Report

Steel River Glass Wool Manufacturing Plant - Transport and Accessibility Assessment

30 JUNE 2009

Prepared for

Crown Project Services Pty Ltd

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URS

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On behalf of Knauf Insulation, URS Australia Pty Ltd has been commissioned by Crown Project Services to conduct the Transport and Accessibility Assessment for the planning approval of the development of a Glass Wool Manufacturing Plant in Australia, namely the Steel River Site in Mayfield West, NSW. This assessment determines the existing transport conditions, the impact of the project on existing conditions and the identification of mitigation and management measures to minimise these impacts.

Existing Conditions

The site is located on the south bank of the Hunter River and is bounded by Maitland Road (Pacific Highway), the Kooragang Goods Railway and Hunter River and is currently accessed via Channel Road / Steel River Boulevard / Industrial Drive.

Two bus routes operate along Maitland Road, providing services between Jesmond and Newcastle. The nearest train station to the site is Warabrook Railway Station, which is on the Hunter line, operating between Scone, Dungog and Newcastle. The site is located approximately three kilometres walking distance to Warabrook Railway Station, which is not considered an appropriate walking distance for commuting purposes.

The surrounding road network, including key intersections operate at an acceptable Level of Service under the existing traffic conditions.

Traffic Generation

Construction Phase

The large equipment components required for the Project are likely to be imported into Australia and transported to the site by special road convoy, from a port in Sydney, Newcastle or Brisbane, via the Pacific Highway and Industrial Drive during the construction phase. It is assumed that up to 12 over-dimensional and/or over-mass vehicle trips carrying components, plus 20 truck-loads of containerised components for the Project would occur during the construction phase. This component of traffic generation is considered a minimal aspect of the Project, since the traffic volumes are insignificant and are expected to occur of a relatively short period.

Construction of the Project is expected to take up to 15 months. An estimate of the number of construction vehicle movements is based on typical construction practices and activities and the anticipated number of personnel expected for the peak construction phase. These estimates include construction personnel, potential removal of construction waste / excavated material and delivery of construction materials. It is expected that the number of construction personnel during the peak construction period will reach 250 personnel per day. Construction personnel are assumed to arrive to the site between 0630 and 0700 hours (prior to the normal AM peak hour) and leave in the normal PM peak hour.

Operational Phase

The facility will operate 24 hours per day, seven days per week. The plant is expected to have a total of 120 personnel working over four shifts, plus 15 administration personnel during regular office hours, which are assumed to be from 0900 to 1700 hours. The distribution of personnel over the 4 shifts is likely to have more personnel during the day than during the night-time shifts. For the purpose of this study, it is assumed that 33 percent of personnel would be rostered during the day, with the remaining 67 percent spread across the remaining three shifts.

Executive Summary

The operational phase of the Project is assumed to generate regular daily vehicle trips of up to 226 light vehicle movements and 108 heavy vehicle movements. This translates to up to 68 light vehicles per hour and 14 heavy vehicles per hour within the peak periods. The daily heavy vehicle movements are associated with the delivery of raw materials and distribution of the final product.

Access Arrangements

The access to the site for shift personnel and administration staff would be via Channel Road and the access for heavy vehicles required for the transportation of raw materials and product distribution would be via Pambalong Drive (drawing number MBA-5-A-H59148, revision G). These two locations provide separate accesses for heavy vehicle and light vehicle movements associated with the operation of the Project, which would reduce potential vehicular conflicts. Additionally, pedestrian movements from the staff and visitor parking area would be segregated from heavy vehicle movements within the site, minimising the risk of pedestrian and heavy vehicular conflicts.

Access and circulation arrangements for heavy vehicles within the site have been designed in accordance with B-double turning circles which would accommodate the largest vehicle expected to access the site. There will be sufficient turning provisions for B-doubles within the internal access roads which allows for trucks to enter the site in the forward direction, turn fully within the site and exit again in the forward direction.

