



**Australian Rail Track Corporation**

Maitland to Minimbah Third Track Project

Submissions Report including  
Preferred Project Report

September 2010

H8R-REP-S2G-ENV-0019-0



Appendix D  
Traffic Study





Appendix D  
Traffic Study



**Australian Rail Track Corporation**

Maitland to Minimbah Third Track

Submissions Report

Traffic and Access Study

September 2010

H8R-REP-S2G-ENV-0021-0





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- A Construction Traffic
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## Glossary of Terms

<b>Chainage</b>	Chainage is generally the location in kilometres of the position of a railway in relation to Sydney (NSW only) based on the 0.00 kilometres being located at the end of Central No. 1 Platform.
<b>Concept design</b>	Initial functional layout of a concept, such as for the proposed duplication, to provide a level of understanding to later establish detailed design parameters.
<b>Consent</b>	Approval to undertake a development received from the consent authority.
<b>Construction Environmental Management Plan</b>	A document setting out the management, control and monitoring measures to be implemented during construction of a development, to avoid or minimise the potential environmental impacts identified during an environmental impact assessment process.
<b>Construction impact zone</b>	The area which would be affected by construction works as part of the Project. The construction impact zone incorporates the Project's extent of works, proposed site access, construction compound locations and spoil locations.
<b>Cumulative impact</b>	The sum on the environment resulting from the successive effects of several different impacts.
<b>Detailed design stage</b>	The stage at which the project design is detailed on the basis of an approved concept design.
<b>Director-General's Requirements</b>	Requirements for an environmental assessment issued by the Director-General of the NSW Department of Planning in accordance with the Environment Planning and Assessment Act 1979.
<b>Down side</b>	In a situation with more than one rail track in the rail corridor, the Down side is the side of the track on which trains travel when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
<b>Hunter 8 Alliance</b>	Hunter 8 Alliance, which has been formed to deliver a new third track and ancillary infrastructure between Maitland and Minimbah.
<b>Investigation area</b>	The investigation area is the area assessed throughout the Environmental Assessment and comprises the construction impact zone and additional areas.
<b>Level crossing</b>	A crossing provided at grade across the railway corridor.
<b>Mitigation</b>	Reduction in severity.
<b>Option</b>	A concept design alternative developed for consideration.
<b>Overbridge</b>	A bridge where a road or pedestrian footway is situated over the railway line.
<b>Proponent</b>	Australian Rail Track Corporation (ARTC).
<b>Rail corridor</b>	The area of land dedicated to the ARTC between Maitland and Minimbah.
<b>Site compound</b>	Area enclosing construction machinery, materials and site offices usually adjacent to construction sites.
<b>Underbridge</b>	A bridge where a road, pedestrian footway or waterway crossing is situated under the railway line.
<b>Up side</b>	In a situation with more than one rail track in the rail corridor, the Up side is the side of the track on which trains travel when they are heading towards Sydney and is usually positioned on the left when facing towards Sydney.

## Executive Summary

This Preferred Project Study has been undertaken to incorporate changes to the Maitland to Minimbah Third Track Design. These changes are following the submission of the Environmental Assessment and community consultation undertaken as part of the public exhibition.

A considerable change is the proposed phasing of Project construction, as described in Chapter 5 of the Submissions Report. Phase 1 would be constructed initially and Phase 2 deferred to an undetermined time in the future. This report describes the traffic impacts and proposed mitigation measures of both phases.

For this assessment, the design changes to be incorporated are:

- ▶ Phased construction of the Project.
- ▶ Changes to the size and location of construction compounds as shown in the Table E-1.

**Table E-1 Changes to Construction Compounds**

Compound Location	Road access to NEH	Compound Type in Environmental Assessment	Revised Compound Type	Phase 1	Phase 2
Wollombi Road, Farley	Wollombi Road, Telarah	Secondary	Secondary	•	✓
Gardiner Street, Rutherford	Shipleigh Drive, Rutherford	None	Secondary	✓	•
Station Lane, Lochinvar	Station Lane, Lochinvar	Primary	Primary	✓	•
Allandale Road, Allandale	Allandale Road, Allandale	None	Secondary	✓	•
Nelson Street, Greta	Nelson Street, Greta	Secondary	Secondary	•	✓
Sawyers Creek	Nelson Street, Greta	None	Secondary	•	✓
Bridge Street, Branxton	Station Street, Branxton	Primary	Secondary	•	✓
Black Creek, Belford	Rixs Road, Belford	Secondary	Primary	✓	•
Hermitage Road	Hermitage Road, Belford	Secondary	Secondary	✓	•

Overall, the changes to the Project results in a similar volume of construction vehicles distributed over two phases of construction. Several intersections with the New England Highway have been identified as being impacted by additional traffic. They are listed together with the proposed mitigation measures in Table E-2.

**Table E-2 Proposed Intersection Treatments**

Road access to New England Highway	Compound Type	Phase 1 Treatment	Phase 2 Treatment
Wollombi Road, Telarah	Secondary	None required – No works Phase 1	Traffic Signals*
Shipleigh Drive, Rutherford (Gardiner Street compound)	Secondary	None required – Adequate operation	None required – No works Phase 2
Station Lane, Lochinvar	Primary	Traffic Controllers	None required – No works Phase 2
Allandale Road, Allandale	Secondary	Lane closure/realignment	None required – No works Phase 2
Nelson Street, Greta (Nelson Street and Sawyers Creek compounds)	Secondary	None required – No works Phase 1	Traffic Controllers*
Station Street, Branxton (Bridge Street compound)	Secondary	None required – No works Phase 1	Traffic Signals*
Rixs Road, Belford (Black Creek compound)	Primary	Lane closure/realignment	None required – No works Phase 2
Hermitage Road, Belford	Secondary	None required – Adequate operation	None required – No works Phase 2

\* To be reviewed prior to construction to consider operational status of Hunter Expressway and potential impacts on traffic

## 1. Introduction

This Traffic and Access assessment has been prepared by the Hunter 8 Alliance on behalf of the Australian Rail Track Corporation (ARTC) as part of the Submissions Report for the Maitland to Minimbah Third Track Project (the Project). This report has been prepared to assess how proposed modifications to the design, construction and operation of the Project may amend or increase the potential traffic and access impacts identified in the Environmental Assessment, and develop any additional mitigation measures required to address such amended or increased potential impacts.

### 1.1 Background

The Australian Rail Track Corporation (ARTC) proposes to construct a third train track adjacent to the existing two tracks of the Main Northern Railway between Maitland and Minimbah, within the Hunter Valley, NSW (the Project).

The Project commences in Farley approximately two kilometres west of Maitland Station and continues through the local government areas of Maitland, Cessnock and Singleton for approximately 30 kilometres, concluding at Minimbah.

The Project would facilitate the more efficient movement of coal to the Port of Newcastle.

An Environmental Assessment of the Project was completed in May 2010 (Hunter 8 Alliance, 2010) in accordance with the Director General's requirements for undertaking the environmental assessment received by ARTC on 25 May 2009. The Environmental Assessment was then placed on public exhibition from 9 June 2010 to 12 July 2010 in accordance with Section 75H(3) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). During this time submissions were invited from members of the public, government agencies and stakeholders.

As a result of the community consultation process and further consideration of the project implementation, a number of modifications to the Project as described in the Environmental Assessment, are proposed.

### 1.2 Description of Project Modifications

Several key modifications to the Project as described in Chapter 7 of the Environmental Assessment are proposed. These modifications are summarised by the following:

- ▶ Amendments to the earthworks design required for the third track, including modification to the design of the Down side access track.
- ▶ A reduction in the required property acquisition resulting from the amendments to the earthworks design.
- ▶ Additional potential spoil disposal areas and the addition of potential sources of appropriate track construction material adjacent to the rail corridor (known as borrow pits).
- ▶ Alternative and proposed new locations for construction compounds (primary and secondary) and associated changes to traffic access and management.

- ▶ The proposed phasing of construction of the Project: deferment of the construction of the third track (and associated earthworks, infrastructure and construction support facilities) between chainages 209.840 kilometres and 216.340 kilometres (Branxton to Greta), and chainages 194.500 kilometres and 196.100 kilometres (Farley to Telarah).
- ▶ To facilitate operations until construction of the final phase is completed, installation of rail turnouts would be required at the following chainages:
  - 216.340 kilometres (Branxton).
  - 209.840 kilometres (Greta).
  - 196.100 kilometres (Farley).

Further detail on the proposed modifications to the design, construction and operation of the Project are provided in Chapter 5 of the Submissions Report.

### **1.3 Objectives and Purposes of this Report**

Under Section 75H(6) of the *Environmental Planning and Assessment Act 1979*, the Department of Planning requires the Hunter 8 Alliance to prepare and submit a response to submissions made during the public exhibition period.

The objective of the Submissions Report (to which this report forms an appendix) is to:

- ▶ Provide information about the nature of the submissions received.
- ▶ Discuss how submissions have been considered and addressed.
- ▶ Describe aspects of the Proposal that have been modified.
- ▶ Provide specialist reports that incorporate issues raised in submissions and address the modifications to the Project.
- ▶ Describe how the Statement of Commitments has been revised to reflect the recent community consultation.

The purpose of this Traffic and Access report is to consider how the proposed modifications to the design, construction and operation of the Project may amend the impact assessment included in the Traffic Study included in the Environmental Assessment, and whether changes or additions to the mitigation measures included in the Environmental Assessment are required.

This traffic study also assists in informing the responses in the Submissions Report to issues relating to traffic and access raised during the Environmental Assessment exhibition period.

### **1.4 Revised Construction Impact Zone**

The proposed Project modifications described in Section 1.2 above and detailed in Chapter 5 of the Submissions Report result in revisions to the construction impact zone described in Section 7.8 and shown in Figure 7.1 of the Environmental Assessment.

Figure 1-1 shows the revised construction impact zone and the revised investigation area.

## 1.5 Additional Investigations

The revised construction impact zone includes key changes relating to traffic and access. These changes are related to the size and location of temporary construction compounds.

The number of construction vehicles used in this investigation is based on estimates provided by the Hunter 8 construction team. These estimates are shown in Table 1-1.

**Table 1-1 Peak Hour Vehicle Trips at Construction Compounds**

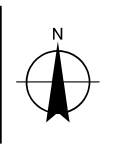
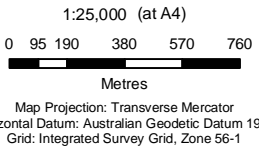
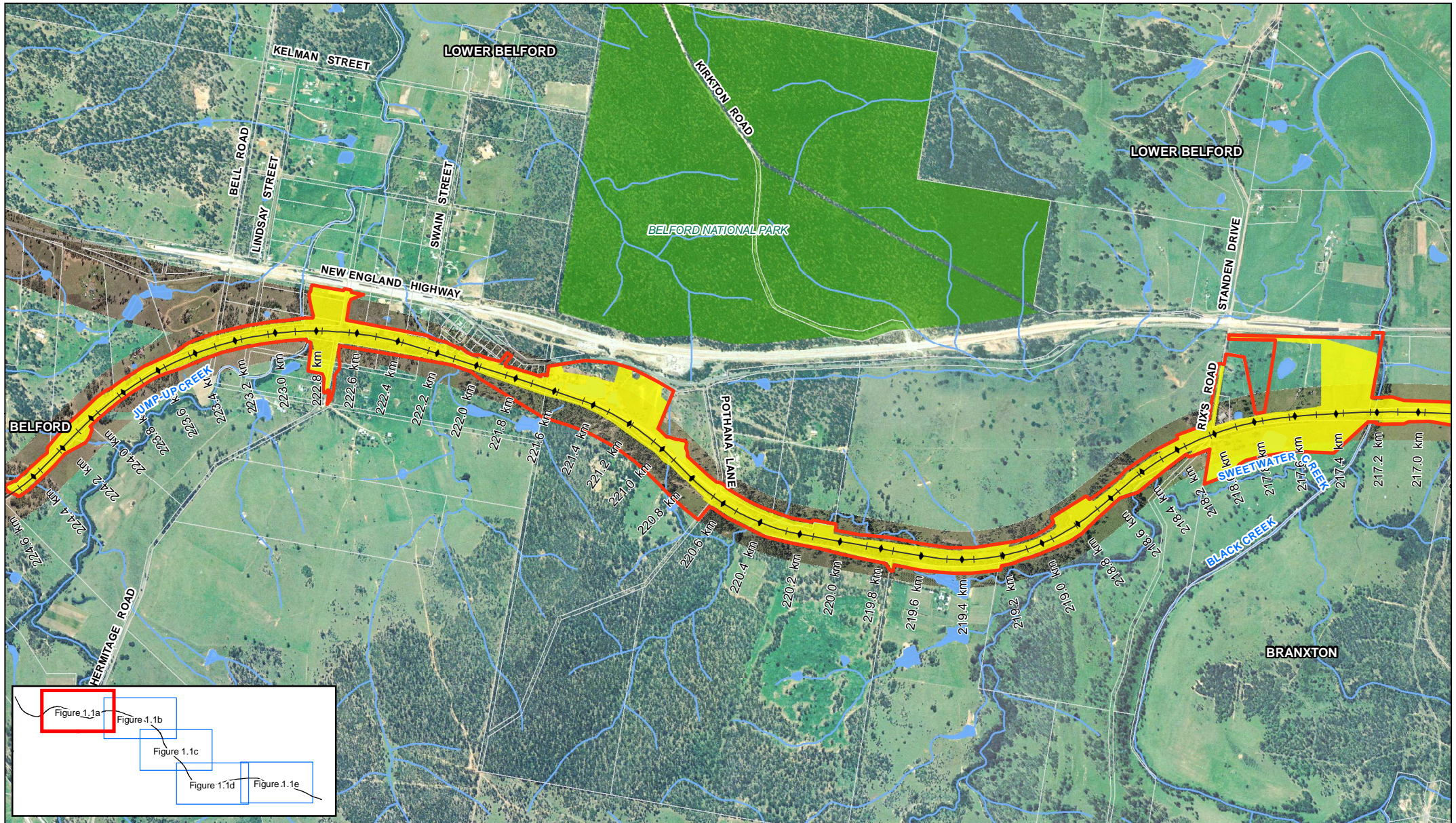
Type	Light Vehicles	Heavy Vehicles
Primary	150	35
Secondary	30	20

Table 1-2 lists the compound locations that were considered in the Environmental Assessment and the additional sites and access roads for Phases 1 and 2 for assessment in this report.

**Table 1-2 Changes to Construction Compounds**

Compound Location	Road access to New England Highway	Compound Type in Environmental Assessment	Revised Compound Type	Phase 1	Phase 2
Wollombi Road, Farley	Wollombi Road, Telarah	Secondary	Secondary	·	✓
Gardiner Street, Rutherford	Shipleigh Drive, Rutherford	None	Secondary	✓	·
Station Lane, Lochinvar	Station Lane, Lochinvar	Primary	Primary	✓	·
Allandale Road, Allandale	Allandale Road, Allandale	None	Secondary	✓	·
Nelson Street, Greta	Nelson Street, Greta	Secondary	Secondary	·	✓
Sawyers Creek	Nelson Street, Greta	None	Secondary	·	✓
Bridge Street, Branxton	Station Street, Branxton	Primary	Secondary	·	✓
Black Creek, Belford	Rixs Road, Belford	Satellite	Primary	✓	·
Hermitage Road	Hermitage Road, Belford	Secondary	Secondary	✓	·

The sites listed in Table 1-2 are shown with the extents of Phase 1 in Figure 1-2 and Phase 2 in Figure 1-3.



