Seagull 2011 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	92	30.4	0.060	9.3	LOS A	0	0.00	0.67	49.0
2	T	314	16.6	0.178	0.0	LOS A	0	0.00	0.00	60.0
Approach		406	19.7	0.178	2.1	LOS A		0.00	0.15	57.1
New England Hwy (Sthb)										
8	T	273	20.1	0.158	0.0	LOS A	0	0.00	0.00	60.0
9	R	36	2.8	0.040	10.3	LOS B	1	0.47	0.70	46.8
Approach		309	18.1	0.158	1.2	LOS A	1	0.05	0.08	58.1
Thomas Mitchell Dr										
10	L	39	7.7	0.053	10.9	LOS B	2	0.45	0.72	46.4
12	R	162	24.7	0.488	22.7	LOS C	30	0.71	1.03	37.5
Approach		201	21.4	0.488	20.4	LOS C	30	0.66	0.97	38.9
All Vehicles		916	19.5	0.488	5.8	Not Applicable	30	0.16	0.31	52.1

Seagull 2011 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	79	25.3	0.050	9.1	LOS A	0	0.00	0.67	49.0
2	T	314	16.6	0.178	0.0	LOS A	0	0.00	0.00	60.0
Approach		393	18.3	0.178	1.8	LOS A		0.00	0.13	57.4
New England Hwy (Sthb)										
8	T	273	20.1	0.158	0.0	LOS A	0	0.00	0.00	60.0
9	R	36	2.8	0.039	10.2	LOS B	1	0.46	0.69	47.0
Approach		309	18.1	0.158	1.2	LOS A	1	0.05	0.08	58.1
Thomas Mitchell Dr										
10	L	39	7.7	0.052	10.8	LOS B	2	0.44	0.71	46.5
12	R	149	21.5	0.419	20.2	LOS C	24	0.67	0.98	39.1
Approach		188	18.6	0.418	18.2	LOS C	24	0.63	0.92	40.4
All Vehicles		890	18.3	0.419	5.1	Not Applicable	24	0.15	0.28	52.9

New England Highway / Thomas Mitchell Drive

Seagull 2011 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	90	28.9	0.058	9.2	LOS A	0	0.00	0.67	49.0
2	T	354	12.7	0.197	0.0	LOS A	0	0.00	0.00	60.0
Approach		444	16.0	0.197	1.9	LOS A		0.00	0.14	57.4
New England Hwy (Sthb)										
8	T	295	17.3	0.168	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.009	11.3	LOS B	0	0.49	0.67	46.3
Approach		302	17.2	0.168	0.3	LOS A	0	0.01	0.02	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.035	10.6	LOS B	1	0.45	0.71	46.4
12	R	162	17.9	0.439	20.0	LOS C	25	0.68	0.99	39.1
Approach		188	15.4	0.440	18.7	LOS C	25	0.65	0.95	40.0
All Vehicles		934	16.3	0.439	4.7	Not Applicable	25	0.13	0.26	53.4

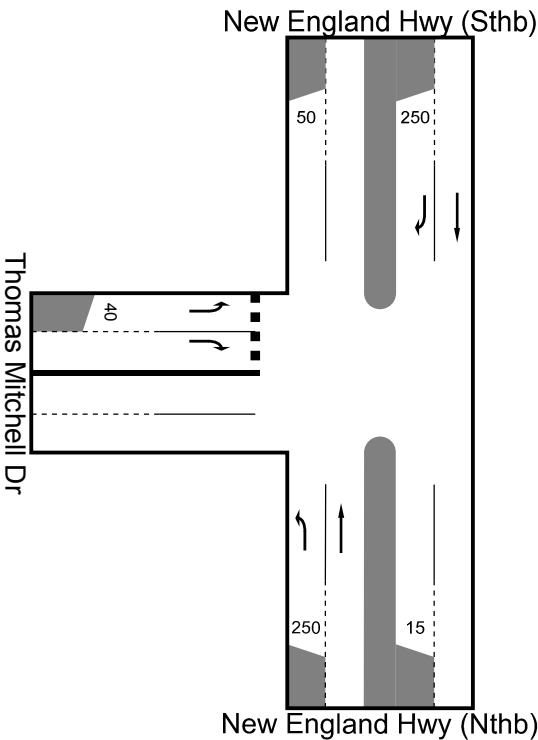
Seagull 2011 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	76	22.4	0.047	9.0	LOS A	0	0.00	0.67	49.0
2	T	364	12.4	0.202	0.0	LOS A	0	0.00	0.00	60.0
Approach		440	14.1	0.202	1.6	LOS A		0.00	0.12	57.8
New England Hwy (Sthb)										
8	T	295	17.3	0.168	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.009	11.2	LOS B	0	0.48	0.66	46.4
Approach		302	17.2	0.168	0.3	LOS A	0	0.01	0.02	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.035	10.6	LOS B	1	0.45	0.71	46.4
12	R	148	13.5	0.373	17.9	LOS C	19	0.65	0.95	40.6
Approach		174	11.5	0.373	16.8	LOS C	19	0.62	0.91	41.4
All Vehicles		916	14.6	0.373	4.0	Not Applicable	19	0.12	0.23	54.2