Existing cycle lanes within the site consist of marked cycleways within the wide shoulders on both sides of the roads, including Channel Road, Riverside Drive and Steel River Boulevard. Any cycling trips to and from the Project site would use the existing on-road cycleways along Channel Road, Riverside Drive and Steel River Boulevard.

Parking Arrangements

Based on the parking allocation required with the total building area equating to 22,280 metres squared, the total number of parking spaces required is 223. However, the maximum number of staff on site at a given time would be 84, which is considerably lower than the 223 required by the Steel River Strategic Impact Assessment Study. For this reason, parking provision for the site has been reduced to the following number of spaces, which would be adequate for the development:

- 90 staff parking spaces;
- 32 visitor parking spaces (including 4 disabled spaces); and
- 17 truck parking spaces (for B-doubles).

Impact Assessment and Mitigation Measures

Construction Phase

The construction phase of the Project is likely to generate up to 209 light vehicle movements between 0630 and 0700 hours, which is outside the normal AM peak hour, and nine heavy vehicle movements within the AM peak hour. This equates to a daily volume of 418 light vehicle movements and 70 heavy vehicle movements. The main impacts from construction are likely to occur:

- outside the normal morning peak between 0630 and 0700 when construction staff and early delivery vehicles arrive to the site via Maitland Road, Industrial Drive and Steel River Boulevard;
- through regular daily traffic generated by delivery trucks for equipment, plant and materials with intermittent peaks associated with works; and

- outside of peak periods, through delivery of large equipment and facility components from Port to the site, which is likely to be a one-off occurrence.

Preliminary mitigation measures proposed for the minimising the impacts associated with the transportation of equipment and components for the development include:

- Commissioning a licensed haulage contractor, with the experience and equipment required to transport over-mass and over-dimension loads.
- Complying with approvals and permits obtained from the relevant road authorities.
- Meeting the requirements of the Transport Plan.
- Designing and constructing internal road access that is suitable for over-mass, over-dimension vehicle access.
- Develop a detailed Traffic Management Plan for the construction phase of the Project in accordance with *Traffic Control at Worksites*, Version 3.1 (RTA, April 2006).

Operational Phase

The concept design for the Steel River Industrial Estate included an access to be constructed from Maitland Road (Pacific Highway), adjacent to the Kooragang Goods Rail Line, north-west of Industrial Drive. The Knauf Insulation development is replacing 31 smaller lots proposed in Stages 9 and 10 of the Steel River Estate development. The 31 smaller lots are estimated to generate a considerably higher volume of traffic compared to the traffic generation associated with the Knauf Insulation development. The intersections of Steel River Boulevard / Industrial Drive and Industrial Drive / Maitland Road (Pacific Highway) operate at the same Level of Service B without the Knauf Insulation development and with the Knauf Insulation development. These intersections operate the same Level of Service or better, than those determined by the previous traffic studies for the site, which were based on the development of the 31 smaller lots. For this reason, the additional access to the site from Maitland Road (Pacific Highway) is not considered necessary for the purpose of the Knauf Insulation development.

Operational traffic is likely to have minimal impact on the existing arterial road network (Maitland Road and Industrial Drive). These two routes provide links between Sydney and Newcastle and access to the industrial land uses along Steel River banks, respectively and are therefore designed to accommodate significant traffic volumes and proportions of heavy vehicles. The impacts on Pambalong Drive, Channel Road and Steel River Boulevard include a significant increase in the total traffic volume and the proportion of heavy vehicle movements.

At the commencement of the operational phase, a mitigation measure associated with operational traffic involves the development of a detailed Traffic Management Plan for the operational phase, which details the procedures for moving around the site, transportation of raw materials and the distribution of the final product, loading and unloading procedures, parking provisions for delivery vehicles, employees, visitors and maintenance staff. The Traffic Management Plan would be the responsibility of Knauf Insulation.

1

Introduction

1.1 Background

Knauf Insulation (KI) proposes to develop a Glass Wool Manufacturing Plant in Australia (referred herein as the "Project"). Crown Project Services Pty Ltd (CPS) has been appointed by KI to assist with the identification of potential sites, undertake a due diligence on a number of preferred sites and seek statutory approvals for these sites.