LEGEND	
	Existing Railway
	Watercourse
	Cadastre
	Revised Construction Impact Zone
	Revised Investigation Area
	Watercourse Area
	National Park



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Submissions Report  
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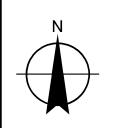
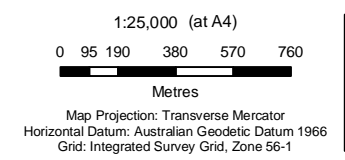
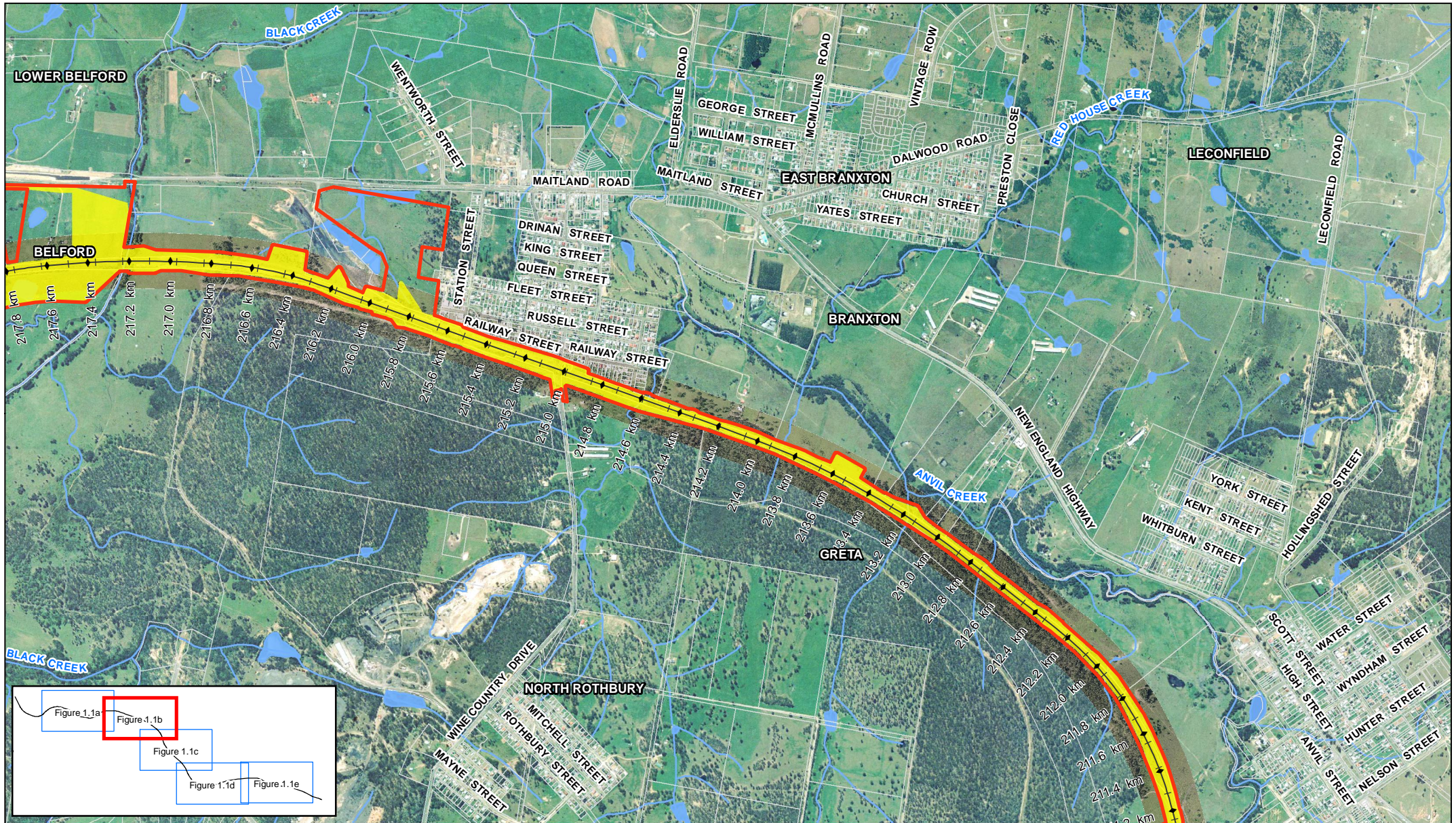
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Revised Project Plan

Figure 1.1a

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**LEGEND**

Existing Railway	Revised Construction Impact Zone
Watercourse	Revised Investigation Area
Cadastre	Watercourse Area
National Park	



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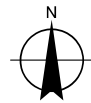
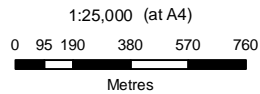
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Figure 1.1b

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**LEGEND**

- Existing Railway
- Watercourse
- Cadastre
- Revised Construction Impact Zone
- Revised Investigation Area
- Watercourse Area
- National Park



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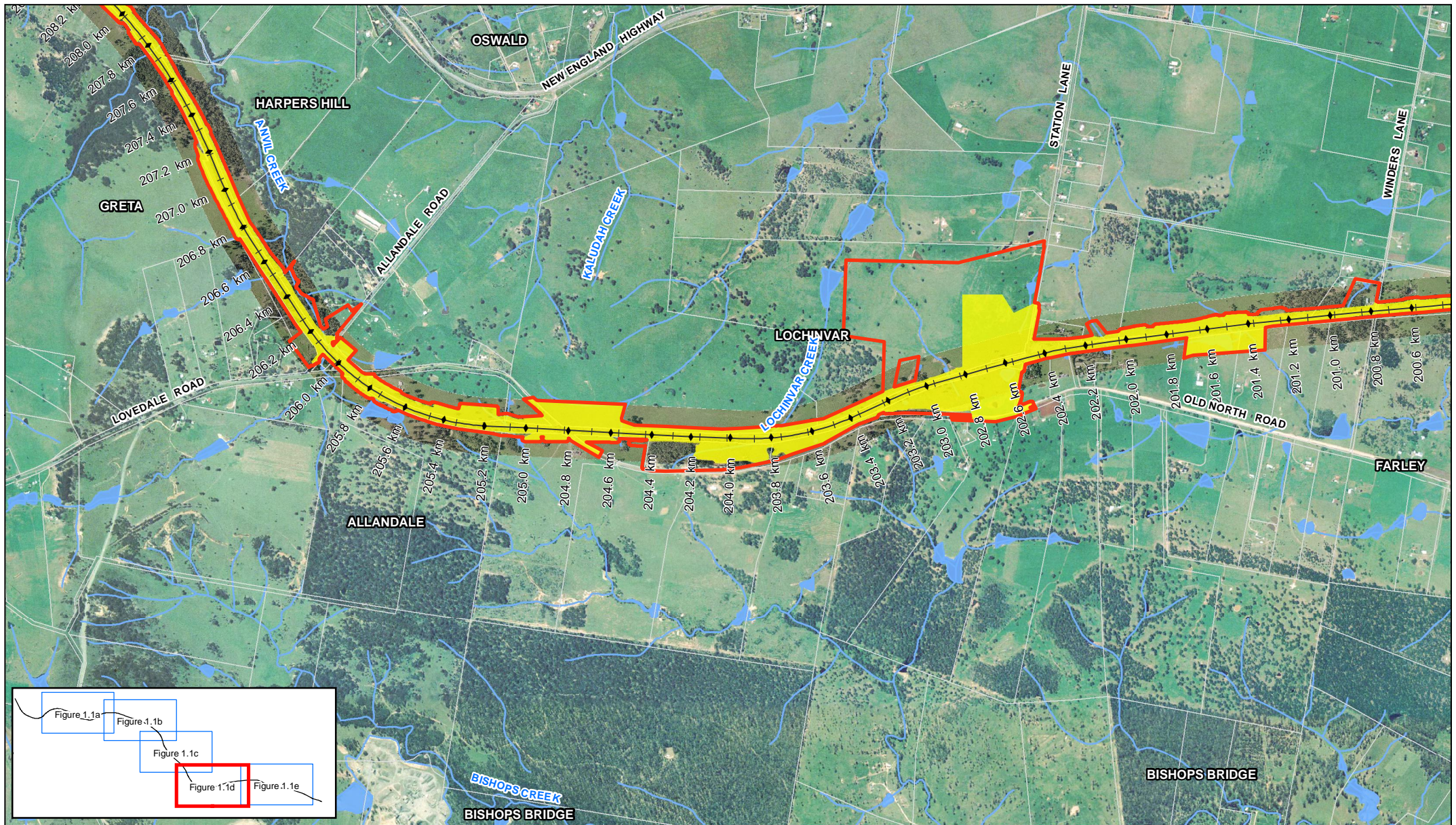
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 Date | August 2010

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Figure 1.1c

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**LEGEND**

- Existing Railway
- Watercourse
- Cadastre
- Revised Construction Impact Zone
- Revised Investigation Area
- Watercourse Area
- National Park



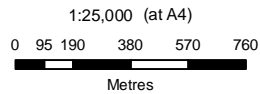
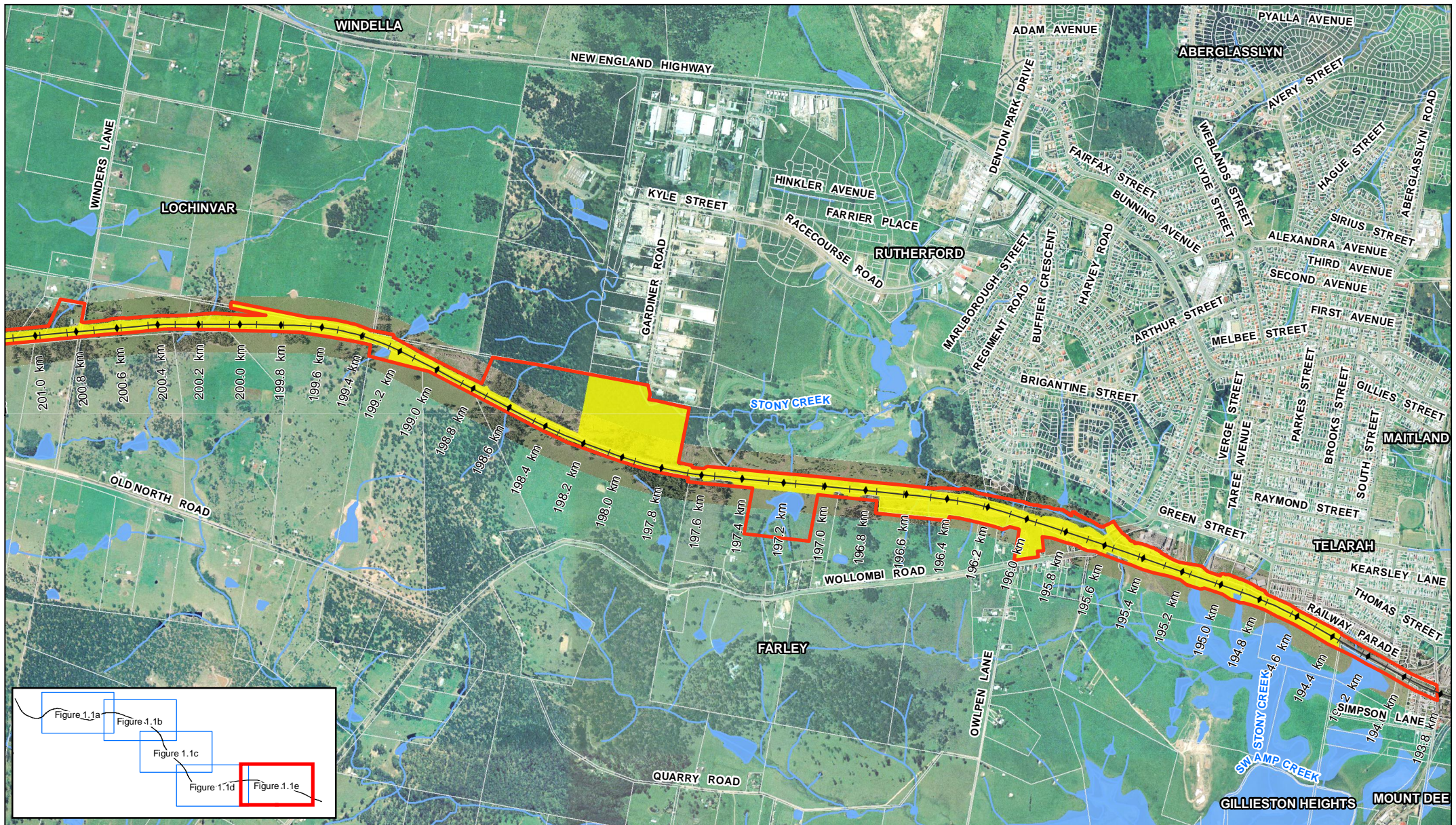
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Figure 1.1d

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**LEGEND**

- Existing Railway
- Watercourse
- Cadastre
- Revised Construction Impact Zone
- Revised Investigation Area
- Watercourse Area
- National Park