New England Hwy / Thomas Mitchell Drive

Critical Turning Movement				Right Turn from Thomas Mitchell Dr to New England Highway					
				Average Delays		Level of Service		95% Back of Queue (m)	
				AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development		96.8	68.0	LOS F	LOS F	103	71
		Without Development		55.9	42.3	LOS F	LOS E	57	41
	2019	With Development		600.1	331.6	LOS F	LOS F	417	293
		Without Development		286.2	123.5	LOS F	LOS F	221	102
Upgraded to Full Seagull	2011	With Development		22.7	20.0	LOS C	LOS C	30	25
		Without Development		20.2	17.9	LOS C	LOS C	24	19
	2019	With Development		27.3	26.2	LOS D	LOS D	36	34
		Without Development		23.4	21.5	LOS D	LOS D	31	23



New England Highway / Thomas Mitchell Drive

2019 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	173	17.3	0.105	8.8	LOS A	0	0.00	0.67	49.0
2	T	383	16.7	0.218	0.0	LOS A	0	0.00	0.00	60.0
Approach		556	16.9	0.218	2.7	LOS A		0.00	0.21	56.1
New England Hwy (Sthb)										
8	T	333	20.1	0.193	0.0	LOS A	0	0.00	0.00	60.0
9	R	37	2.7	0.050	11.4	LOS B	2	0.54	0.76	45.8
Approach		370	18.4	0.193	1.1	LOS A	2	0.05	0.08	58.2
Thomas Mitchell Dr										
10	L	40	7.5	0.063	11.9	LOS B	2	0.51	0.77	45.5
12	R	177	23.7	1.580	600.1	LOS F	417	1.00	3.45	3.4
Approach		217	20.7	1.586	491.7	LOS F	417	0.91	2.96	4.1
All Vehicles		1143	18.1	1.580	95.1	Not Applicable	417	0.19	0.69	16.6

2019 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	148	13.5	0.087	8.7	LOS A	0	0.00	0.67	49.0
2	T	383	16.7	0.218	0.0	LOS A	0	0.00	0.00	60.0
Approach		531	15.8	0.218	2.4	LOS A		0.00	0.19	56.5
New England Hwy (Sthb)										
8	T	333	20.1	0.193	0.0	LOS A	0	0.00	0.00	60.0
9	R	37	2.7	0.048	11.1	LOS B	2	0.52	0.75	46.0
Approach		370	18.4	0.193	1.1	LOS A	2	0.05	0.07	58.2
Thomas Mitchell Dr										
10	L	40	7.5	0.061	11.7	LOS B	2	0.50	0.76	45.6
12	R	152	21.1	1.226	286.2	LOS F	221	1.00	2.56	6.8
Approach		192	18.2	1.222	229.0	LOS F	221	0.90	2.19	8.2
All Vehicles		1093	17.1	1.226	41.8	Not Applicable	221	0.18	0.50	28.0

New England Highway / Thomas Mitchell Drive

2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	101	26.7	0.065	9.2	LOS A	0	0.00	0.67	49.0
2	T	445	12.4	0.247	0.0	LOS A	0	0.00	0.00	60.0
Approach		546	15.0	0.247	1.7	LOS A		0.00	0.12	57.6
New England Hwy (Sthb)										
8	T	361	17.5	0.206	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.011	12.1	LOS B	0	0.54	0.70	45.5
Approach		368	17.4	0.206	0.2	LOS A	0	0.01	0.01	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.040	11.4	LOS B	1	0.50	0.75	45.6
12	R	173	17.3	1.341	379.8	LOS F	293	1.00	3.01	5.2
Approach		199	15.1	1.340	331.6	LOS F	293	0.93	2.71	5.9
All Vehicles		1113	15.8	1.341	60.2	Not Applicable	293	0.17	0.55	22.6

2019 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	76	22.4	0.047	9.0	LOS A	0	0.00	0.67	49.0
2	T	445	12.4	0.247	0.0	LOS A	0	0.00	0.00	60.0
Approach		521	13.8	0.247	1.3	LOS A		0.00	0.10	58.1
New England Hwy (Sthb)										
8	T	361	17.5	0.206	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.010	11.8	LOS B	0	0.52	0.69	45.7
Approach		368	17.4	0.206	0.2	LOS A	0	0.01	0.01	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.039	11.3	LOS B	1	0.49	0.74	45.8
12	R	148	13.5	1.000	123.5	LOS F	102	1.00	1.82	13.7
Approach		174	11.5	0.999	106.7	LOS F	102	0.92	1.65	15.3
All Vehicles		1063	14.7	1.000	18.2	Not Applicable	102	0.15	0.32	40.1

New England Highway / Thomas Mitchell Drive

Seagull 2019 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	173	17.3	0.105	8.8	LOS A	0	0.00	0.67	49.0
2	T	383	16.7	0.218	0.0	LOS A	0	0.00	0.00	60.0
Approach		556	16.9	0.218	2.7	LOS A		0.00	0.21	56.1
New England Hwy (Sthb)										
8	T	333	20.1	0.193	0.0	LOS A	0	0.00	0.00	60.0
9	R	37	2.7	0.050	11.4	LOS B	2	0.54	0.76	45.8
Approach		370	18.4	0.193	1.1	LOS A	2	0.05	0.08	58.2
Thomas Mitchell Dr										
10	L	40	7.5	0.063	11.9	LOS B	2	0.51	0.77	45.5
12	R	173	17.3	0.582	27.3	LOS D	36	0.80	1.11	34.6
Approach		213	15.5	0.583	24.4	LOS C	36	0.75	1.05	36.2
All Vehicles		1139	17.1	0.582	6.3	Not Applicable	36	0.16	0.32	51.4