On behalf of KI, URS Australia Pty Ltd (URS) has been commissioned by CPS to conduct the Transport and Accessibility Assessment for the planning approval of the development of a Glass Wool Manufacturing Plant in Australia, namely the Steel River Site in Mayfield West, NSW. The assessment determines the existing transport conditions, the impact of the project on existing conditions and the identification of mitigation and management measures to minimise these impacts. This Transport and Accessibility Assessment has been conducted in accordance with the *Guide to Traffic Generating Developments*, version 2.2 (NSW Roads and Traffic Authority (RTA), October 2002).

The objective of this study is to determine any transport impacts associated with the construction and operation of the Project.

1.2 Project Overview

The glass wool manufacturing process involves raw materials for glass wool (primarily recycled glass bottles, plate glass and sand) being conveyed into a glass furnace at 1,200 degrees Celsius and transformed into molten glass. The molten glass then proceeds to spinning fiberisers, which convert the glass into "glass wool". The fibres are then transferred onto a production line to form a blanket of glass wool. The blanket is then cured in an oven, cut and compressed into a roll or batt.

The Project would comprise a furnace with a 200 tonne per day capacity and the facility would operate 24 hours a day, seven days a week. Depending on market conditions, the plant would produce between 100 and 200 tonnes per day. For the purpose of this Transport and Accessibility Assessment, the output of the plant is assumed at maximum capacity of 200 tonnes per day.

1.3 Site Location

The site is located on the south bank of the Hunter River and is bounded by Maitland Road (Pacific Highway), the Kooragang Goods Railway and Hunter River. The site is currently accessed via Channel Road / Steel River Boulevard / Industrial Drive. **Figure 1.1** illustrates the location of the site. The site is zoned 4(c) industrial and is currently vacant.

1.4 Report Structure

The remainder of this report is structured in the following sections:

- **Section 2** summarises the planning and environmental context for the site, including approved Development Applications (DAs) for the site;
- **Section 3** describes the existing conditions of the transportation network immediately surrounding the site;
- **Section 4** provides estimates of the traffic generated during the construction and operational phases of the Project;
- **Section 5** assesses the impacts of the traffic generated by the Project; and
- **Section 6** identifies management and mitigation measures to minimise the impact associated with the Project.

Client: CROWN PROJECT SERVICES PTY LTD	Project: KNAUF INSULATION WOOL MANUFACTURING PLANT, TRANSPORT AND ACCESSIBILITY ASSESSMENT		Title: **SITE LOCALITY**
URS	Drawn: AO	Approved: NV	Date: 18/06/2009
	Job No: **43177672**	File No: 43177672.004.wor	Figure: **1-1**

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Planning and Approval Context

2.1 Overview

To support the Steel River Strategic Impact Assessment Study, BHP commissioned a traffic study by Colston Budd and Twiney Pty Ltd, which was produced in June 1997. On 30 August 2005, DA05/1548 for Stages 8A, 8B and 8C (later known as Stages 8, 9 and 10) was lodged with Newcastle City Council. The application was for 53 lots in three stages. There was no intersection for the Steel River Estate with the Pacific Highway proposed for this development application.

BHP sold the Steel River Estate to a private developer Steel River Pty Ltd in March 2001. In July 2005, Steel River Pty Ltd sold the area west of Steel River Boulevard to Domaine Property Funds Limited.

On 25 November 2005, Newcastle City Council advised that the Local development Committee requested a traffic study be conducted for providing an intersection with the Pacific Highway at the western end of the Steel River Estate. Newcastle City Council advised that the development of smaller lot sizes would generate greater traffic volumes than those estimated in the June 1997 Colston Budd and Twiney report. The average lot size for the Steel River Estate Stage 8 lodgement was 6,911 metres squared for 110 lots, which is smaller than the expected average of one hectare per lot assumed for the Mater Plan for the site.