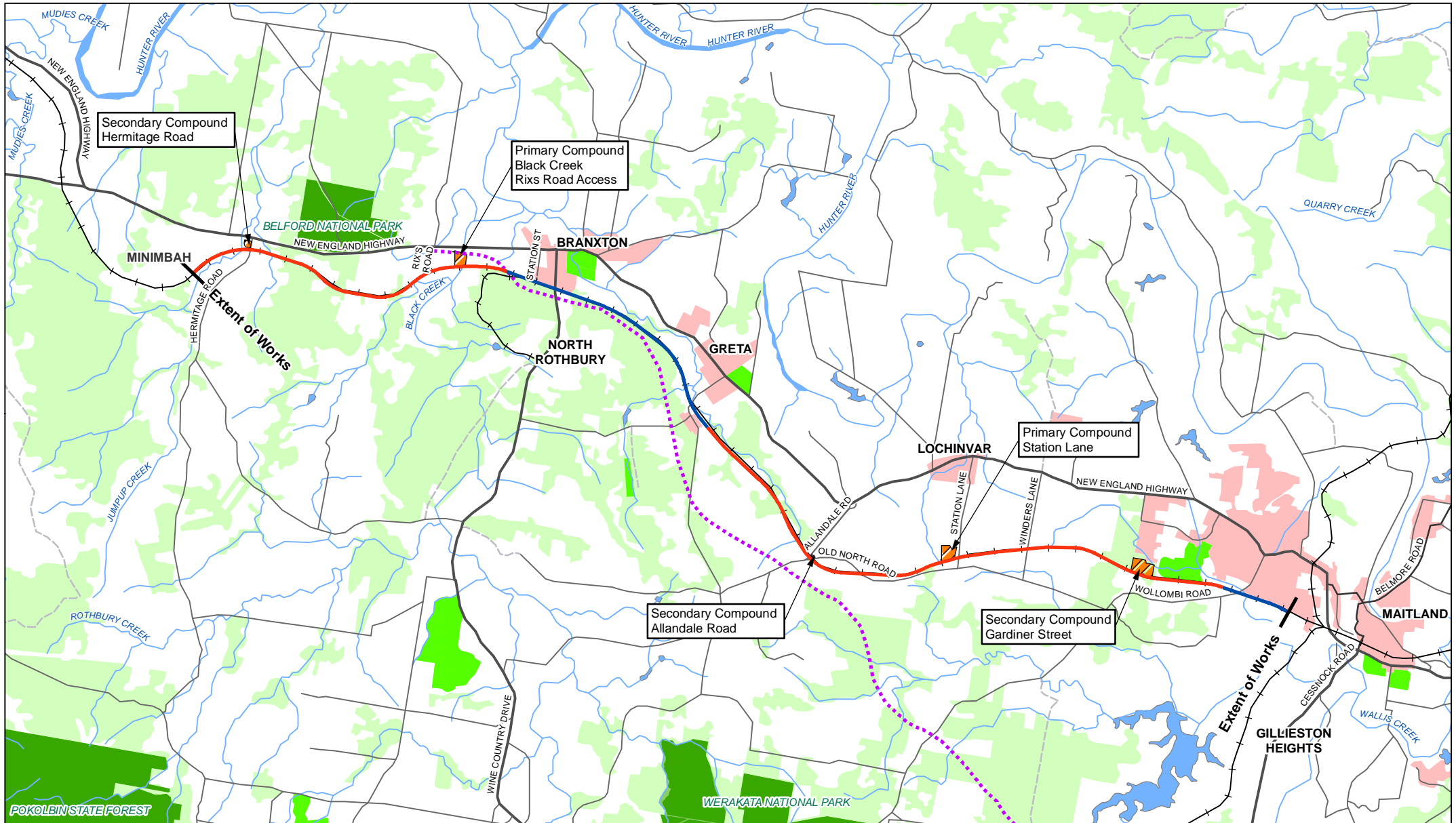


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Figure 1.1e

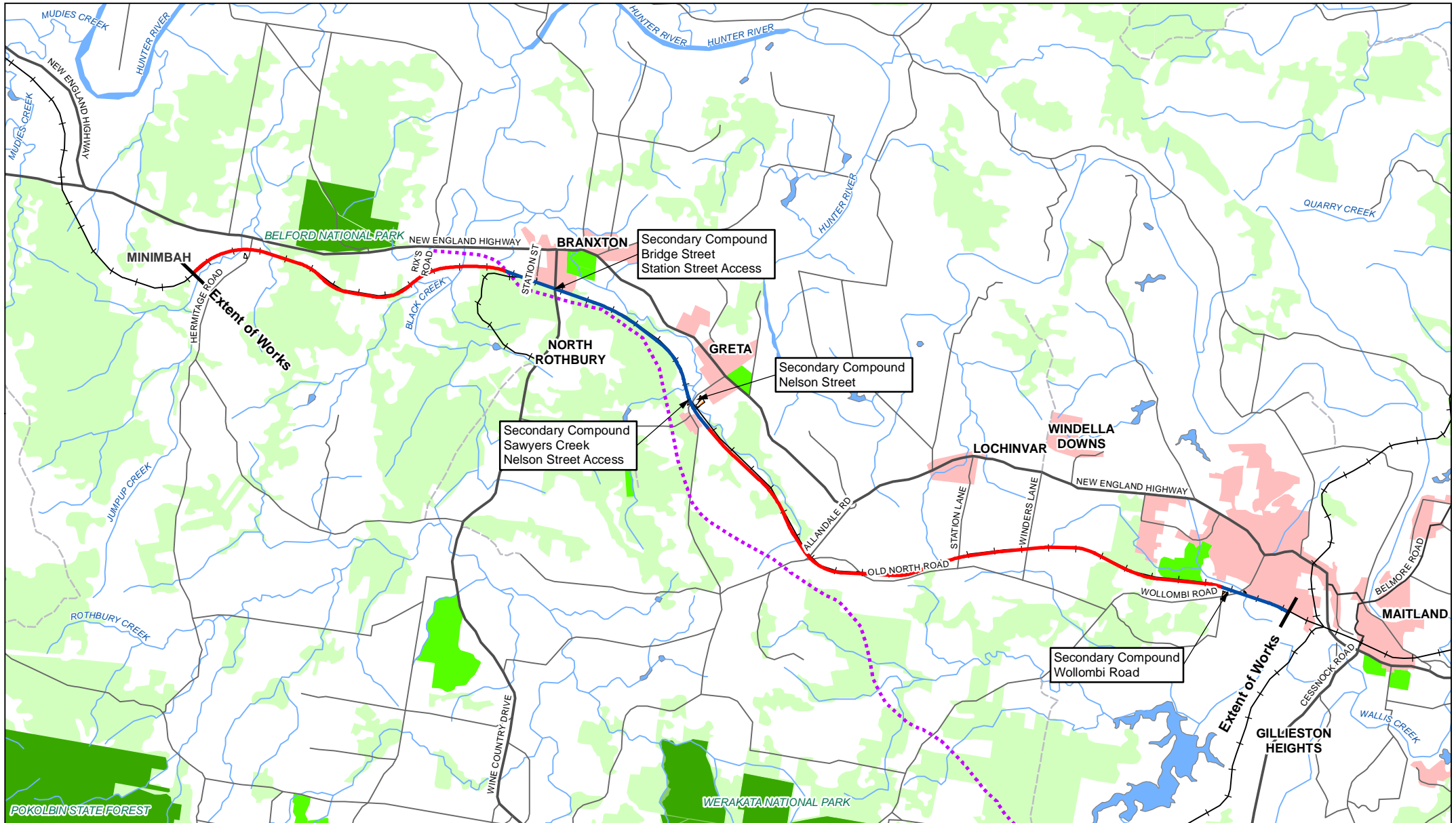


<p>1:120,000 (at A4)</p> <p>0 0.5 1 2 3</p> <p>Kilometers</p> <p>Map Projection: Transverse Mercator Horizontal Datum: Australian Geodetic Datum 1966 Grid: Integrated Survey Grid, Zone 56-1</p>		<p><b>LEGEND</b></p> <table border="0"> <tr> <td> Principal Road</td> <td> Hunter Expressway</td> <td> Recreation Areas</td> </tr> <tr> <td> Secondary Road</td> <td> Built Up Areas</td> <td> Nature Conservation Reserve</td> </tr> <tr> <td> Minor Road</td> <td> Watercourse Areas</td> <td> State Forest</td> </tr> <tr> <td> Track</td> <td> Phase 1 Project Location</td> <td> Forest Or Shrub</td> </tr> <tr> <td> Existing Rail</td> <td> Phase 2 Project Location</td> <td> Construction Compound</td> </tr> <tr> <td> Water Course</td> <td></td> <td></td> </tr> </table>	Principal Road	Hunter Expressway	Recreation Areas	Secondary Road	Built Up Areas	Nature Conservation Reserve	Minor Road	Watercourse Areas	State Forest	Track	Phase 1 Project Location	Forest Or Shrub	Existing Rail	Phase 2 Project Location	Construction Compound	Water Course				<p>Maitland To Minimbah Third Track Submissions Report Traffic Specialist Report</p>	<table border="0"> <tr> <td>Job Number</td> <td>22-14471</td> </tr> <tr> <td>Revision</td> <td>A</td> </tr> <tr> <td>Date</td> <td>August 2010</td> </tr> </table>	Job Number	22-14471	Revision	A	Date	August 2010
Principal Road	Hunter Expressway	Recreation Areas																											
Secondary Road	Built Up Areas	Nature Conservation Reserve																											
Minor Road	Watercourse Areas	State Forest																											
Track	Phase 1 Project Location	Forest Or Shrub																											
Existing Rail	Phase 2 Project Location	Construction Compound																											
Water Course																													
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Project Location Phase 1 **Figure 1.2**

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Data Source: Geoscience Australia: Topography - 2003. Created by: fmackay, msmiljkovski, tmorton



<p>1:120,000 (at A4)</p> <p>0 0.5 1 2 3 Kilometers</p> <p>Map Projection: Transverse Mercator Horizontal Datum: Australian Geodetic Datum 1966 Grid: Integrated Survey Grid, Zone 56-1</p>		<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li> Principal Road</li> <li> Secondary Road</li> <li> Minor Road</li> <li> Track</li> <li> Existing Rail</li> <li> Water Course</li> <li> Hunter Expressway</li> <li> Built Up Areas</li> <li> Watercourse Areas</li> <li> Phase 1 Project Location</li> <li> Phase 2 Project Location</li> <li> Recreation Areas</li> <li> Nature Conservation Reserve</li> <li> State Forest</li> <li> Forest Or Shrub</li> <li> Construction Compound</li> </ul>		<p>Maitland To Minimbah Third Track Submissions Report Traffic Specialist Report</p>	<p>Job Number   22-14471 Revision   A Date   August 2010</p>
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Project Location Phase 2 **Figure 1.3**

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## 2. Methodology

The methodology applied to this assessment is essentially the same as in the Traffic Study for the Environmental Assessment (Appendix J).

A summary of the methodology is:

- ▶ Review of existing road network conditions.
- ▶ Assessment of potential traffic impacts from the Project:
  - Estimate volume of additional construction traffic.
  - Assess changes to level of service on public roads due to predicted construction traffic.
- ▶ Propose mitigation measures.

### 3. Existing Environment

The key roads in respect to the Project are as described in the Traffic Study (Appendix J of the Environmental Assessment) in the sections listed in Table 3-1.

**Table 3-1 References to Relevant Sections in Environmental Assessment**

Location	Traffic Study (Appendix J of the Environmental Assessment)
Wollombi Road, Telarah	2.2.2
Racecourse Road, Rutherford	2.2.3
Shipleigh Drive, Rutherford	2.2.4
Kyle Street, Rutherford	2.2.5
Station Lane, Lochinvar	2.2.7
Old North Road, Allandale	2.2.8
Allandale Road, Allandale	2.2.9
Nelson Street, Greta	2.2.10
Station Street, Branxton	2.2.11
Wine Country Drive (Bridge Street), Branxton	2.2.12
Standen Drive (Rixs Road)	2.2.13
Hermitage Road, Belford	2.2.14

## 4. Impact Assessment

The revised location, size and number of the proposed construction compounds would change the level of construction traffic and therefore the traffic impact on affected roads and intersections reported in the Environmental Assessment.

### 4.1 Changes to Construction Compounds

Table 4.2 in the Traffic Study (Appendix J of the Environmental Assessment) lists proposed construction compounds. The changes to the construction compounds being assessed in this report are listed in Table 4-1.

**Table 4-1 Environmental Assessment Compound Locations and Proposed Changes**

Location	Suburb	Compound Type in Environmental Assessment	Changes to Construction Compounds
Wollombi Road	Rutherford	Secondary	No change
Gardiner Street (Shipley Drive Access)	Rutherford	None	New secondary compound
Station Lane	Lochinvar	Primary	No change
Allandale Road	Allandale	None	New secondary compound
Nelson Street	Greta	Secondary	One additional secondary compound
Bridge Street (Station Street Access)	Branxton	Primary	Change from primary to secondary compound
Black Creek (Rixs Road Access)	Belford	Satellite	Change from satellite to primary compound
Hermitage Road	Belford	Secondary	No change

The affected roads that intersect with the New England Highway are listed in Table 4-2. The table also shows the construction phase applicable for each compound, demonstrating that construction activity at several sites would not occur at the same time.

**Table 4-2 Phasing of Proposed Construction Compounds**

Location	Compound Type	Phase 1	Phase 2
Wollombi Road, Telarah	Secondary	•	✓
Gardiner Street, Rutherford (Shipley Drive Access)	Secondary	✓	•
Station Lane, Lochinvar	Primary	✓	•
Allandale Road, Allandale	Secondary	✓	•
Nelson Street, Greta	Secondary	•	✓
Bridge Street, Branxton (Station Street Access)	Secondary	•	✓
Black Creek, Belford (Rixs Road Access)	Primary	✓	•
Hermitage Road, Belford	Secondary	✓	•

The proposed construction activities are as described in Section 4 of the Traffic Study (Appendix J of the Environmental Assessment).

The proposed construction traffic generated by the Project and the intersections with the Highway that would be impacted is shown in Appendix A.

#### 4.2 Intersection Performance

A summary of the modelled performance of intersections during construction of Phase 1 and Phase 2, based on existing traffic layout and controls is given in Table 4-3 and Table 4-4.

**Table 4-3 Phase 1 Construction Traffic Impact on Intersection Capacity**

Location	Suburb	Level of Service <sup>1</sup> Existing	Level of Service Construction
Shipley Drive at New England Highway (Gardiner Street compound)	Rutherford	LOS B	LOS B
Station Lane at New England Highway	Lochinvar	LOS D	LOS F
Allandale Road at New England Highway	Allandale	LOS F	LOS F
Old North Road at Allandale Road	Allandale	LOS B	LOS B
Rixs Road at New England Highway (Black Creek compound)	Belford <sup>2</sup>	LOS A	LOS F
Hermitage Road at New England Highway	Belford <sup>2</sup>	LOS B	LOS D

<sup>1</sup> Level of service (LOS) is based on the worst movement except for at Shipley Drive where the intersection LOS is reported.

<sup>2</sup> These sites were assessed in the Traffic Study (Appendix J of the Environmental Assessment).

**Table 4-4 Phase 2 Construction Traffic Impact on Intersection Capacity**

Location	Suburb	Level of Service <sup>1</sup>	
		Existing	Construction
Wollombi Road at New England Highway	Telarah	LOS F	LOS F
Nelson Street at New England Highway (Nelson Street and Sawyers Creek compounds)	Greta <sup>2</sup>	LOS E	LOS F
Station Street at New England Highway (Bridge Street compound)	Branxton <sup>2</sup>	LOS D	LOS F

<sup>1</sup> Level of Service at these priority controlled junctions is reported as the 'worst movement' LOS.

<sup>2</sup> These sites were assessed in the Traffic Study (Appendix J of the Environmental Assessment).

Table 4-3 and Table 4-4 show that the addition of construction compounds increases traffic at intersections with the New England Highway. The increase in traffic generally results in delays for traffic leaving the side road turning right onto the New England Highway.

The Hunter Expressway is expected for completion at the end of 2013. Once this road is open to traffic, there will be a substantial decrease in the traffic volumes on the New England Highway through the Project investigation area. Construction of Phase 2 of the Project may occur after Hunter Expressway has opened. The impacts and mitigation measures for Phase 2 should be reviewed in consultation with the RTA prior to construction Phase 2 of the Project.

#### 4.2.1 Construction

A brief description of the analysis results for the existing and construction cases for each intersection is given in Table 4-5. Overall, the changes to the Project results in a similar volume of construction vehicles distributed over two phases of construction.

**Table 4-5 Construction Traffic Impact**

Location	Existing Traffic	With Phase 1 Construction Traffic	With Phase 2 Construction Traffic
Wollombi Road, Telarah	The right turn movement out of Wollombi Road onto the New England Highway is currently over-capacity in both morning and afternoon peak periods.	No construction traffic in Phase 1.	The addition of vehicles in the morning between 6.30 – 7.30 AM, when construction vehicles would peak, would further increase delays for vehicles turning right out of Wollombi Road.
Shipleigh Drive, Rutherford (Gardiner Street compound)	The roundabout is reported to operate at good level of service with some spare capacity in both the morning and afternoon peaks.	The performance of the intersection is good with acceptable delays and spare capacity with the addition of construction vehicles. In the morning peak, there is a small increase in delay for vehicles leaving Shipleigh Drive. This delay is still within good performance criteria.	No construction traffic in Phase 2.
Station Lane, Lochinvar	Unchanged from Environmental Assessment.	Unchanged from Environmental Assessment.	No construction traffic in Phase 2.
Allandale Road, Allandale	The movements out of Allandale Road onto the New England Highway and into Allandale Road from the west are nearing capacity in the morning peak and over-capacity in the afternoon peak period. Vehicles travelling on the New England Highway experience acceptable delays.	The addition of construction vehicles in the morning peak would reduce the performance of the intersection. In the afternoon peak, vehicles leaving Allandale Road would experience increased delays.	No construction traffic in Phase 2.

Location	Existing Traffic	With Phase 1 Construction Traffic	With Phase 2 Construction Traffic
<p>Nelson Street, Greta (Nelson Street and Sawyers Creek compounds)</p>	<p>The existing intersection is currently at capacity in afternoon peak for the through and right turn movements from the southern approach of Nelson Street. Vehicles travelling along the New England Highway experience acceptable delays.</p>	<p>No construction traffic in Phase 1.</p>	<p>The addition of construction vehicles increases the delays out of Nelson Street from the southern approach and increases the risk of crashes.</p>
<p>Station Street, Branxton (Bridge Street compound)</p>	<p>The existing intersection is operating near capacity in the morning peak with the movement out of Station Street being critical.</p>	<p>No construction traffic in Phase 1.</p>	<p>The addition of construction vehicles to this intersection would further reduce the level of service of vehicles exiting Station Street resulting in the intersection being over capacity in the morning and afternoon peak periods.</p> <p>There is a three tonne load limit on local roads between Bowen Street and Wine Country Drive. This restriction results in Station Street being the only access to the Project site from the New England Highway in Branxton.</p>



Location	Existing Traffic	With Phase 1 Construction Traffic	With Phase 2 Construction Traffic
Rixs Road, Belford (Black Creek compound)	The existing intersection is generally performing with acceptable delays and spare capacity.	The addition of construction traffic increases delays for vehicles exiting Rixs Road in the morning peak. Rixs Road LOS reduces to F for left turning vehicles and E for right turning vehicles.	No construction traffic in Phase 2.
Hermitage Road, Belford	Unchanged from Environmental Assessment.	Unchanged from Environmental Assessment.	No construction traffic in Phase 2.