Seagull 2019 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	148	13.5	0.087	8.7	LOS A	0	0.00	0.67	49.0
2	T	383	16.7	0.218	0.0	LOS A	0	0.00	0.00	60.0
Approach		531	15.8	0.218	2.4	LOS A		0.00	0.19	56.5
New England Hwy (Sthb)										
8	T	333	20.1	0.193	0.0	LOS A	0	0.00	0.00	60.0
9	R	37	2.7	0.048	11.1	LOS B	2	0.52	0.75	46.0
Approach		370	18.4	0.193	1.1	LOS A	2	0.05	0.07	58.2
Thomas Mitchell Dr										
10	L	40	7.5	0.061	11.7	LOS B	2	0.50	0.76	45.6
12	R	152	21.1	0.530	26.5	LOS D	31	0.78	1.07	35.1
Approach		192	18.2	0.529	23.4	LOS C	31	0.72	1.01	36.9
All Vehicles		1093	17.1	0.530	5.7	Not Applicable	31	0.14	0.29	52.1

New England Highway / Thomas Mitchell Drive

Seagull 2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	101	26.7	0.065	9.2	LOS A	0	0.00	0.67	49.0
2	T	445	12.4	0.247	0.0	LOS A	0	0.00	0.00	60.0
Approach		546	15.0	0.247	1.7	LOS A		0.00	0.12	57.6
New England Hwy (Sthb)										
8	T	361	17.5	0.206	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.011	12.1	LOS B	0	0.54	0.70	45.5
Approach		368	17.4	0.206	0.2	LOS A	0	0.01	0.01	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.040	11.4	LOS B	1	0.50	0.75	45.6
12	R	173	17.3	0.567	26.2	LOS D	34	0.79	1.10	35.2
Approach		199	15.1	0.566	24.3	LOS C	34	0.75	1.05	36.3
All Vehicles		1113	15.8	0.567	5.3	Not Applicable	34	0.14	0.25	52.7

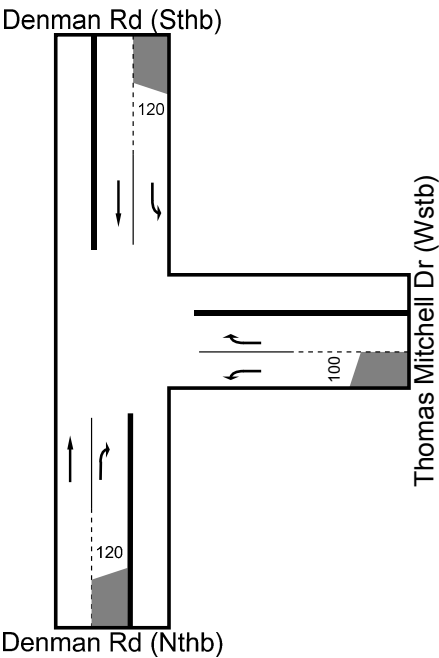
Seagull 2019 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
New England Hwy (Nthb)										
1	L	76	22.4	0.047	9.0	LOS A	0	0.00	0.67	49.0
2	T	445	12.4	0.247	0.0	LOS A	0	0.00	0.00	60.0
Approach		521	13.8	0.247	1.3	LOS A		0.00	0.10	58.1
New England Hwy (Sthb)										
8	T	361	17.5	0.206	0.0	LOS A	0	0.00	0.00	60.0
9	R	7	14.3	0.010	11.8	LOS B	0	0.52	0.69	45.7
Approach		368	17.4	0.206	0.2	LOS A	0	0.01	0.01	59.6
Thomas Mitchell Dr										
10	L	26	0.0	0.039	11.3	LOS B	1	0.49	0.74	45.8
12	R	148	13.5	0.438	21.5	LOS C	23	0.72	1.00	38.0
Approach		174	11.5	0.438	19.9	LOS C	23	0.69	0.96	39.0
All Vehicles		1063	14.7	0.438	4.0	Not Applicable	23	0.12	0.21	54.2

Denman Road / Thomas Mitchell Drive

Critical Turning Movements				Right Turn from Thomas Mitchell Dr to Denman Road					
				Average Delays		Level of Service		95% Back of Queue (m)	
				AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development		24.4	37.6	LOS C	LOS E	31	101
		Without Development		23.4	33.6	LOS C	LOS D	28	88
	2019	With Development		36.7	108.6	LOS E	LOS F	49	230
		Without Development		31.6	56.2	LOS D	LOS F	36	133
Upgraded to Full Seagull	2011	With Development		19.7	17.4	LOS C	LOS C	25	51
		Without Development		19	16.7	LOS C	LOS C	23	47
	2019	With Development		24	20.3	LOS C	LOS C	34	63
		Without Development		22	18	LOS D	LOS D	26	51