As a result of the issues raised by Newcastle City Council, Domaine Steel River withdrew Stages 8B and 8C, proceeding with Stage 8A only. Stages 8B and 8C became known as Stage 9 and 10 respectively, with Stage 9 later being divided into Stages 9 and 11. Stage 8A was approved on 1 August 2006 and civil construction was completed in 2008.

In conjunction with the development of Stage 8A, Domaine Steel River appointed Varga Traffic Planning Pty Ltd to conduct a report to address the issues raised by Newcastle City Council in the initial lodgement. This report concluded that a left-in / left-out access to the Steel River Estate with the Pacific Highway should be included as part of the DA consent conditions for Stage 8B and that the requirement for traffic signals to allow for right-turn movements be evaluated at a later date.

On 20 March 2007, the RTA requested that a micro-simulation traffic model be produced for the road network surrounding the Steel River Estate to assess the cumulative traffic impacts of the site. Mark Waugh Pty Ltd was subsequently commissioned to conduct Paramics modelling for the site. This modelling confirmed the recommendations from the Varga report. As part of the Land and Environment Appeal, the RTA agreed to approve a left-in only access from the Pacific Highway to the Steel River Industrial Estate on 11 March 2008.

The following subsections summarise the assumptions and recommendations for each of the traffic reports conducted for the Steel River Estate.

2.2 Colston Budd Hunt and Twiney Pty Ltd, June 1997

BHP commissioned this report to produce a transport strategy for the development of Steel River Estate. The following assumptions were adopted for the purpose of this study:

- 95 percent of employees travel by car, which equates to an average vehicle occupancy rate of 1.2 persons per car, based on nearby BHP industrial sites.
- This report seeks an immediate reduction of the portion of employees travelling by car to 85 percent and increasing car occupancy to 1.4 persons per vehicle.

The study indicated that the access roads to the site would operate at an acceptable Level of Service with the following provisions:

- Pacific Highway – two through lanes in each direction on Pacific Highway, right-turn bay on Pacific Highway, left-turn slip lane on Pacific Highway and one left lane / one right lane on the access road;
- Industrial Drive – two through lanes in each direction on Industrial Drive, right-turn bay on Industrial Drive, left-turn slip lane on Industrial Drive and one left lane / one shared left and right lane on the access road.

2.3 Varga Traffic Planning Pty Ltd, 7 July 2006

This report was prepared in response to two letters from the RTA dated 24 November 2005 and 27 February 2006. The letters respectively requested that:

- the Colston Budd Hunt and Twiney report (June 1997) be reviewed and updated to reflect current traffic conditions; and
- additional information on the distribution of traffic used in the traffic analysis and details of the configuration of the intersection on the Pacific Highway and Tourle Street be provided.

The assessment was based on the following assumptions:

- The eastern portion of the site is largely developed (213,197 metres squared), yielding a floor area of 45,954 metres squared and a equivalent floor space ratio of 0.21:1.
- The steel River Estate is assumed to accommodate 2,000 employees.
- 95 percent of employees travel by car, which equates to an average vehicle occupancy rate of 1.2 persons per car, based on nearby BHP industrial sites.
- Two new intersections are to be constructed with Tourle Street and the Pacific Highway at the western end of the site, adjacent to the existing goods railway line. Both intersections would ultimately be signalised and allow for all turning movements. The intersections are to be constructed on a staged basis, subject to traffic growth.
- Traffic counts conducted 8 December 2005 at existing intersections surrounding the site;
  - Two-way traffic volumes on the Pacific Highway west of Wallsend Road are approximately 4,600 vehicles per hour in the peak periods;
  - Two-way traffic volumes on the Pacific Highway west of Industrial Drive are approximately 3,800 vehicles per hour in the peak periods;
  - Two-way traffic volumes on Industrial Drive near Steel River Boulevard are approximately 2,300 vehicles per hour in the peak periods, with six percent heavy vehicles;
  - Two-way traffic volumes on Steel River Boulevard are approximately 200 vehicles per hour in the peak periods.
- The traffic volumes generated by the developed portion of the site were 211 vehicles per hour in the AM peak and 140 vehicles per hour in the PM peak. The AM peak trips (higher of the two peak periods) is equivalent to a traffic generation of 0.46 peak vehicle trips per 100 metres squared, gross floor area (GFA).
- A traffic generation rate of 0.47 peak vehicle trips per 100 metres squared GFA was adopted for the study and a sensitivity test using 1.0 peak vehicle trips per 100 metres squared GFA conducted.