#### **4.2.2 Operation Impact Assessment**

There is expected to be marginal traffic generation from the project during the operational phase of the Project. Maintenance works are expected to be carried out on an as-needed basis, and the subsequent traffic generation is expected to occur at variable times throughout the day and night. Therefore the impact on the local road network as a result of a potential increase in maintenance activities is expected to be negligible. Vehicles which are currently in use for the existing tracks would be used to maintain the current and proposed track and only a minor increase in the number of maintenance vehicles is expected.

Therefore, modelling was not performed for vehicles in the operational phase of the Project.



## 5. Mitigation Measures

The proposed mitigation measures for the Project are shown in Table 5-1.

Sketches of the proposed linemarking at Allandale Road, Allandale and Rixs Road, Belford are shown in Appendix C.

As noted, the measures proposed for the Phase 2 construction activities would be reviewed prior to construction. The level of service of the identified intersections may have changed depending on the operation status of the Hunter Expressway and therefore intersection treatment to be provided may be amended.

**Table 5-1 Proposed Intersection Treatments**

Road access to New England Highway	Compound Type	Phase 1 Treatment	Phase 2 Treatment
Wollombi Road, Telarah	Secondary	None required – No traffic Phase 1	Traffic Signals*
Shipley Drive, Rutherford (Gardiner Street compound)	Secondary	None required – Adequate	None required – No traffic Phase 2
Station Lane, Lochinvar	Primary	Traffic Controllers	None required – No traffic Phase 2
Allandale Road, Allandale	Secondary	Lane closure/realignment	None required – No traffic Phase 2
Nelson Street, Greta (Nelson Street and Sawyers Creek compounds)	Secondary	None required – No traffic Phase 1	Traffic Controllers*
Station Street, Branxton	Secondary	None required – No traffic Phase 1	Traffic Signals*
Rixs Road, Belford	Primary	Lane closure/realignment	None required – No traffic Phase 2
Hermitage Road, Belford	Secondary	None required – Adequate	None required – No traffic Phase 2

\* To be reviewed prior to construction to consider operational status of Hunter Expressway and potential impacts on traffic

## 6. Conclusions

Overall, the changes to the Project results in a similar volume of construction vehicles distributed over two phases of construction. Several intersections have been identified as being impacted by additional traffic. A summary of the mitigation measures are provided in Table 6-1.

**Table 6-1 Preferred Project Environmental Issues and Mitigation Measures**

Potential Environmental Issue	Additional Areas Existing Environment	Potential Additional Issues	Mitigation Measures Phase 1	Mitigation Measures Phase 2
<b>Traffic and Access</b>	Wollombi Road, Telarah	Unacceptable delays for vehicles exiting Wollombi Road turning right onto the New England Highway	N/A	Traffic Signals
	Shipley Drive, Rutherford (Gardiner Street compound)	None	N/A	N/A
	Station Lane, Lochinvar	Unacceptable delays for vehicles exiting Station Lane turning right onto the New England Highway	Manned Traffic Controllers	N/A
	Allandale Road, Allandale	Unacceptable delays for vehicles exiting Allandale Road turning right onto the New England Highway	Upgrade of New England Highway at Allandale Road linemaking for the duration of construction.	N/A
	Nelson Street, Greta (Nelson Street and Sawyers Creek compounds)	Unacceptable delays for vehicles exiting Nelson Street turning right onto the New England Highway	N/A	Manned Traffic Controllers
	Station Street, Branxton (Bridge Street compound)	Unacceptable delays for vehicles exiting Station Street turning right onto the New England Highway	N/A	Traffic Signals



Potential Environmental Issue	Additional Areas Existing Environment	Potential Additional Issues	Mitigation Measures Phase 1	Mitigation Measures Phase 2
	Rixs Road, Belford (Black Creek compound)	Unacceptable delays for vehicles exiting Rixs Road turning right onto the New England Highway	Upgrade of New England Highway at Rixs Road linemaking for the duration of construction.	N/A
	Hermitage Road, Belford	None	N/A	N/A



## 7. References

Austrroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections.



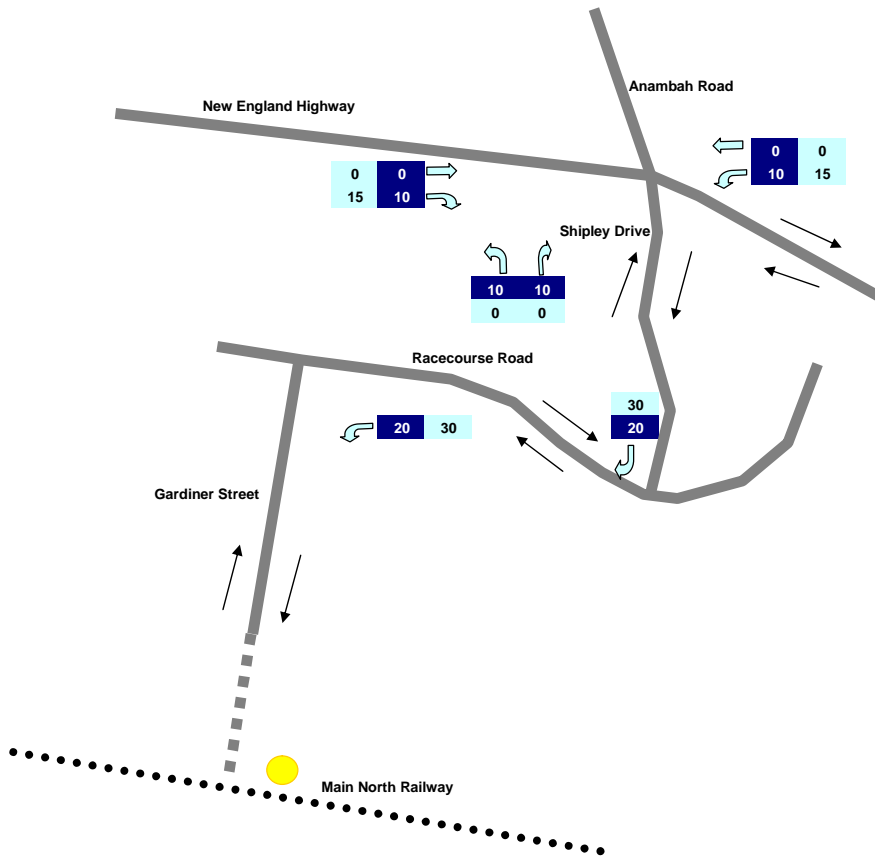
Appendix A  
Construction Traffic

<b>Phase 1</b>	
<b>Road</b>	<b>Suburb</b>
Wollombi Road	Telarah
Shipleigh Drive	Rutherford
Station Lane	Lochinvar
Allandale Road	Allandale
Nelson Street	Greta
Station Street	Branxton
Rixs Road	Belford
Hermitage Road	Belford

<b>In Peak Hour - TMP</b>	
<b>HV</b>	<b>LV</b>
0	0
20	30
35	150
20	30
0	0
0	0
35	150
20	30

Shiple Drive, Rutherford Phase 1 Morning Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



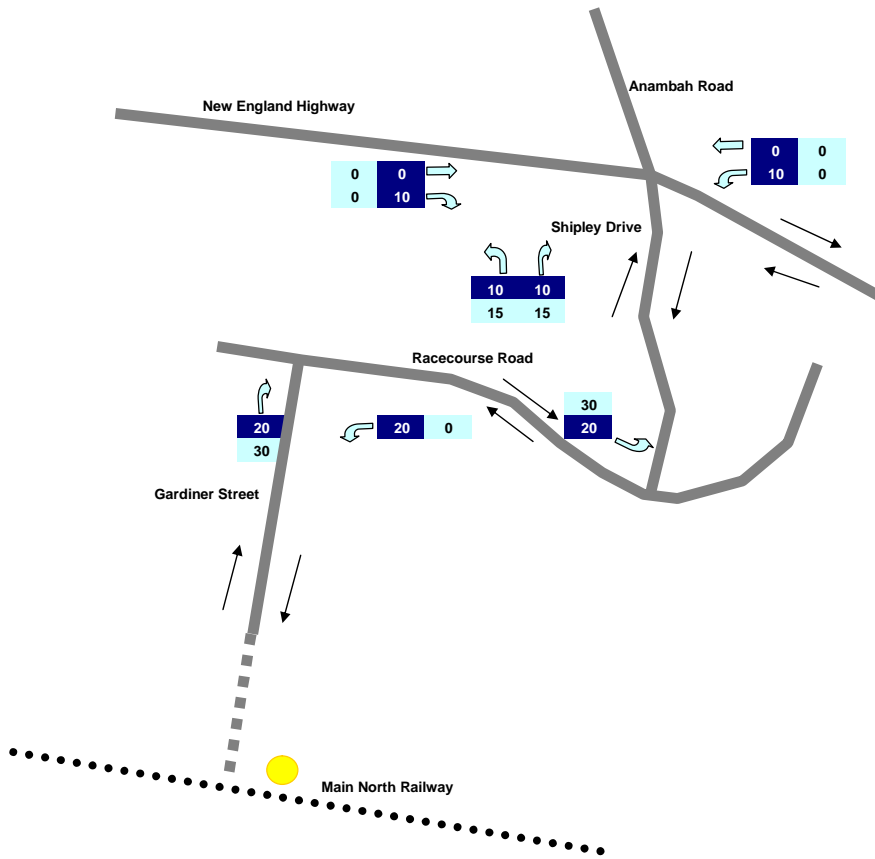
100% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak

50% of vehicles leaving the compound travelling north along Shiple Drive are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Shiple Drive are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

Shiple Drive, Rutherford Phase 1 Afternoon Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



100% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak

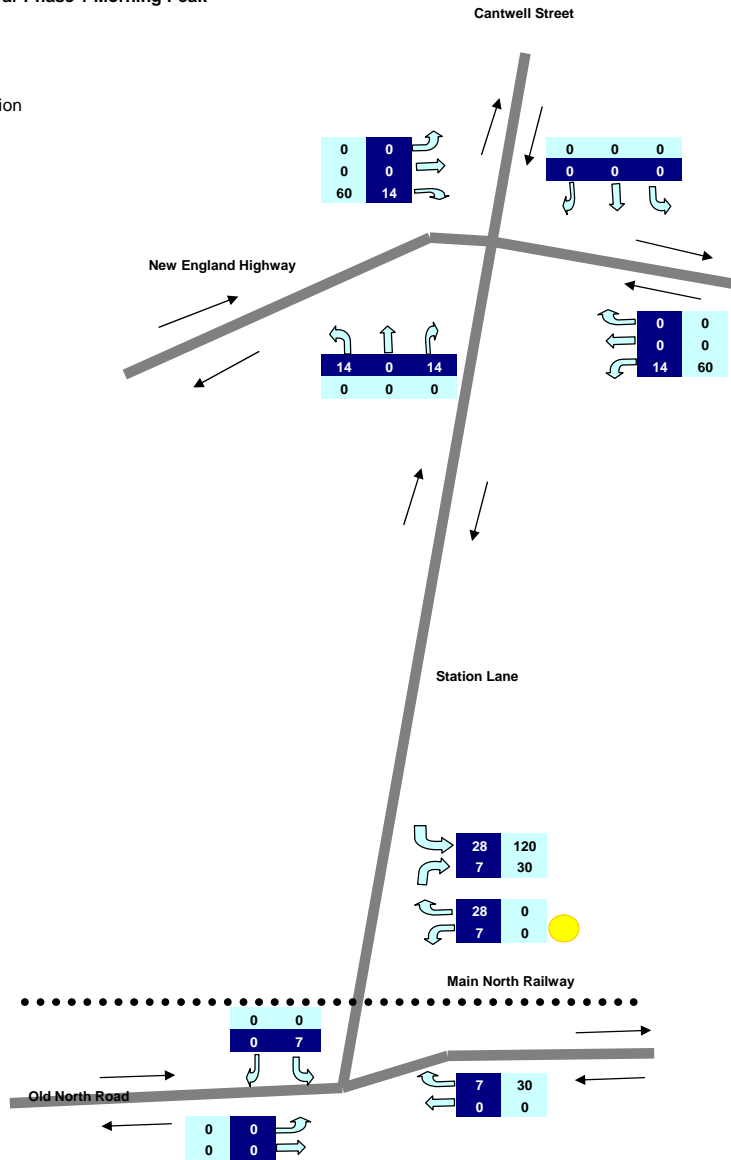
50% of vehicles leaving the compound travelling north along Shiple Drive are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Shiple Drive are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Station Lane AM

Station Lane Lochinvar Phase 1 Morning Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



80% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak  
 20% of vehicles arrive from Old North Road in the morning peak

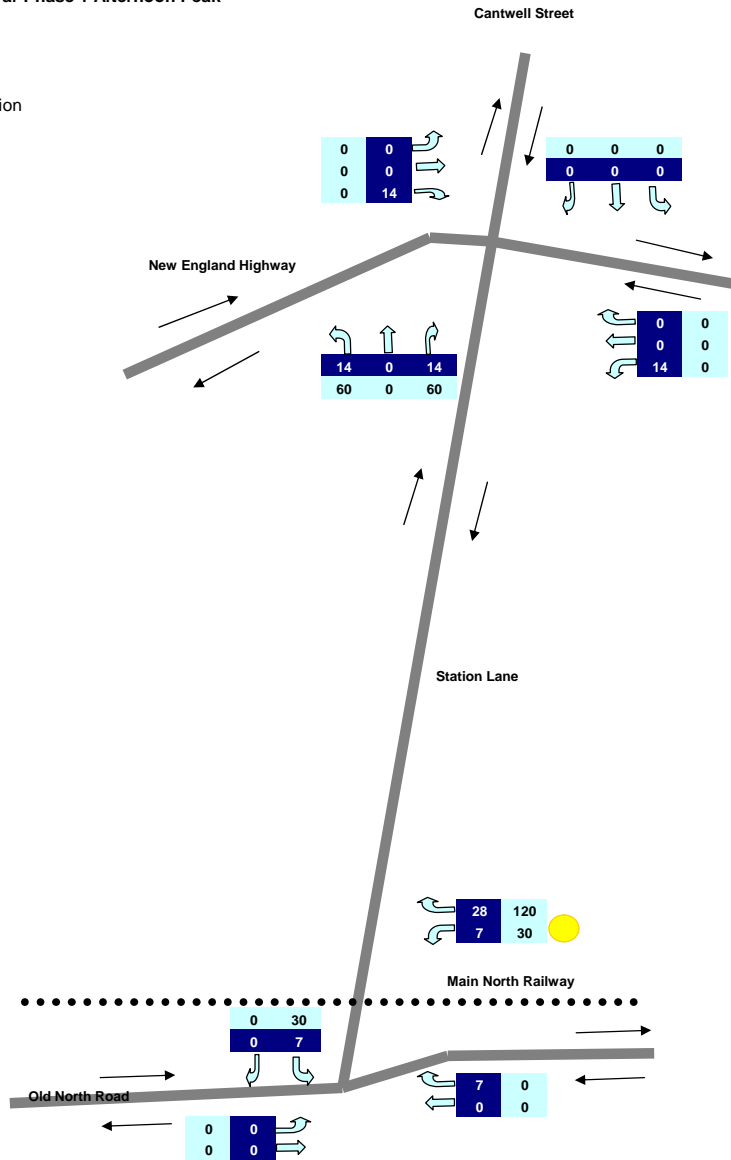
50% of vehicles leaving the compound travelling north along Station Lane are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Station Lane are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