Denman Road / Thomas Mitchell Drive

2011 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	94	4.3	0.050	0.0	LOS A	0	0.00	0.00	60.0
3	R	64	7.8	0.086	11.8	LOS B	3	0.54	0.79	45.5
Approach		158	5.7	0.086	4.8	LOS A	3	0.22	0.32	53.2
Thomas Mitchell Dr (Wstb)										
4	L	77	15.6	0.112	11.5	LOS B	4	0.46	0.75	46.1
6	R	170	15.3	0.528	24.4	LOS C	31	0.76	1.07	36.2
Approach		247	15.4	0.528	20.4	LOS C	31	0.67	0.97	38.8
Denman Rd (Sthb)										
7	L	409	7.1	0.231	8.4	LOS A	0	0.00	0.67	49.0
8	T	167	7.2	0.090	0.0	LOS A	0	0.00	0.00	60.0
Approach		576	7.1	0.231	6.0	LOS A		0.00	0.47	51.7
All Vehicles		981	9.0	0.528	9.4	Not Applicable	31	0.20	0.57	47.9

2011 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	94	4.3	0.050	0.0	LOS A	0	0.00	0.00	60.0
3	R	62	6.5	0.081	11.5	LOS B	3	0.53	0.78	45.7
Approach		156	5.1	0.081	4.6	LOS A	3	0.21	0.31	53.4
Thomas Mitchell Dr (Wstb)										
4	L	76	15.8	0.110	11.5	LOS B	4	0.46	0.74	46.1
6	R	161	15.5	0.495	23.4	LOS C	28	0.75	1.05	36.8
Approach		237	15.6	0.496	19.6	LOS C	28	0.66	0.95	39.4
Denman Rd (Sthb)										
7	L	400	7.2	0.227	8.5	LOS A	0	0.00	0.67	49.0
8	T	167	7.2	0.090	0.0	LOS A	0	0.00	0.00	60.0
Approach		567	7.2	0.227	6.0	LOS A		0.00	0.47	51.8
All Vehicles		960	9.0	0.495	9.1	Not Applicable	28	0.20	0.56	48.3

Denman Road / Thomas Mitchell Drive

2011 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	204	6.4	0.109	0.0	LOS A	0	0.00	0.00	60.0
3	R	53	35.8	0.073	12.1	LOS B	3	0.45	0.71	46.3
Approach		257	12.5	0.109	2.5	LOS A	3	0.09	0.15	56.6
Thomas Mitchell Dr (Wstb)										
4	L	58	15.5	0.070	10.2	LOS B	3	0.35	0.67	47.4
6	R	341	7.0	0.870	37.6	LOS E	101	0.91	1.62	29.5
Approach		399	8.3	0.871	33.6	LOS D	101	0.83	1.48	31.3
Denman Rd (Sthb)										
7	L	145	18.6	0.088	8.9	LOS A	0	0.00	0.67	49.0
8	T	145	11.0	0.080	0.0	LOS A	0	0.00	0.00	60.0
Approach		290	14.8	0.088	4.4	LOS A		0.00	0.33	53.9
All Vehicles		946	11.4	0.870	16.2	Not Applicable	101	0.37	0.77	41.7

2011 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	204	6.4	0.109	0.0	LOS A	0	0.00	0.00	60.0
3	R	52	36.5	0.071	12.0	LOS B	3	0.44	0.71	46.4
Approach		256	12.5	0.109	2.4	LOS A	3	0.09	0.14	56.6
Thomas Mitchell Dr (Wstb)										
4	L	57	15.8	0.069	10.2	LOS B	3	0.35	0.67	47.4
6	R	332	6.9	0.838	33.6	LOS D	88	0.88	1.51	31.2
Approach		389	8.2	0.839	30.2	LOS D	88	0.81	1.38	32.9
Denman Rd (Sthb)										
7	L	136	19.9	0.084	8.9	LOS A	0	0.00	0.67	49.0
8	T	145	11.0	0.080	0.0	LOS A	0	0.00	0.00	60.0
Approach		281	15.3	0.084	4.3	LOS A		0.00	0.32	54.1
All Vehicles		926	11.6	0.838	14.7	Not Applicable	88	0.36	0.72	43.0

Denman Road / Thomas Mitchell Drive

Seagull 2011 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	94	4.3	0.050	0.0	LOS A	0	0.00	0.00	60.0
3	R	64	7.8	0.086	11.8	LOS B	3	0.54	0.79	45.5
Approach		158	5.7	0.086	4.8	LOS A	3	0.22	0.32	53.2
Thomas Mitchell Dr (Wstb)										
4	L	77	15.6	0.112	11.5	LOS B	4	0.46	0.75	46.1
6	R	170	15.3	0.443	19.7	LOS C	25	0.68	1.00	39.3
Approach		247	15.4	0.443	17.1	LOS C	25	0.61	0.92	41.2
Denman Rd (Sthb)										
7	L	409	7.1	0.231	8.4	LOS A	0	0.00	0.67	49.0
8	T	167	7.2	0.090	0.0	LOS A	0	0.00	0.00	60.0
Approach		576	7.1	0.231	6.0	LOS A		0.00	0.47	51.7
All Vehicles		981	9.0	0.443	8.6	Not Applicable	25	0.19	0.56	48.8

Seagull 2011 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	94	4.3	0.050	0.0	LOS A	0	0.00	0.00	60.0
3	R	62	6.5	0.081	11.5	LOS B	3	0.53	0.78	45.7
Approach		156	5.1	0.081	4.6	LOS A	3	0.21	0.31	53.4
Thomas Mitchell Dr (Wstb)										
4	L	76	15.8	0.110	11.5	LOS B	4	0.46	0.74	46.1
6	R	161	15.5	0.416	19.0	LOS C	23	0.67	0.98	39.8
Approach		237	15.6	0.416	16.6	LOS C	23	0.60	0.90	41.6
Denman Rd (Sthb)										
7	L	400	7.2	0.227	8.5	LOS A	0	0.00	0.67	49.0
8	T	167	7.2	0.090	0.0	LOS A	0	0.00	0.00	60.0
Approach		567	7.2	0.227	6.0	LOS A		0.00	0.47	51.8
All Vehicles		960	9.0	0.416	8.4	Not Applicable	23	0.18	0.55	49.1