- Background traffic growth rate of two percent per annum based on growth rates identified by the RTA.

The results of the traffic assessment are:

- Projected future traffic volumes for the Steel River estate equate to 1,070 vehicle trips per hour in the AM peak based on current trip generation rates for the developed portion of the site and 2,140 vehicle trips per hour for sensitivity testing purposes.
- The majority of the intersections surrounding Steel River Estate currently operate at an acceptable Level of Service;
- Based on the traffic generation rate of 0.47 peak vehicle trips per 100 metres squared GFA, it is likely that new access roads on Pacific Highway and Tourle Street with left-in / left-out control would be required to accommodate traffic volumes during the development of Stage 8B.
- Based on the sensitivity test, signalised controlled intersections on Pacific Highway and Tourle Street should be considered to allow for all turning movements in the future.

2.4 Mark Waugh Pty Ltd, Paramics Modelling, September 2007

This report was prepared in response to the RTA's request for a Paramics model to be conducted for the Steel River Estate, to assess the cumulative impact of the development on the surrounding road network.

The assumptions adopted for the Paramics modelling were:

- The full development of the Steel River Estate would generate 1,070 trips per hour during the peak periods.
- 95 percent of employees travel by car, which equates to an average vehicle occupancy rate of 1.2 persons per car (Varga, 7 July 2006).
- A traffic generation rate of 0.47 peak vehicle trips per 100 metres squared GFA was adopted.
- The following trip distribution was adopted:
  - North along Tourle Street 11 percent
  - East along Industrial Drive 32 percent
  - West along Maitland Road 43 percent
  - South along Werribi Road 7 percent
  - South-east along Maitland Road 7 percent

The Paramics modelling report concludes that:

- traffic volumes generated by Stages 9 and 10 of the development could be accommodated by constructing left-in / left-out intersections on Pacific Highway and Tourle Street.
- construction of a signal-controlled intersection on Pacific Highway to allow for all turning movements would reduce delays at the intersection of Pacific Highway and Industrial Drive at full development of Stages 9 and 10.

This report recommended that left-in / left-out controlled intersections be constructed on Pacific Highway and Tourle Street as part of the Stage 9 and 10 DA conditions to allow for future upgrade to signal-controlled intersections.

3

Existing Conditions

3.1 General

A site visit was conducted on Tuesday 12 May 2009 to determine the existing conditions and provisions of the transportation network surrounding the Project site.

The overall Steel River site has direct frontage to two major arterial roads, Maitland Road (Pacific Highway) and Industrial Drive and is accessed from an existing intersection with Industrial Drive. This allows road access to the site without the use of residential roads.

Two bus routes operate along Maitland Road, providing services between Jesmond and Newcastle. The nearest train station to the site is Warabrook Railway Station, which is on the Hunter line, operating between Scone or Dungog and Newcastle. The site is located approximately three kilometres walking distance to Warabrook Railway Station, which is not an appropriate walking distance for commuting purposes.

3.2 Level of Service

The Levels of Service definitions for typical mid-block capacities for urban roads with interrupted flow in accordance with *Guide to Traffic Generating Developments*, version 2.2 (RTA, October 2002) are summarised in **Table 3-1**.