Station Lane PM

Station Lane Lochinvar Phase 1 Afternoon Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



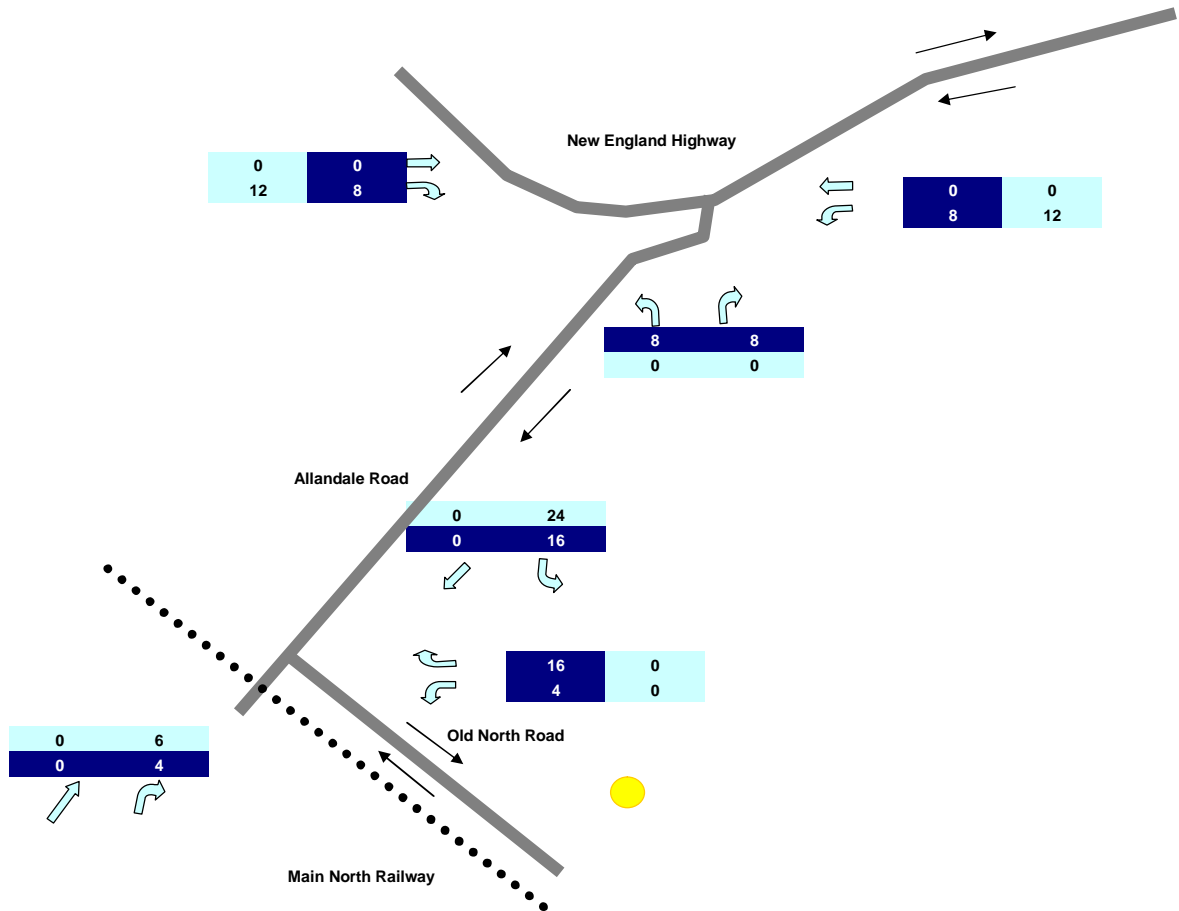
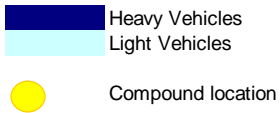
80% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak  
 20% of vehicles leaving the compound are assumed to turn left to Station Lane in the evening peak

100% of vehicles leaving the compound are travelling south to Old North Road are assumed to turn left

50% of vehicles leaving the compound travelling north along Station Lane are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Station Lane are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Allandale Road, Allandale Phase 1 Morning Peak



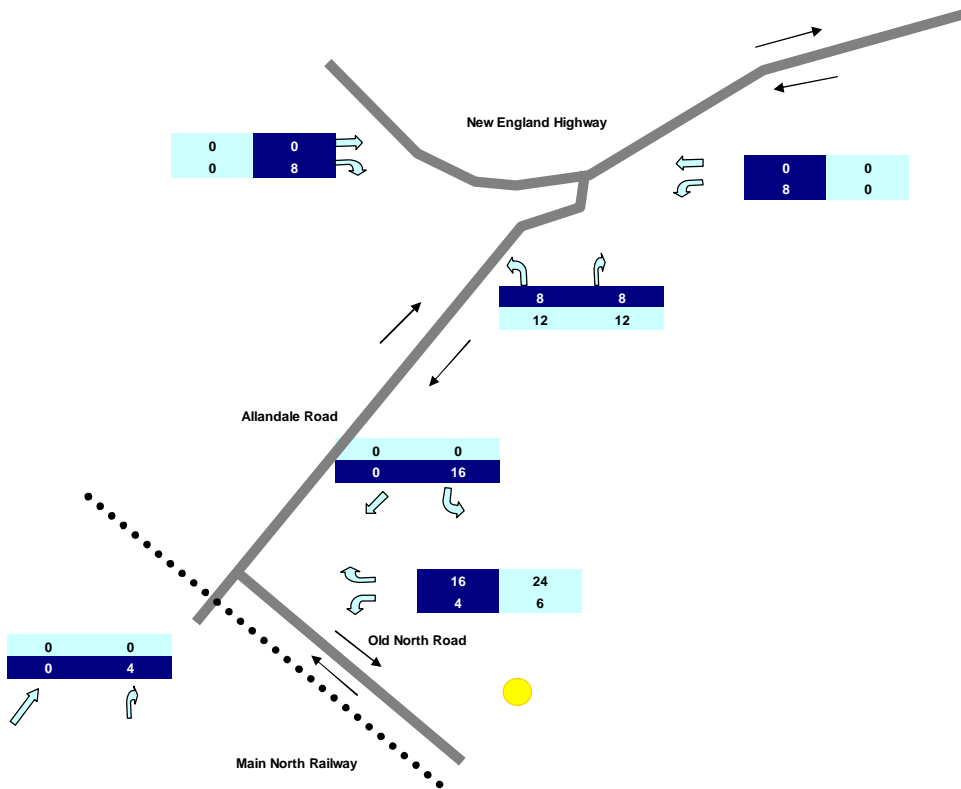
80% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak  
 20% of vehicles arrive from the south in the morning peak

50% of vehicles leaving the compound travelling north along Allandale Road are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Allandale Road are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

Allandale Road, Allandale Phase 1 Afternoon Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



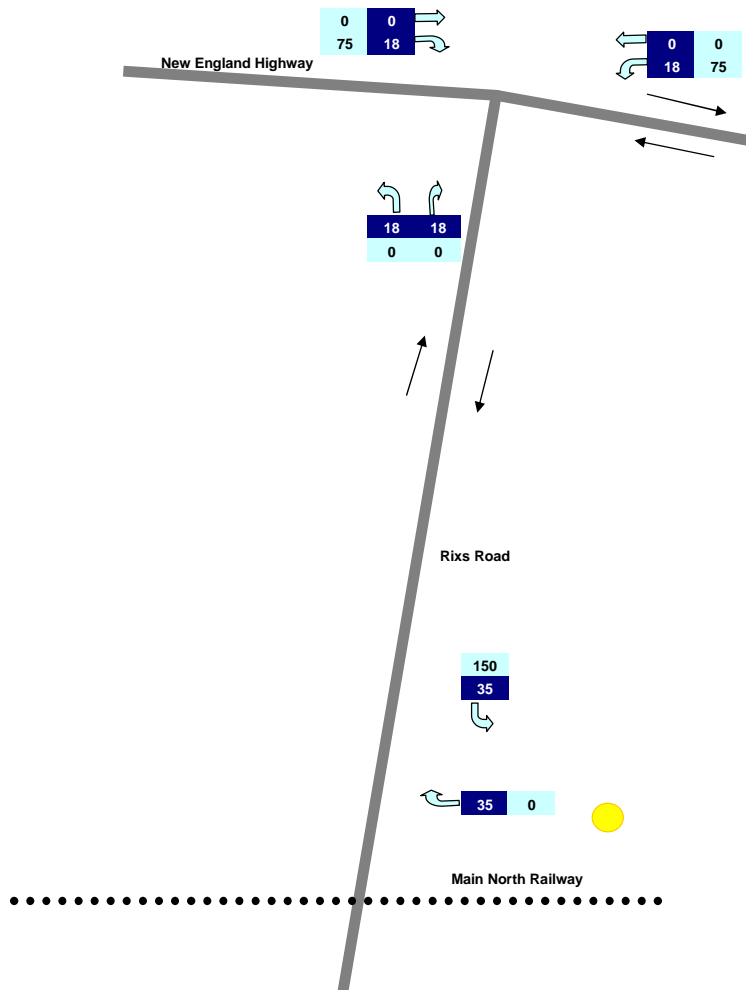
80% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak  
 20% of vehicles leaving the compound are assumed to turn left to Allandale Road in the evening peak

50% of vehicles leaving the compound travelling north along Allandale Road are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Allandale Road are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Rixs Road, Belford Phase 1 Morning Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



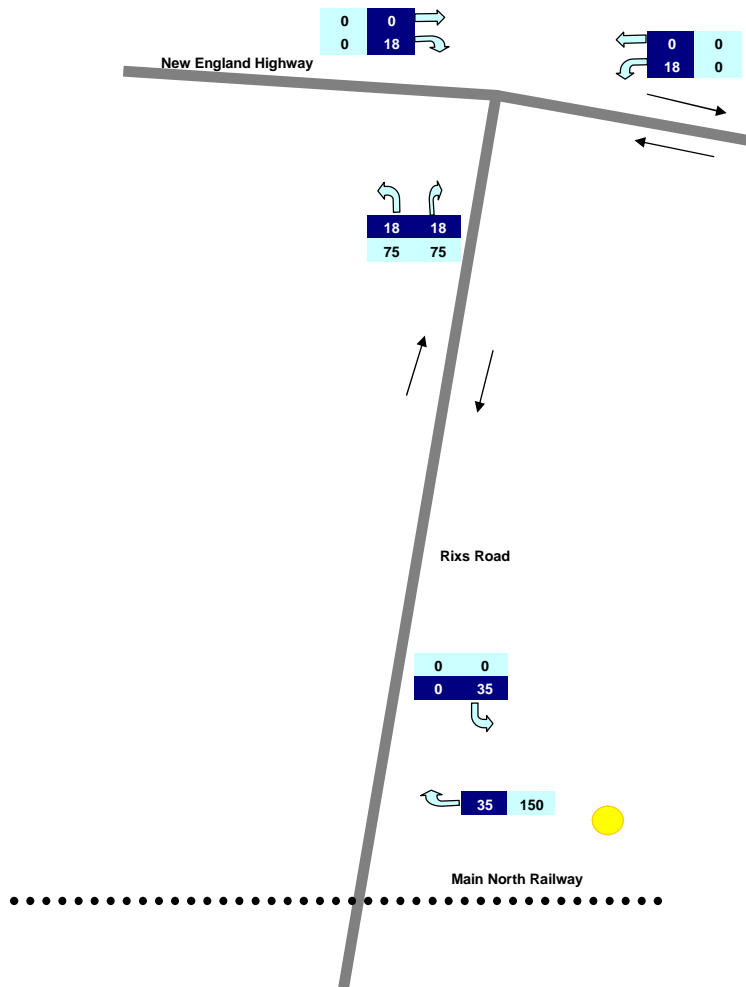
100% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak

50% of vehicles leaving the compound travelling north along Rixs Road are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Rixs Road are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Rixs Road, Belford Phase 1 Afternoon Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



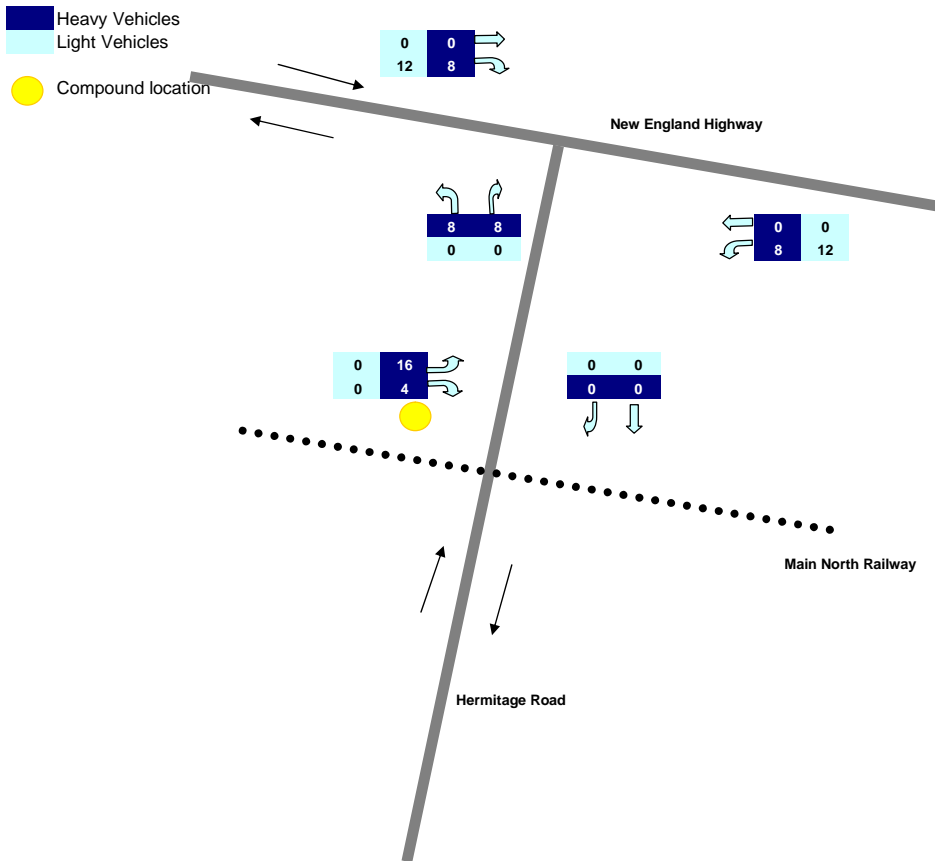
100% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak

50% of vehicles leaving the compound travelling north along Rixs Road are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Rixs Road are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

100% of vehicles going to the compound are assumed to turn right from Rixs in the evening peak