Denman Road / Thomas Mitchell Drive

Seagull 2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	204	6.4	0.109	0.0	LOS A	0	0.00	0.00	60.0
3	R	53	35.8	0.073	12.1	LOS B	3	0.45	0.71	46.3
Approach		257	12.5	0.109	2.5	LOS A	3	0.09	0.15	56.6
Thomas Mitchell Dr (Wstb)										
4	L	58	15.5	0.070	10.2	LOS B	3	0.35	0.67	47.4
6	R	341	7.0	0.614	17.4	LOS C	51	0.70	1.07	40.7
Approach		399	8.3	0.615	16.4	LOS C	51	0.65	1.01	41.6
Denman Rd (Sthb)										
7	L	145	18.6	0.088	8.9	LOS A	0	0.00	0.67	49.0
8	T	145	11.0	0.080	0.0	LOS A	0	0.00	0.00	60.0
Approach		290	14.8	0.088	4.4	LOS A		0.00	0.33	53.9
All Vehicles		946	11.4	0.614	8.9	Not Applicable	51	0.30	0.57	48.5

Seagull 2011 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	204	6.4	0.109	0.0	LOS A	0	0.00	0.00	60.0
3	R	52	36.5	0.071	12.0	LOS B	3	0.44	0.71	46.4
Approach		256	12.5	0.109	2.4	LOS A	3	0.09	0.14	56.6
Thomas Mitchell Dr (Wstb)										
4	L	57	15.8	0.069	10.2	LOS B	3	0.35	0.67	47.4
6	R	332	6.9	0.593	16.7	LOS C	47	0.68	1.03	41.3
Approach		389	8.2	0.593	15.8	LOS C	47	0.63	0.98	42.1
Denman Rd (Sthb)										
7	L	136	19.9	0.084	8.9	LOS A	0	0.00	0.67	49.0
8	T	145	11.0	0.080	0.0	LOS A	0	0.00	0.00	60.0
Approach		281	15.3	0.084	4.3	LOS A		0.00	0.32	54.1
All Vehicles		926	11.6	0.593	8.6	Not Applicable	47	0.29	0.55	48.8

Denman Road / Thomas Mitchell Drive

Critical Turning Movements				Right Turn from Thomas Mitchell Dr to Denman Road					
				Average Delays		Level of Service		95% Back of Queue (m)	
				AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development		24.4	37.6	LOS C	LOS E	31	101
		Without Development		23.4	33.6	LOS C	LOS D	28	88
	2019	With Development		36.7	108.6	LOS E	LOS F	49	230
		Without Development		31.6	56.2	LOS D	LOS F	36	133
Upgraded to Full Seagull	2011	With Development		19.7	17.4	LOS C	LOS C	25	51
		Without Development		19	16.7	LOS C	LOS C	23	47
	2019	With Development		24	20.3	LOS C	LOS C	34	63
		Without Development		22	18	LOS D	LOS D	26	51

Denman Road / Thomas Mitchell Drive

2019 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	138	5.8	0.073	0.0	LOS A	0	0.00	0.00	60.0
3	R	68	8.8	0.104	12.7	LOS B	4	0.58	0.83	44.7
Approach		206	6.8	0.104	4.2	LOS A	4	0.19	0.28	53.9
Thomas Mitchell Dr (Wstb)										
4	L	82	17.1	0.134	12.4	LOS B	5	0.51	0.79	45.3
6	R	189	13.8	0.724	36.7	LOS E	49	0.89	1.27	30.0
Approach		271	14.8	0.725	29.3	LOS D	49	0.77	1.12	33.4
Denman Rd (Sthb)										
7	L	428	7.0	0.242	8.4	LOS A	0	0.00	0.67	49.0
8	T	227	7.9	0.122	0.0	LOS A	0	0.00	0.00	60.0
Approach		655	7.3	0.242	5.5	LOS A		0.00	0.44	52.3
All Vehicles		1132	9.0	0.724	11.0	Not Applicable	49	0.22	0.57	46.3

2019 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	138	5.8	0.073	0.0	LOS A	0	0.00	0.00	60.0
3	R	65	7.7	0.094	12.2	LOS B	3	0.56	0.81	45.2
Approach		203	6.4	0.094	3.9	LOS A	3	0.18	0.26	54.3
Thomas Mitchell Dr (Wstb)										
4	L	79	16.5	0.126	12.2	LOS B	5	0.50	0.78	45.5
6	R	161	15.5	0.619	31.6	LOS D	36	0.85	1.15	32.3
Approach		240	15.8	0.618	25.2	LOS D	36	0.73	1.03	35.7
Denman Rd (Sthb)										
7	L	400	7.2	0.227	8.5	LOS A	0	0.00	0.67	49.0
8	T	227	7.9	0.122	0.0	LOS A	0	0.00	0.00	60.0
Approach		627	7.5	0.227	5.4	LOS A		0.00	0.43	52.5
All Vehicles		1070	9.2	0.619	9.5	Not Applicable	36	0.20	0.53	47.8