Table 3-1 Levels of Service, Urban Road Peak Hour Flows

Level of Service	One Lane (vehicle/hour)	Two Lanes (vehicle/hour)	Definition
A	200	900	Free-flow conditions with a high degree of freedom for motorists to select speed and manoeuvre within traffic
B	380	1,400	Stable flow conditions, reasonable freedom to select speed and manoeuvre within traffic
C	600	1,800	Stable flow conditions, restricted freedom to select speed and manoeuvre within traffic
D	900	2,200	Approaching unstable flow conditions, severely restricted to select speed and manoeuvre within traffic
E	1,400	2,800	Close to capacity, virtually no freedom to select speed and manoeuvre within traffic. Small increases in traffic volume would generally cause operational problems

In accordance with the *SIDRA Intersection User Guide* (Akcelik and Associates Pty Ltd, July 2007), the Levels of Service for various intersection controls for the RTA NSW method and the *Guide to Traffic Generating Developments*, version 2.2 (RTA, October 2002) are summarised in **Table 3-2**.

Table 3-2 Levels of Service, Intersections

Level of Service	Average Delay per Vehicle (seconds)	Traffic Signals, Roundabout	Give Way and Stop Sign
A	<14.5	Good operation	Good operation
B	14.5 to 28.5	Good operation with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28.5 to 42.5	Satisfactory	Satisfactory, however a crash study is recommended
D	42.5 to 56.5	Operating near capacity	Operating near capacity and a crash study is required
E	56.5 to 70.5	At capacity and is likely to cause excessive delays at signals. Consider implementing alternative control method to roundabouts.	At capacity and requires alternative control method
F	70.5<	At capacity and small increases in traffic volumes are likely to cause disproportionately greater increases in delay.	At capacity and small increases in traffic volumes are likely to cause disproportionately greater increases in delay

Intersections and roads operating at a Level of Service C or better are generally considered to have acceptable flow conditions.

3.3 Steel River Site Locality

3.3.1 Key Roads

Maitland Road (Pacific Highway)

Maitland Road (Pacific Highway) is a classified State Road and operates as a key east-west road link for the region. Maitland Road is a four-lane, two-way configuration, with a median width of approximately two metres for a significant portion of its length. The posted speed limit north-west of the intersection with Industrial Drive is 80 kilometres per hour. The posted speed limit south of the intersection with Industrial Drive is 60 kilometres per hour heading into the Mayfield town centre. There is a cycle lane on the wide, sealed shoulder along the length of Maitland Road on both sides.

The nearest RTA count station is located west of Maud Street, and has an Annual Average Daily Traffic (AADT) count of 22,902 vehicles (RTA, 2004). Based on a growth rate identified by the RTA of two percent per annum (Varga, 7 July 2006) it is anticipated that traffic volumes in this road would be approximately 25,290 AADT.

Industrial Drive

Industrial Drive is a classified State Road, providing an east-west link to the Mayfield industrial area and developments along the banks of the Hunter River. Industrial Drive consists of a four-lane, two-way configuration, with a median of approximately two metres for the majority of its length. The posted speed limit on Industrial Drive is 80 kilometres per hour. There is a cycle lane located within the 1.5-metre sealed shoulder. Industrial Drive does not have kerb and gutter for its entire length.

3 Existing Conditions

Two RTA count stations on Industrial Drive are relevant to the surrounding area. These count stations are (RTA, 2004):

- West of Werribi Street – 23,339 AADT; and
- West of Woodstock Street – 30,717 AADT.

Based on a growth rate identified by the RTA of two percent per annum (Varga, 7 July 2006) it is anticipated that traffic volumes in this road would be approximately 25,770 AADT and 33,910 AADT, respectively.

There are no footpaths along the length of Industrial Drive adjacent to the site.

Steel River Boulevard

Steel River Boulevard is a local road providing access from Industrial Drive to the Steel River Estate, which is bounded by the Hunter River, Tourle Street, Industrial Drive and the Kooragang Goods Railway. Steel River Boulevard is a two-lane, two-way configuration, with a posted speed limit of 50 kilometres per hour. There are cycle lanes within the wide, sealed shoulder in both directions and unrestricted parking also provided within the shoulders. There are currently no footpaths along the length of Steel River Boulevard.