Hermitage Road, Belford Phase 1 Morning Peak

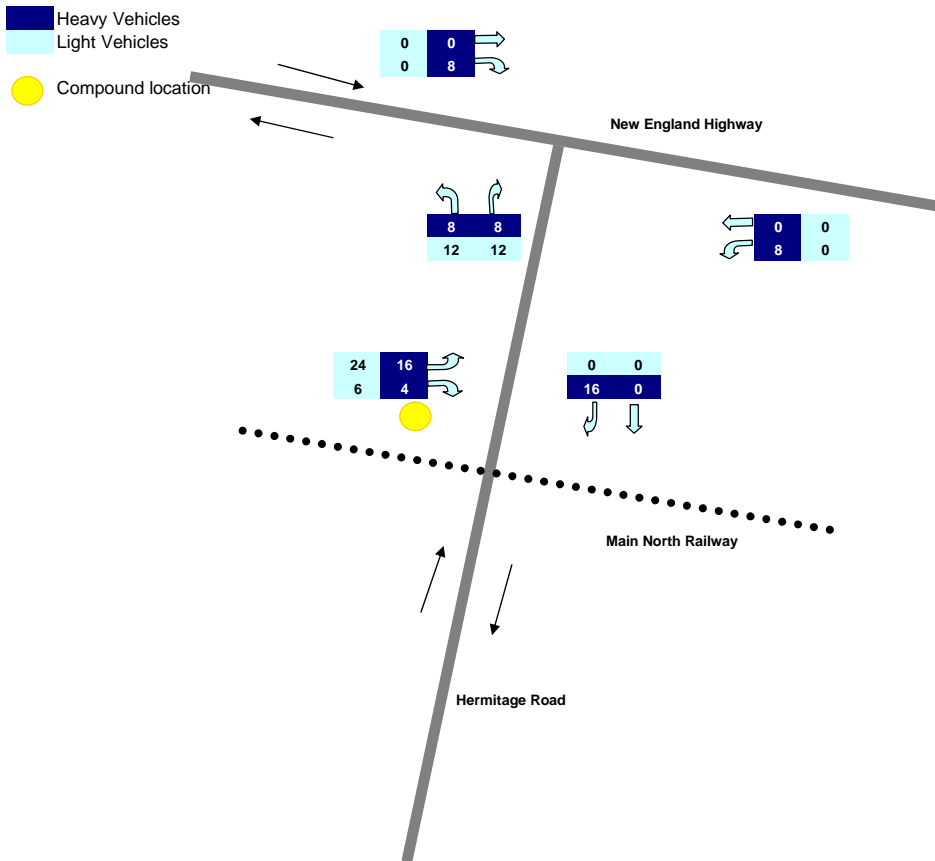


80% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak  
 20% of vehicles arrive from Hermitage Road in the morning peak

50% of vehicles leaving the compound travelling north along Hermitage Road are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Hermitage Road are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

Hermitage Road, Belford Phase 1 Morning Peak



80% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak  
 20% of vehicles leaving the compound are assumed to turn left to Hermitage Road in the evening peak

50% of vehicles leaving the compound travelling north along Hermitage Road are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Hermitage Road are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

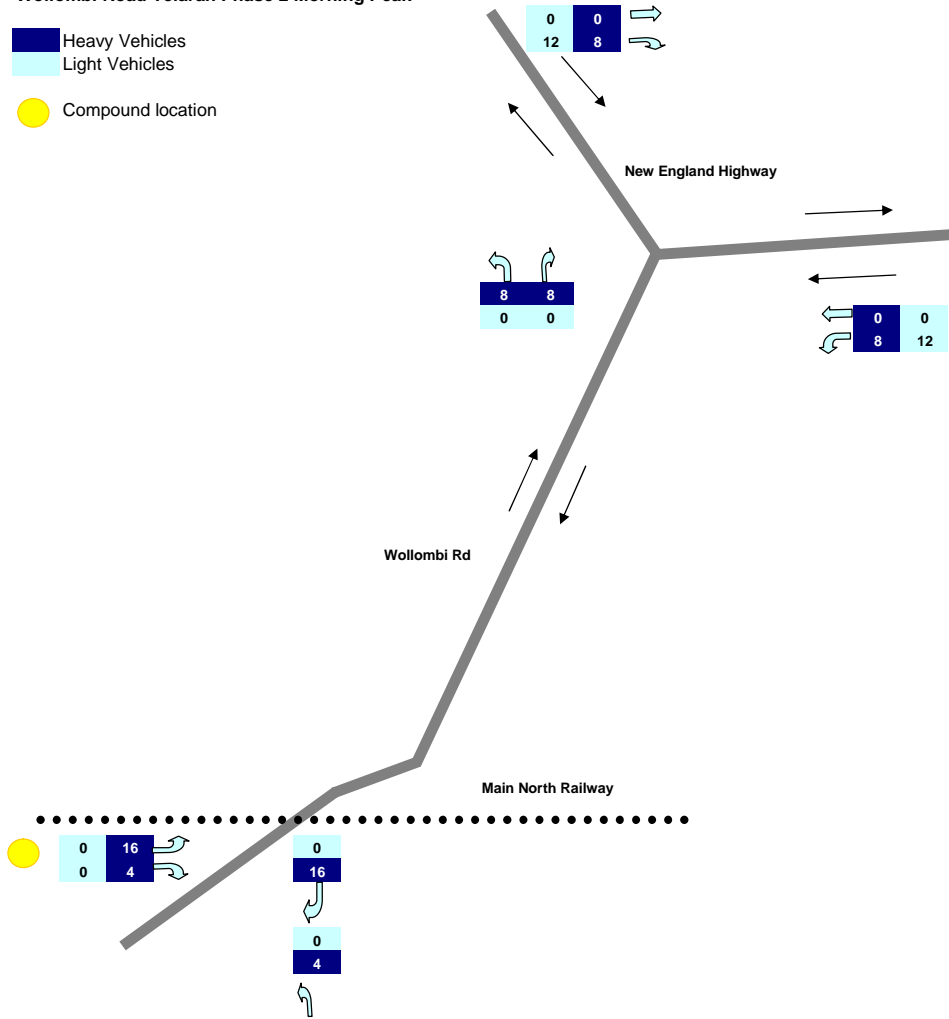
<b>Phase 2</b>	
<b>Road</b>	<b>Suburb</b>
Wollombi Road	Telarah
Shipley Drive	Rutherford
Station Lane	Lochinvar
Allandale Road	Allandale
Nelson Street	Greta
Station Street	Branxton
Rixs Road	Belford
Hermitage Road	Belford

<b>In Peak Hour - TMP</b>	
<b>HV</b>	<b>LV</b>
20	30
0	0
0	0
0	0
40	60
20	30
0	0
0	0

Wollombi Road AM

Wollombi Road Telarah Phase 2 Morning Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



80% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak  
 20% of vehicles arrive from the south in the morning peak

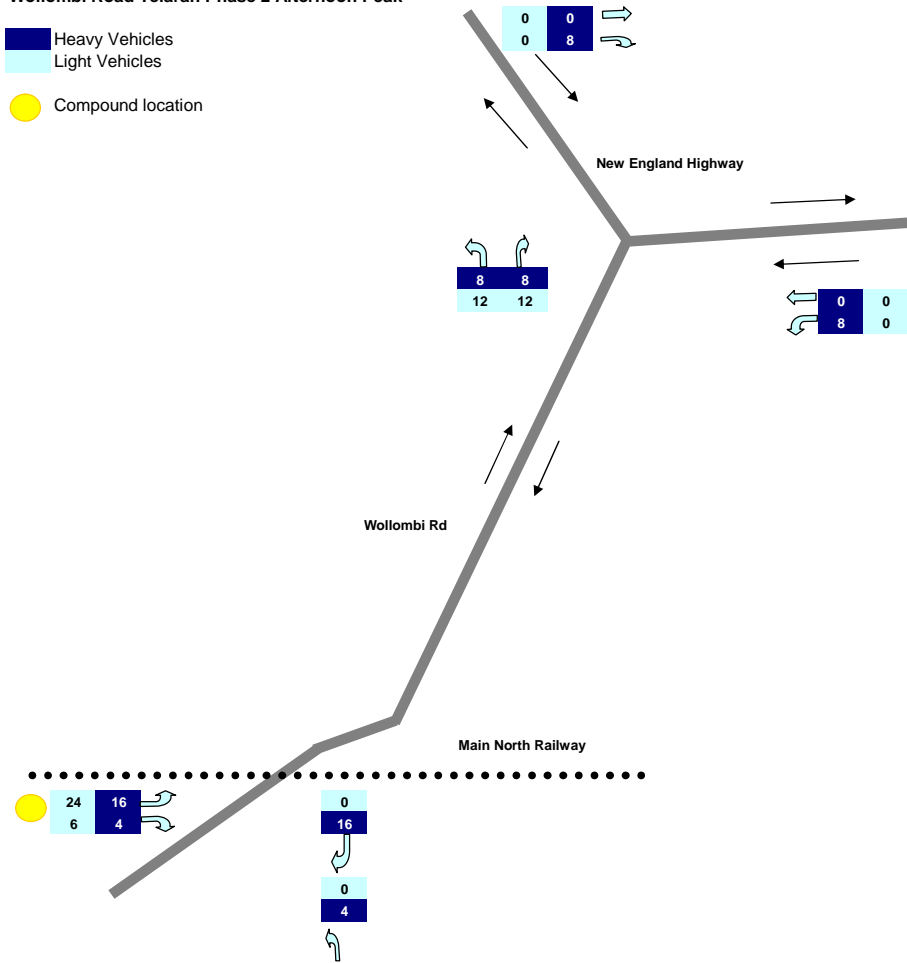
50% of vehicles leaving the compound travelling north along Wollombi Road are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Wollombi Road are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

Wollombi Road PM

Wollombi Road Telarah Phase 2 Afternoon Peak

- Heavy Vehicles
- Light Vehicles
- Compound location



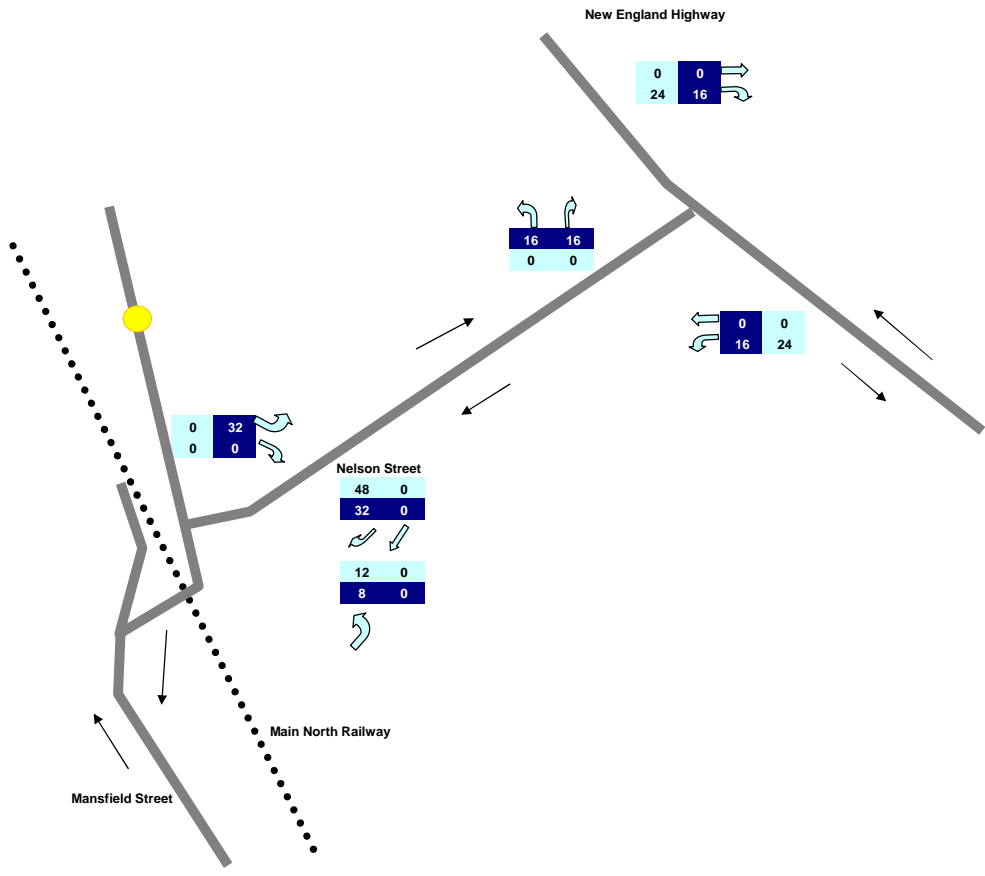
80% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak  
 20% of vehicles leaving the compound are assumed to turn left to Wollombi Road in the evening peak

50% of vehicles leaving the compound travelling north along Wollombi Road are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Wollombi Road are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

**Nelson Street, Greta Phase 2 Morning Peak**

- Heavy Vehicles
- Light Vehicles
- Compound location



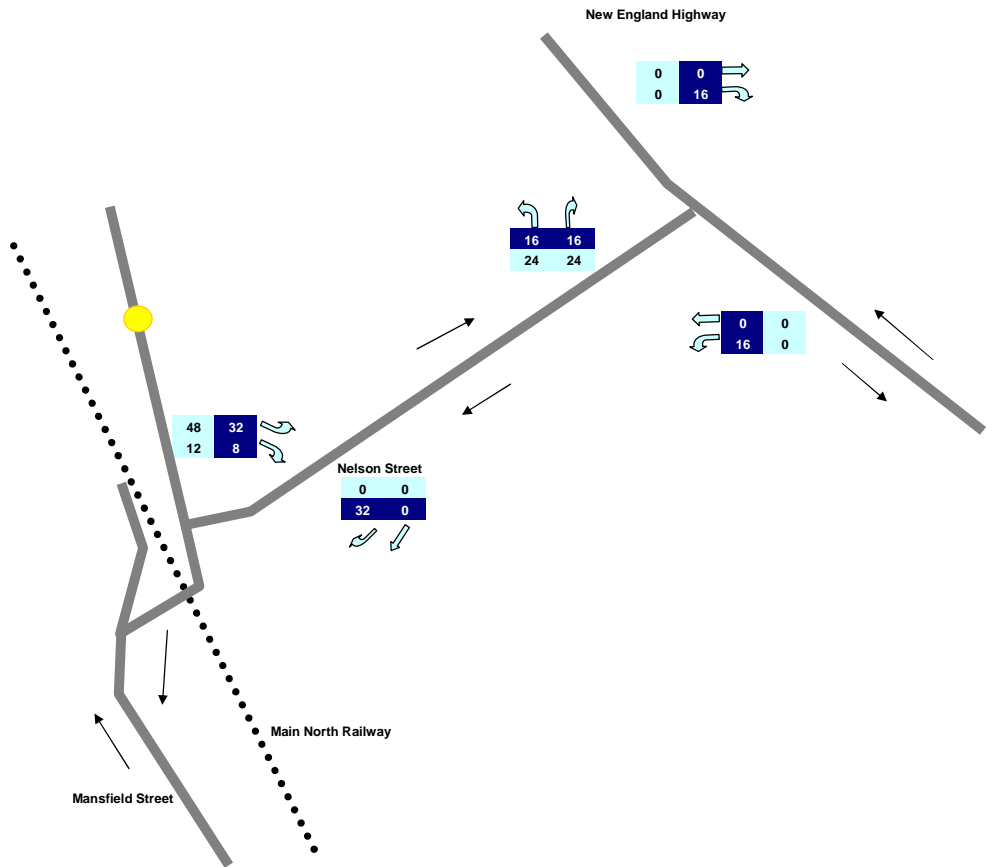
80% of vehicles arriving at the compound are assumed to come from the New England Highway  
 20% of vehicles arriving at the compound are assumed come from the south (cessnock direction)

50% of vehicles leaving the compound travelling north along Nelson Street are assumed to turn left on the New England Highway in the morning peak  
 50% of vehicles leaving the compound travelling north along Nelson Street are assumed to turn right on the New England Highway in the morning peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the morning peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the morning peak