Denman Road / Thomas Mitchell Drive

2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	244	6.1	0.130	0.0	LOS A	0	0.00	0.00	60.0
3	R	55	36.4	0.081	12.6	LOS B	4	0.48	0.74	45.8
Approach		299	11.7	0.130	2.3	LOS A	4	0.09	0.14	56.8
Thomas Mitchell Dr (Wstb)										
4	L	60	16.7	0.077	10.6	LOS B	3	0.39	0.69	47.0
6	R	360	6.7	1.056	108.6	LOS F	230	1.00	2.67	15.0
Approach		420	8.1	1.055	94.6	LOS F	230	0.91	2.39	16.6
Denman Rd (Sthb)										
7	L	164	17.1	0.099	8.8	LOS A	0	0.00	0.67	49.0
8	T	172	11.0	0.095	0.0	LOS A	0	0.00	0.00	60.0
Approach		336	14.0	0.099	4.3	LOS A		0.00	0.33	54.1
All Vehicles		1055	11.0	1.056	39.7	Not Applicable	230	0.39	1.09	28.8

2019 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	244	6.1	0.130	0.0	LOS A	0	0.00	0.00	60.0
3	R	52	36.5	0.074	12.3	LOS B	3	0.46	0.72	46.1
Approach		296	11.5	0.130	2.2	LOS A	3	0.08	0.13	57.0
Thomas Mitchell Dr (Wstb)										
4	L	57	15.8	0.071	10.4	LOS B	3	0.37	0.68	47.2
6	R	332	6.9	0.946	56.2	LOS F	133	0.97	1.95	23.6
Approach		389	8.2	0.947	49.5	LOS E	133	0.88	1.76	25.5
Denman Rd (Sthb)										
7	L	136	19.9	0.084	8.9	LOS A	0	0.00	0.67	49.0
8	T	172	11.0	0.095	0.0	LOS A	0	0.00	0.00	60.0
Approach		308	14.9	0.095	3.9	LOS A		0.00	0.30	54.6
All Vehicles		993	11.3	0.946	21.2	Not Applicable	133	0.37	0.82	38.0

Denman Road / Thomas Mitchell Drive

Seagull 2019 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	138	5.8	0.073	0.0	LOS A	0	0.00	0.00	60.0
3	R	68	8.8	0.104	12.7	LOS B	4	0.58	0.83	44.7
Approach		206	6.8	0.104	4.2	LOS A	4	0.19	0.28	53.9
Thomas Mitchell Dr (Wstb)										
4	L	82	17.1	0.134	12.4	LOS B	5	0.51	0.79	45.3
6	R	189	13.8	0.554	24.0	LOS C	34	0.76	1.09	36.4
Approach		271	14.8	0.554	20.5	LOS C	34	0.69	1.00	38.7
Denman Rd (Sthb)										
7	L	428	7.0	0.242	8.4	LOS A	0	0.00	0.67	49.0
8	T	227	7.9	0.122	0.0	LOS A	0	0.00	0.00	60.0
Approach		655	7.3	0.242	5.5	LOS A		0.00	0.44	52.3
All Vehicles		1132	9.0	0.554	8.9	Not Applicable	34	0.20	0.54	48.5

Seagull 2019 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	138	5.8	0.073	0.0	LOS A	0	0.00	0.00	60.0
3	R	65	7.7	0.094	12.2	LOS B	3	0.56	0.81	45.2
Approach		203	6.4	0.094	3.9	LOS A	3	0.18	0.26	54.3
Thomas Mitchell Dr (Wstb)										
4	L	79	16.5	0.126	12.2	LOS B	5	0.50	0.78	45.5
6	R	161	15.5	0.471	22.0	LOS C	26	0.72	1.02	37.7
Approach		240	15.8	0.471	18.8	LOS C	26	0.65	0.94	40.0
Denman Rd (Sthb)										
7	L	400	7.2	0.227	8.5	LOS A	0	0.00	0.67	49.0
8	T	227	7.9	0.122	0.0	LOS A	0	0.00	0.00	60.0
Approach		627	7.5	0.227	5.4	LOS A		0.00	0.43	52.5
All Vehicles		1070	9.2	0.471	8.1	Not Applicable	26	0.18	0.51	49.3

Denman Road / Thomas Mitchell Drive

Seagull 2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	244	6.1	0.130	0.0	LOS A	0	0.00	0.00	60.0
3	R	55	36.4	0.081	12.6	LOS B	4	0.48	0.74	45.8
Approach		299	11.7	0.130	2.3	LOS A	4	0.09	0.14	56.8
Thomas Mitchell Dr (Wstb)										
4	L	60	16.7	0.077	10.6	LOS B	3	0.39	0.69	47.0
6	R	360	6.7	0.691	20.3	LOS C	63	0.77	1.19	38.6
Approach		420	8.1	0.690	18.9	LOS C	63	0.71	1.12	39.6
Denman Rd (Sthb)										
7	L	164	17.1	0.099	8.8	LOS A	0	0.00	0.67	49.0
8	T	172	11.0	0.095	0.0	LOS A	0	0.00	0.00	60.0
Approach		336	14.0	0.099	4.3	LOS A		0.00	0.33	54.1
All Vehicles		1055	11.0	0.691	9.5	Not Applicable	63	0.31	0.59	47.8