**Nelson Street, Greta Phase 2 Afternoon Peak**

- Heavy Vehicles
- Light Vehicles
- Compound location

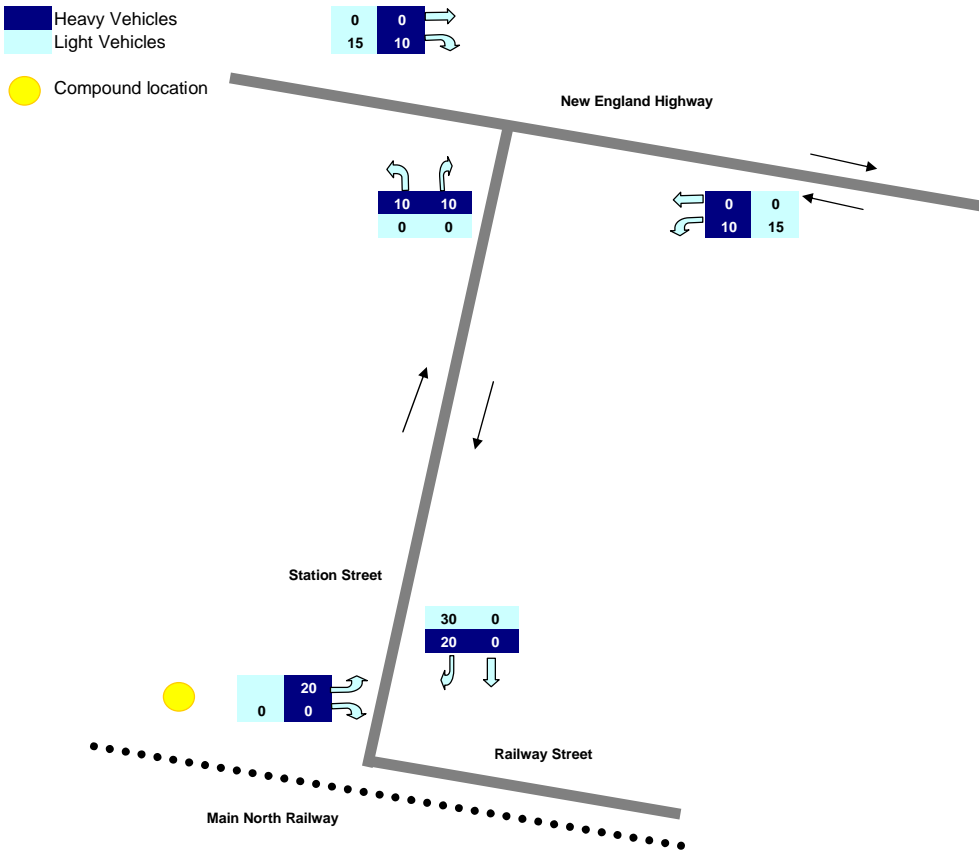


80% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak  
 20% of vehicles leaving the compound are assumed to turn left to Mansfield Street in the evening peak

50% of vehicles leaving the compound travelling north along Nelson Street are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Nelson Street are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Station Street, Branxton Phase 2 Morning Peak

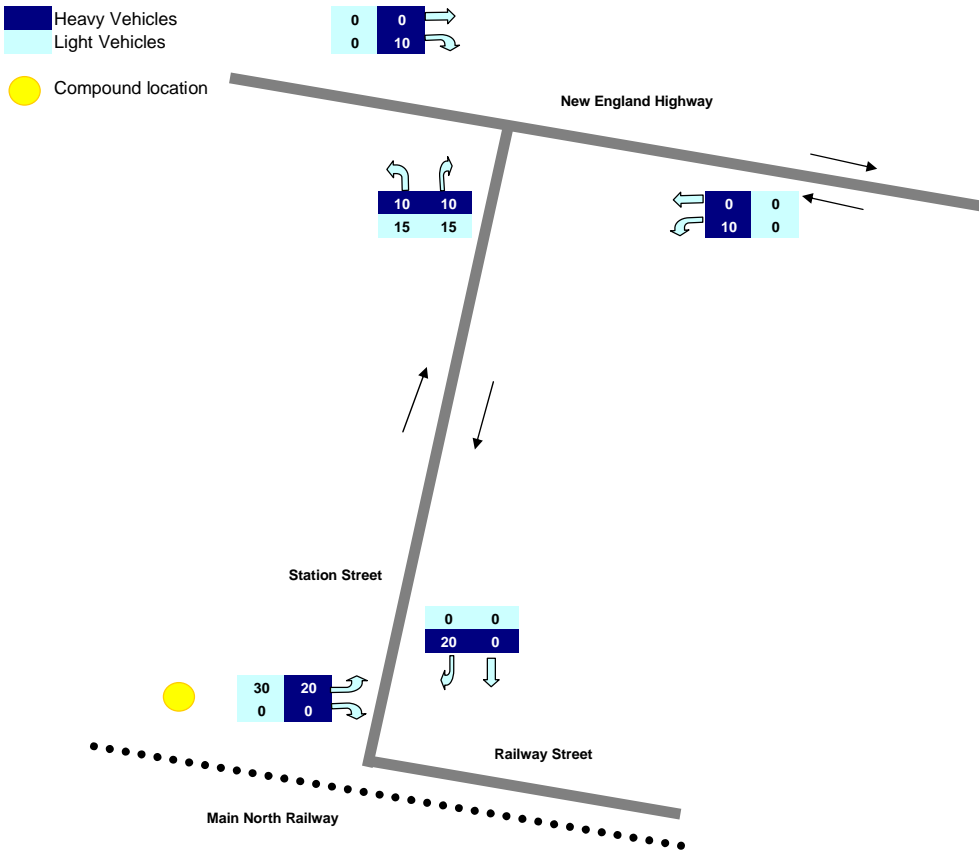


100% of vehicles accessing the site are assumed to arrive via the New England Highway in the morning peak

50% of vehicles leaving the compound travelling north along Station Street are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Station Street are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

Station Street, Branxton Phase 2 Afternoon Peak



100% of vehicles leaving the compound are assumed to turn left to the New England Highway in the evening peak

50% of vehicles leaving the compound travelling north along Station Street are assumed to turn left on the New England Highway in the evening peak  
 50% of vehicles leaving the compound travelling north along Station Street are assumed to turn right on the New England Highway in the evening peak

50% of vehicles going to the compound are assumed to turn left from the New England Highway in the evening peak  
 50% of vehicles going to the compound are assumed to turn right from the New England Highway in the evening peak

100% of vehicles going to the compound are assumed to turn left from Station Road in the evening peak



## Appendix B

# Intersection Performance

Phase 1: Shipley Drive Rutherford  
Allandale Road, Allandale  
Rixs Road, Belford

Station Lane, Lochinvar and Hermitage Road, Belford remain unchanged from the Environmental Assessment

Phase 2: Wollombi Road, Telarah  
Nelson Street, Greta  
Station Street, Branxton



## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy at Shipley Dr

#### Phase 1 AM with Secondary Compound

Roundabout

Vehicle Movements

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)
Shipley Dr										
1	L	24	56.0	0.066	13.6	LOS A	3	0.59	0.79	45.2
2	T	1	100.0	0.100	9.3	LOS A	5	0.54	0.54	46.3
3	R	77	32.5	0.102	14.8	LOS B	5	0.54	0.80	44.3
Approach		103	38.8	0.102	14.5	LOS A	5	0.55	0.79	44.6
NE Hwy										
4	L	152	14.6	0.309	6.3	LOS A	16	0.21	0.48	50.6
5	T	694	11.1	0.314	4.9	LOS A	16	0.20	0.40	52.0
6	R	8	25.0	0.320	12.1	LOS A	16	0.20	0.63	45.9
Approach		853	11.8	0.314	5.2	LOS A	16	0.20	0.42	51.6
Anambah Rd										
7	L	18	11.1	0.021	8.5	LOS A	1	0.60	0.67	48.0
8	T	1	0.0	0.010	10.0	LOS A	0	0.64	0.65	47.2
9	R	3	33.3	0.010	17.7	LOS B	0	0.64	0.79	42.1
Approach		22	13.6	0.021	9.9	LOS A	1	0.61	0.69	47.0
NE Hwy										
10	L	3	66.7	0.375	8.1	LOS A	22	0.32	0.54	49.8
11	T	980	9.1	0.389	5.1	LOS A	23	0.31	0.44	51.1
12	R	51	21.6	0.389	12.2	LOS A	23	0.31	0.64	45.4
Approach		1034	9.9	0.389	5.4	LOS A	23	0.31	0.45	50.7
All Vehicles		2012	12.2	0.389	5.8	LOS A	23	0.28	0.45	50.7

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: NEH at Shipley Dr Secondary AM  
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**Movement Summary**

**NE Hwy at Shipley Dr  
Phase 1 PM with Secondary Compound**

Vehicle Movements

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)
<b>Shipley Dr</b>										
1	L	114	11.4	0.169	9.4	LOS A	7	0.58	0.78	48.1
2	T	13	0.0	0.302	6.6	LOS A	13	0.59	0.61	49.0
3	R	300	6.0	0.301	13.7	LOS A	13	0.59	0.84	44.2
Approach		427	7.3	0.301	12.3	LOS A	13	0.59	0.81	45.3
<b>NE Hwy</b>										
4	L	168	8.9	0.331	6.1	LOS A	18	0.21	0.47	50.6
5	T	764	7.9	0.336	4.7	LOS A	19	0.21	0.40	51.9
6	R	18	11.1	0.333	11.7	LOS A	19	0.20	0.63	45.8
Approach		951	8.1	0.336	5.1	LOS A	19	0.21	0.42	51.5
<b>Anambah Rd</b>										
7	L	26	15.4	0.044	10.6	LOS A	2	0.76	0.78	46.9
8	T	2	0.0	0.016	11.2	LOS A	1	0.74	0.72	46.0
9	R	4	25.0	0.016	18.7	LOS B	1	0.74	0.83	41.2
Approach		32	15.6	0.044	11.7	LOS A	2	0.75	0.79	46.0
<b>NE Hwy</b>										
10	L	6	33.3	0.500	8.6	LOS A	33	0.62	0.67	47.9
11	T	1115	6.9	0.524	6.4	LOS A	35	0.62	0.57	48.8
12	R	38	39.5	0.521	14.0	LOS A	35	0.61	0.79	44.1
Approach		1159	8.1	0.524	6.7	LOS A	35	0.62	0.58	48.6
All Vehicles		2569	8.1	0.524	7.1	LOS A	35	0.46	0.56	49.0

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity  
 Following LOS  
 # - Based on density for continuous movements  
 Following Queue  
 # - Density for continuous movement

Site: NEH at Shipley Dr Secondary PM  
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## SIDRA INTERSECTION

### Movement Summary

#### Allandale Rd at NEH

#### Phase 1 AM 1 x Secondary Compound

#### Vehicle Movements

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)
Allandale Rd										
1	L	18	77.8	0.643	69.0	LOS E	30	0.94	1.11	32.5
3	R	62	22.6	0.639	62.7	LOS E	30	0.94	1.10	32.5
Approach		80	35.0	0.637	64.1	LOS E	30	0.94	1.10	32.5
NE Hwy										
4	L	79	20.3	0.210	14.3	LOS A	0	0.00	0.76	69.1
5	T	661	14.5	0.210	0.0	LOS A	0	0.00	0.00	100.0
Approach		740	15.1	0.210	1.5	LOS A		0.00	0.08	95.5
NE Hwy										
11	T	473	11.8	0.261	0.0	LOS A	0	0.00	0.00	100.0
12	R	27	39.3	0.085	25.8	LOS B	4	0.71	0.94	55.9
Approach		501	13.4	0.261	1.4	LOS A	4	0.04	0.05	95.9
All Vehicles		1321	15.7	0.643	5.3	Not Applicable	30	0.07	0.13	85.8

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: Allandale Rd at NEH Secondary AM 06.30-07.30

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**Movement Summary**

**Allandale Rd at NEH**

**Phase 1 PM 1 x Secondary Compound**

Vehicle Movements

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)
Allandale Rd										
1	L	23	39.1	1.353	427.6	LOS F	191	1.00	2.19	6.3
3	R	82	9.8	1.344	423.9	LOS F	191	1.00	1.91	6.3
Approach		105	16.2	1.341	424.7	LOS F	191	1.00	1.97	6.3
NE Hwy										
4	L	64	14.1	0.206	13.9	LOS A	0	0.00	0.76	69.1
5	T	683	10.4	0.206	0.0	LOS A	0	0.00	0.00	100.0
Approach		748	10.7	0.206	1.2	LOS A		0.00	0.07	96.4
NE Hwy										
11	T	942	9.9	0.514	0.0	LOS A	0	0.00	0.00	100.0
12	R	20	60.0	0.081	31.3	LOS C	4	0.75	0.95	52.0
Approach		962	10.9	0.514	0.7	LOS A	4	0.02	0.02	98.2
All Vehicles		1815	11.1	1.353	25.4	Not Applicable	191	0.07	0.15	53.4

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements

Following Queue  
 # - Density for continuous movement



Site: Allandale Rd at NEH Secondary PM  
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### Movement Summary

#### Rixs Road - Southern Approach

#### Phase 1 AM Primary Compound

#### Vehicle Movements

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)
Rixs Road										
1	L	22	86.4	1.000*	433.4	LOS F	63	1.00	1.27	4.7
2	T	22	86.4	0.449	111.4	LOS F	22	0.97	1.04	15.0
Approach		44	86.4	1.000	272.4	LOS F	63	0.98	1.15	7.1
NE Hwy										
4	L	101	18.8	0.347	14.2	LOS A	0	0.00	0.76	69.1
5	T	1143	12.3	0.347	0.0	LOS A	0	0.00	0.00	100.0
6	R	16	0.0	0.009	12.3	LOS A	0	0.00	0.77	69.5
Approach		1260	12.7	0.347	1.3	LOS A		0.00	0.07	96.1
Median										
8	T	22	86.4	0.524	138.2	LOS F	26	0.97	1.06	12.7
9	R	16	0.0	0.040	14.2	LOS A	1	0.62	0.90	43.1
Approach		38	50.0	0.526	86.0	LOS F	26	0.83	0.99	18.0
All Vehicles										
		1342	16.2	1.000	12.6	Not Applicable	63	0.06	0.13	68.2

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements



Following Queue

# - Density for continuous movement

Site: Rixs Road AM Primary - Southern

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## SIDRA INTERSECTION

### Movement Summary

#### Rixs Road - Northern Approach

#### Phase 1 AM Primary Compound

#### Vehicle Movements

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)
Median										
2	T	16	0.0	0.045	7.0	LOS A	1	0.05	0.56	50.1
3	R	22	86.4	0.045	12.4	LOS A	1	0.05	0.71	48.0
Approach		38	50.0	0.045	10.1	LOS A	1	0.05	0.65	48.9
Standen Drive										
7	L	16	0.0	0.009	8.2	LOS A	0	0.00	0.67	49.0
8	T	16	0.0	0.008	6.9	LOS A	0	0.00	0.59	50.4
Approach		32	0.0	0.009	7.6	LOS A		0.00	0.63	49.6
NE Hwy										
10	L	16	0.0	0.009	12.6	LOS A	0	0.00	0.75	69.1
11	T	458	15.9	0.130	0.0	LOS A	0	0.00	0.00	100.0
12	R	101	18.8	0.062	14.3	LOS A	0	0.00	0.80	69.3
Approach		575	16.0	0.130	2.9	LOS A		0.00	0.16	91.8
All Vehicles		645	17.2	0.130	3.5	Not Applicable	1	0.00	0.21	85.6

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: Rixs Road AM Primary - Northern  
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## SIDRA INTERSECTION

### Movement Summary

#### Rixs Road - Southern Approach

#### Phase 1 PM Primary Compound

#### Vehicle Movements

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)
Rixs Road										
1	L	100	19.0	0.208	14.7	LOS B	8	0.60	0.87	43.3
2	T	3	0.0	0.004	9.6	LOS A	0	0.51	0.61	47.4
Approach		103	18.4	0.208	14.6	LOS B	8	0.60	0.86	43.4
NE Hwy										
4	L	22	86.4	0.158	20.2	LOS B	0	0.00	0.79	69.1
5	T	543	11.0	0.159	0.0	LOS A	0	0.00	0.00	100.0
6	R	16	0.0	0.009	12.3	LOS A	0	0.00	0.77	69.5
Approach		581	13.6	0.159	1.1	LOS A		0.00	0.05	97.2
Median										
8	T	101	18.8	0.166	12.1	LOS A	7	0.59	0.82	45.6
9	R	16	0.0	0.024	10.8	LOS A	0	0.35	0.78	46.2
Approach		117	16.2	0.165	12.0	LOS A	7	0.56	0.81	45.7
All Vehicles		801	14.6	0.208	4.4	Not Applicable	8	0.16	0.27	77.0

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: Rixs Road PM Primary - Southern