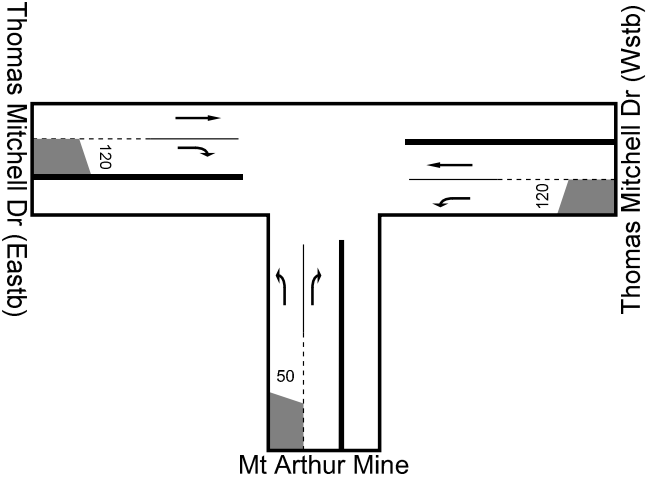
Seagull 2019 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Denman Rd (Nthb)										
2	T	244	6.1	0.130	0.0	LOS A	0	0.00	0.00	60.0
3	R	52	36.5	0.074	12.3	LOS B	3	0.46	0.72	46.1
Approach		296	11.5	0.130	2.2	LOS A	3	0.08	0.13	57.0
Thomas Mitchell Dr (Wstb)										
4	L	57	15.8	0.071	10.4	LOS B	3	0.37	0.68	47.2
6	R	332	6.9	0.621	18.0	LOS C	51	0.71	1.10	40.3
Approach		389	8.2	0.621	16.9	LOS C	51	0.66	1.03	41.2
Denman Rd (Sthb)										
7	L	136	19.9	0.084	8.9	LOS A	0	0.00	0.67	49.0
8	T	172	11.0	0.095	0.0	LOS A	0	0.00	0.00	60.0
Approach		308	14.9	0.095	3.9	LOS A		0.00	0.30	54.6
All Vehicles		993	11.3	0.621	8.5	Not Applicable	51	0.28	0.53	49.0

Mt Arthur Mine Access / Thomas Mitchell Drive

Critical Turning Movements			Right Turn from Mine Access Road to Thomas Mitchell Dr					
			Average Delays		Level of Service		95% Back of Queue (m)	
			AM	PM	AM	PM	AM	PM
Existing Layout	2011	With Development	8.7	8.7	LOS A	LOS A	0	0
		Without Development	8.8	8.8	LOS A	LOS A	0	0
	2019	With Development	8.7	8.7	LOS A	LOS A	0	0
		Without Development	8.8	8.8	LOS A	LOS A	0	0



Mt Arthur Mine Access / Thomas Mitchell Drive

2011 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	60	13.3	0.035	8.7	LOS A	0	0.00	0.67	49.0
3	R	37	10.8	0.021	8.7	LOS A	0	0.00	0.68	48.8
Approach		97	12.4	0.035	8.7	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	90	12.2	0.053	8.6	LOS A	0	0.00	0.67	49.0
5	T	236	13.1	0.131	0.0	LOS A	0	0.00	0.00	60.0
Approach		326	12.9	0.131	2.4	LOS A		0.00	0.18	56.5
Thomas Mitchell Dr (Eastb)										
11	T	231	14.7	0.130	0.0	LOS A	0	0.00	0.00	60.0
12	R	135	6.7	0.076	8.6	LOS A	0	0.00	0.68	48.8
Approach		366	11.7	0.130	3.2	LOS A		0.00	0.25	55.3
All Vehicles		789	12.3	0.131	3.5	Not Applicable	0	0.00	0.28	54.9

2011 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	50	14.0	0.030	8.7	LOS A	0	0.00	0.67	49.0
3	R	32	12.5	0.019	8.8	LOS A	0	0.00	0.68	48.8
Approach		82	13.4	0.030	8.7	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	77	13.0	0.045	8.7	LOS A	0	0.00	0.67	49.0
5	T	236	13.1	0.131	0.0	LOS A	0	0.00	0.00	60.0
Approach		313	13.1	0.131	2.1	LOS A		0.00	0.16	56.9
Thomas Mitchell Dr (Eastb)										
11	T	231	14.7	0.130	0.0	LOS A	0	0.00	0.00	60.0
12	R	112	7.1	0.063	8.6	LOS A	0	0.00	0.68	48.8
Approach		343	12.2	0.130	2.8	LOS A		0.00	0.22	55.8
All Vehicles		738	12.7	0.131	3.2	Not Applicable	0	0.00	0.25	55.4

Mt Arthur Mine Access / Thomas Mitchell Drive

2011 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	142	12.0	0.083	8.6	LOS A	0	0.00	0.67	49.0
3	R	88	11.4	0.051	8.7	LOS A	0	0.00	0.68	48.8
Approach		230	11.7	0.083	8.7	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	38	13.2	0.022	8.7	LOS A	0	0.00	0.67	49.0
5	T	236	14.8	0.133	0.0	LOS A	0	0.00	0.00	60.0
Approach		274	14.6	0.133	1.2	LOS A		0.00	0.09	58.2
Thomas Mitchell Dr (Eastb)										
11	T	239	13.4	0.133	0.0	LOS A	0	0.00	0.00	60.0
12	R	58	8.6	0.033	8.5	LOS A	0	0.00	0.67	48.9
Approach		297	12.5	0.133	1.7	LOS A		0.00	0.13	57.5
All Vehicles		801	13.0	0.133	3.5	Not Applicable	0	0.00	0.27	54.9

2011 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	119	13.4	0.070	8.7	LOS A	0	0.00	0.67	49.0
3	R	75	12.0	0.044	8.8	LOS A	0	0.00	0.68	48.8
Approach		194	12.9	0.070	8.7	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	33	15.2	0.020	8.7	LOS A	0	0.00	0.67	49.0
5	T	236	14.8	0.133	0.0	LOS A	0	0.00	0.00	60.0
Approach		269	14.9	0.133	1.1	LOS A		0.00	0.08	58.4
Thomas Mitchell Dr (Eastb)										
11	T	239	13.4	0.133	0.0	LOS A	0	0.00	0.00	60.0
12	R	47	8.5	0.027	8.5	LOS A	0	0.00	0.67	48.9
Approach		286	12.6	0.133	1.4	LOS A		0.00	0.11	57.9
All Vehicles		749	13.5	0.133	3.2	Not Applicable	0	0.00	0.25	55.4

Mt Arthur Mine Access / Thomas Mitchell Drive

2019 with Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	81	11.1	0.047	8.6	LOS A	0	0.00	0.67	49.0
3	R	48	10.4	0.028	8.7	LOS A	0	0.00	0.68	48.8
Approach		129	10.9	0.047	8.6	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	116	10.3	0.067	8.6	LOS A	0	0.00	0.67	49.0
5	T	256	13.3	0.143	0.0	LOS A	0	0.00	0.00	60.0
Approach		372	12.4	0.143	2.7	LOS A		0.00	0.21	56.1
Thomas Mitchell Dr (Eastb)										
11	T	247	15.0	0.139	0.0	LOS A	0	0.00	0.00	60.0
12	R	186	6.5	0.105	8.5	LOS A	0	0.00	0.68	48.8
Approach		433	11.3	0.139	3.7	LOS A		0.00	0.29	54.6
All Vehicles		934	11.7	0.143	4.0	Not Applicable	0	0.00	0.31	54.3

2019 without Development AM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	51	15.7	0.031	8.8	LOS A	0	0.00	0.67	49.0
3	R	32	12.5	0.019	8.8	LOS A	0	0.00	0.68	48.8
Approach		83	14.5	0.031	8.8	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	78	14.1	0.046	8.7	LOS A	0	0.00	0.67	49.0
5	T	256	13.3	0.143	0.0	LOS A	0	0.00	0.00	60.0
Approach		334	13.5	0.143	2.0	LOS A		0.00	0.16	57.0
Thomas Mitchell Dr (Eastb)										
11	T	247	15.0	0.139	0.0	LOS A	0	0.00	0.00	60.0
12	R	113	8.0	0.064	8.6	LOS A	0	0.00	0.68	48.8
Approach		360	12.8	0.139	2.7	LOS A		0.00	0.21	56.0
All Vehicles		777	13.3	0.143	3.1	Not Applicable	0	0.00	0.24	55.6

Mt Arthur Mine Access / Thomas Mitchell Drive

2019 with Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	193	10.4	0.112	8.6	LOS A	0	0.00	0.67	49.0
3	R	115	9.6	0.066	8.7	LOS A	0	0.00	0.68	48.8
Approach		308	10.1	0.112	8.6	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	49	12.2	0.029	8.6	LOS A	0	0.00	0.67	49.0
5	T	250	14.8	0.141	0.0	LOS A	0	0.00	0.00	60.0
Approach		299	14.4	0.141	1.4	LOS A		0.00	0.11	57.9
Thomas Mitchell Dr (Eastb)										
11	T	254	13.4	0.142	0.0	LOS A	0	0.00	0.00	60.0
12	R	79	8.9	0.045	8.5	LOS A	0	0.00	0.67	48.9
Approach		333	12.3	0.142	2.0	LOS A		0.00	0.16	57.0
All Vehicles		940	12.2	0.142	4.0	Not Applicable	0	0.00	0.31	54.3

2019 without Development PM Peak

Give-way

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mt Arthur Mine										
1	L	120	14.2	0.071	8.7	LOS A	0	0.00	0.67	49.0
3	R	76	13.2	0.045	8.8	LOS A	0	0.00	0.68	48.8
Approach		196	13.8	0.071	8.7	LOS A		0.00	0.67	48.9
Thomas Mitchell Dr (Wstb)										
4	L	33	15.2	0.020	8.7	LOS A	0	0.00	0.67	49.0
5	T	250	14.8	0.141	0.0	LOS A	0	0.00	0.00	60.0
Approach		283	14.8	0.141	1.0	LOS A		0.00	0.08	58.5
Thomas Mitchell Dr (Eastb)										
11	T	254	13.4	0.142	0.0	LOS A	0	0.00	0.00	60.0
12	R	49	12.2	0.029	8.6	LOS A	0	0.00	0.67	48.9
Approach		303	13.2	0.142	1.4	LOS A		0.00	0.11	57.9
All Vehicles		782	13.9	0.142	3.1	Not Applicable	0	0.00	0.24	55.5