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## SIDRA INTERSECTION

### Movement Summary

#### Rixs Road - Northern Approach

#### Phase 1 PM Primary Compound

#### Vehicle Movements

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)
Median										
2	T	16	0.0	0.114	7.0	LOS A	2	0.04	0.57	50.2
3	R	101	18.8	0.115	9.6	LOS A	2	0.04	0.71	48.0
Approach		117	16.2	0.114	9.3	LOS A	2	0.04	0.69	48.3
Standen Drive										
7	L	16	0.0	0.009	8.2	LOS A	0	0.00	0.67	49.0
8	T	16	0.0	0.008	6.9	LOS A	0	0.00	0.59	50.4
Approach		32	0.0	0.009	7.6	LOS A		0.00	0.63	49.6
NE Hwy										
10	L	16	0.0	0.009	12.6	LOS A	0	0.00	0.75	69.1
11	T	1164	8.1	0.314	0.0	LOS A	0	0.00	0.00	100.0
12	R	22	86.4	0.019	20.7	LOS B	0	0.00	0.83	69.3
Approach		1203	9.4	0.314	0.5	LOS A		0.00	0.03	98.6
All Vehicles		1352	9.8	0.314	1.5	Not Applicable	2	0.00	0.10	90.7

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: Rixs Road PM Primary - Northern  
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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy Wollombi Rd

#### Phase 2 AM - 1 x Secondary Compound

#### Vehicle Movements

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)
Wollombi Road										
1	L	28	37.9	0.234	39.3	LOS C	9	0.89	0.98	29.4
3	R	73	17.8	1.217	351.3	LOS F	87	1.00	1.65	5.6
Approach		102	23.5	1.217	262.6	LOS F	87	0.97	1.46	7.3
NE Hwy										
4	L	71	21.1	0.044	8.2	LOS A	0	0.00	0.60	49.8
5	T	1062	13.5	0.296	0.0	LOS A	0	0.00	0.00	60.0
Approach		1133	13.9	0.296	0.5	LOS A		0.00	0.04	59.2
NE Hwy										
11	T	632	16.8	0.179	0.0	LOS A	0	0.00	0.00	60.0
12	R	92	17.4	0.346	25.4	LOS B	14	0.85	1.01	35.7
Approach		723	16.9	0.345	3.2	LOS A	14	0.11	0.13	55.2
All Vehicles		1958	15.5	1.217	15.2	Not Applicable	87	0.09	0.14	42.4

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: NE Hwy Wollombi Rd Secondary AM 0630-0730

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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy Wollombi Rd

#### Phase 2 PM - 1 x Secondary Compound

#### Vehicle Movements

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)
Wollombi Road										
1	L	128	10.9	0.454	24.2	LOS B	19	0.85	1.03	36.4
3	R	80	13.8	1.333	1147.2	LOS F	126	1.00	2.26	1.8
Approach		209	12.0	1.333	454.0	LOS F	126	0.90	1.50	4.5
NE Hwy										
4	L	112	12.5	0.066	7.9	LOS A	0	0.00	0.60	49.8
5	T	1016	5.7	0.270	0.0	LOS A	0	0.00	0.00	60.0
Approach		1128	6.4	0.270	0.8	LOS A		0.00	0.06	58.8
NE Hwy										
11	T	1409	7.4	0.379	0.0	LOS A	0	0.00	0.00	60.0
12	R	163	9.8	0.449	21.9	LOS B	20	0.83	1.04	37.6
Approach		1572	7.6	0.449	2.3	LOS A	20	0.09	0.11	56.5
All Vehicles		2909	7.5	1.333	34.2	Not Applicable	126	0.11	0.19	31.0

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: NE Hwy Wollombi Rd Secondary PM

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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy at Nelson St

#### Phase 2 AM 2 x Secondary Compounds

#### Vehicle Movements

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)
Nelson St										
1	L	124	19.4	0.339	18.7	LOS B	14	0.74	1.08	30.1
2	T	4	50.0	1.000*	268.4	LOS F	69	1.00	1.48	7.2
3	R	49	36.0	1.000*	264.0	LOS F	69	1.00	1.64	6.4
Approach		178	24.7	1.000	93.2	LOS F	69	0.82	1.24	14.2
NE Hwy										
4	L	56	30.4	0.037	5.0	LOS A	0	0.00	0.52	36.7
5	T	619	13.9	0.348	7.6	LOS A	58	0.88	0.00	34.6
6	R	1	0.0	0.333	16.0	LOS B	58	0.88	1.05	41.5
Approach		676	15.2	0.348	7.4	LOS A	58	0.80	0.04	34.8
Nelson St										
7	L	11	0.0	0.080	27.1	LOS B	2	0.81	1.00	35.3
8	T	3	33.3	0.081	28.9	LOS C	2	0.81	1.00	35.4
9	R	2	0.0	0.080	27.0	LOS B	2	0.81	1.00	35.2
Approach		16	6.2	0.080	27.5	LOS B	2	0.81	1.00	35.3
NE Hwy										
10	L	5	0.0	0.385	8.2	LOS A	0	0.00	0.67	49.0
11	T	714	10.1	0.393	0.0	LOS A	0	0.00	0.00	40.0
12	R	124	15.3	0.244	11.6	LOS A	10	0.67	0.88	32.6
Approach		843	10.8	0.393	1.8	LOS A	10	0.10	0.13	38.7
All Vehicles		1713	14.0	1.000	13.7	Not Applicable	69	0.46	0.22	31.6

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy at Nelson St

#### Nelson St at NE Hwy Phase 2 2xSecondary PM

#### Vehicle Movements

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)
Nelson St										
1	L	157	11.5	0.344	16.0	LOS B	14	0.69	1.08	31.1
2	T	8	0.0	1.333	468.5	LOS F	167	1.00	2.35	4.3
3	R	77	22.1	1.328	466.7	LOS F	167	1.00	2.69	3.9
Approach		242	14.5	1.333	174.4	LOS F	167	0.80	1.63	9.0
NE Hwy										
4	L	62	30.6	0.376	5.0	LOS A	0	0.00	0.52	36.7
5	T	619	8.2	0.375	0.0	LOS A	0	0.00	0.00	40.0
6	R	8	12.5	0.019	15.9	LOS B	1	0.68	0.84	42.0
Approach		689	10.3	0.375	0.6	LOS A	1	0.01	0.06	39.7
Nelson St										
7	L	4	0.0	0.040	29.3	LOS C	1	0.85	1.00	34.1
8	T	2	0.0	0.040	29.0	LOS C	1	0.85	1.00	34.2
9	R	1	0.0	0.040	29.2	LOS C	1	0.85	0.96	34.1
Approach		7	0.0	0.040	29.2	LOS C	1	0.85	0.99	34.1
NE Hwy										
10	L	5	0.0	0.500	8.2	LOS A	0	0.00	0.67	49.0
11	T	898	6.2	0.482	0.0	LOS A	0	0.00	0.00	40.0
12	R	159	12.6	0.311	12.2	LOS A	14	0.70	0.93	32.2
Approach		1062	7.2	0.482	1.9	LOS A	14	0.11	0.14	38.6
All Vehicles		2000	9.1	1.333	22.4	Not Applicable	167	0.16	0.30	27.7

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: Nelson St at NE Hwy Phase 2 2xSecondary PM  
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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy at Station St - Branxton

#### Phase 2 AM 1 x Secondary Compound

Give-way

Vehicle Movements

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)
Station St										
1	L	61	19.7	1.245	524.0	LOS F	169	1.00	2.31	3.5
3	R	14	85.7	1.273	525.4	LOS F	169	1.00	2.18	3.5
Approach		75	32.0	1.250	524.3	LOS F	169	1.00	2.28	3.5
NE Hwy										
4	L	32	37.5	0.627	5.1	LOS A	0	0.00	0.52	36.7
5	T	1093	12.8	0.629	0.0	LOS A	0	0.00	0.00	40.0
Approach		1125	13.5	0.629	0.1	LOS A		0.00	0.01	39.9
NE Hwy										
11	T	436	16.5	0.248	0.0	LOS A	0	0.00	0.00	40.0
12	R	48	24.5	0.282	29.4	LOS C	11	0.89	1.00	25.2
Approach		485	17.3	0.282	3.0	LOS A	11	0.09	0.10	37.8
All Vehicles		1685	15.4	1.273	24.3	Not Applicable	169	0.07	0.14	26.8

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



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Site: NE Hwy at Station St Secondary AM

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## SIDRA INTERSECTION

### Movement Summary

#### NE Hwy at Station St - Branxton

#### Phase 2 PM 1 x Secondary Compound

Give-way

Vehicle Movements

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)
Station St										
1	L	42	25.6	1.103	331.0	LOS F	114	1.00	2.68	5.2
3	R	35	34.3	1.094	331.4	LOS F	114	1.00	2.19	5.2
Approach		78	29.5	1.103	331.2	LOS F	114	1.00	2.46	5.2
NE Hwy										
4	L	25	46.2	0.310	5.2	LOS A	0	0.00	0.52	36.7
5	T	527	11.4	0.309	0.0	LOS A	0	0.00	0.00	40.0
Approach		553	13.0	0.309	0.2	LOS A		0.00	0.02	39.8
NE Hwy										
11	T	1029	8.9	0.559	0.0	LOS A	0	0.00	0.00	40.0
12	R	145	8.9	0.210	9.0	LOS A	8	0.59	0.82	33.9
Approach		1176	8.9	0.559	1.1	LOS A	8	0.07	0.10	39.1
All Vehicles		1807	11.1	1.103	15.1	Not Applicable	114	0.09	0.18	30.6

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: NE Hwy at Station St Secondary PM  
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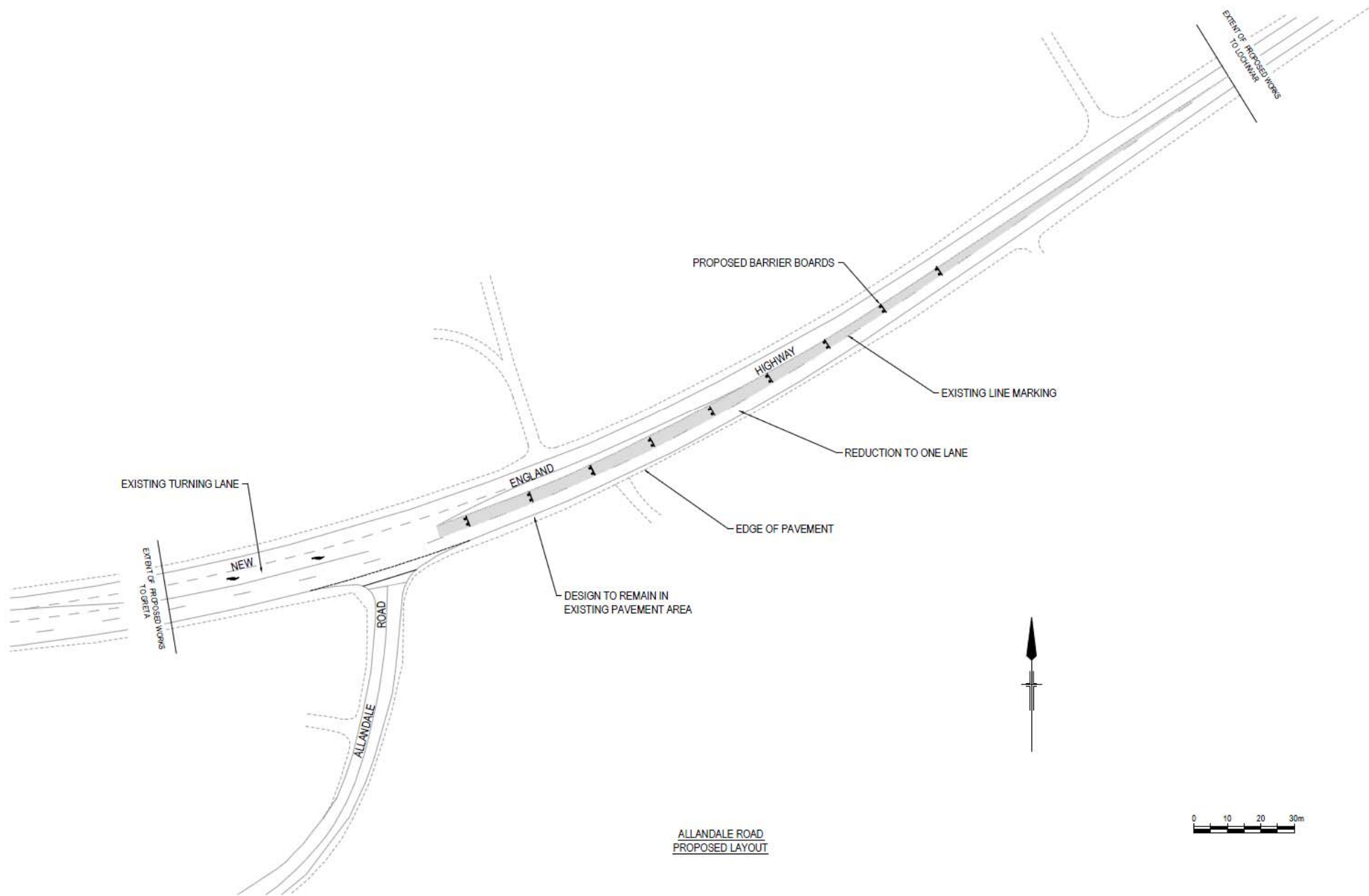


Appendix C

## Proposed Intersection Layouts

Allandale Road, Allandale

Rixs Road, Belford

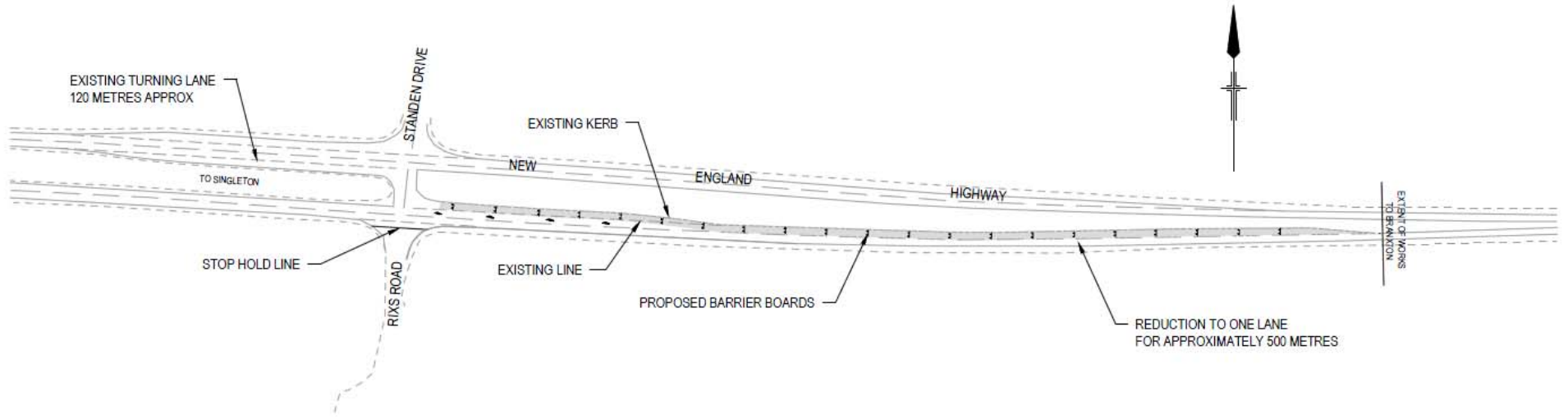


ALLANDALE ROAD  
PROPOSED LAYOUT



**NOTES:**

1. NEW ENGLAND HIGHWAY POSTED SPEED LIMIT 100 KM/HR
2. RIXS ROAD NOT CURRENTLY SIGNPOSTED
3. ACCESS TO SITE COMPOUND VIA ACCESS TRACK



RIXS ROAD, BELFORD  
PROPOSED LAYOUT