Two-way traffic volumes equates to 232 vehicles per hour (RTA SCATS data, April 2009 and Varga, 7 July 2006). Considering the traffic volumes illustrated in **Figure 2-1**, Steel River Boulevard is operating at Level of Service A during the AM peak hour.

Channel Road

Channel Road is a local access road, comprising a two-lane, two-way configuration. The road has a wide sealed shoulder of approximately three metres, with unrestricted parallel parking on both sides and a cycle lane. There are no footpaths along the length of Channel Road. The on-street parking occupancy was observed to be approximately 70 percent during the site visit.

Channel Road has a kerb and gutter and the pavement is in very good condition.

There is no traffic volume data available for Channel Road. Based on the Stages 9 and 10 Subdivision Plan (Monteath and Powys Pty Ltd, September 2006) traffic volumes along Channel Road have been estimated from traffic counts and SCATS data (RTA, April 2009) received for the Industrial Drive / Steel River Boulevard intersection (refer to **Figure 2-1**). The subdivision plan illustrates that approximately 25 percent of existing properties would be accessed via Channel Road. Based on this assumption, Channel Road would accommodate approximately 60 vehicles in the AM peak and 75 vehicles in the PM peak (two-way traffic volumes). This indicates that Channel Road operates at Level of Service A.

3.3.2 Key Intersections

SCATS data was obtained from the RTA for the signalised intersections of Steel River Boulevard / Industrial Drive and Industrial Drive / Maitland Road for period between 30 March 2009 and 5 April 2009. The SCATS data is comparable to the data collected for the *Steel River Industrial Development Traffic Report* (Varga Traffic Planning Pty Ltd, 7 July 2006) for the intersection of Maitland Road / Industrial Drive. These traffic surveys were conducted Thursday 8 December 2005.

SCATS data does not include counts for the following left-turn movements:

3 Existing Conditions

- Slip lane from Maitland Road (Pacific Highway) onto Industrial Drive;
- Slip lane from Industrial Drive onto Steel River Boulevard; and
- Slip lane from Steel River Boulevard onto Industrial Drive.

For the traffic volumes missing from the SCATS data set, the following assumptions have been adopted:

- Left turn movements at the Maitland Road / Industrial Drive intersection have been adopted from the counts conducted 8 December 2005 (Varga, 7 July 2006) since the traffic volumes for the remaining movements are comparable; and
- Left turn movements at the Steel River Boulevard / Industrial Drive intersections have been proportionally increased according to the increase in movements going into and out of Steel River Boulevard.

Channel Road / Steel River Boulevard Intersection

The Channel Road / Steel River Boulevard intersection is give-way controlled.

There is no traffic volume data available for the Channel Road / Steel River Boulevard intersection. Based on the Stages 9 and 10 Subdivision Plan (Monteath and Powys Pty Ltd, September 2006) traffic volumes along Channel Road have been estimated from traffic counts and SCATS data received for the Industrial Drive / Steel River Boulevard intersection (refer to **Figure 3-1**). The subdivision plan illustrates that approximately 25 percent of existing properties are likely to be accessed via Channel Road, ten percent would be accessed via Murray River Circuit and the remaining 65 percent would be accessed by continuing along Steel River Boulevard, based on the most direct route to the properties from the Steel River Boulevard / Industrial Drive intersection.

Based on this assumption, the Channel Road / Steel River Boulevard intersection would expect to operate at Level of Service A for both the AM and PM peak hours.

Steel River Boulevard / Industrial Drive Intersection

The Steel River Boulevard / Industrial Drive intersection is a signalised intersection. Left-turn, give-way controlled slip lanes are provided into and out of Steel River Boulevard. The left-turn bay from Industrial Drive is approximately 50 metres in length. There are marked pedestrian crossings on both slip lanes, with signalised crossings on the northern and eastern arms of the intersection.

The right-turn bay from Industrial Drive to Steel River Boulevard is approximately 100 metres long.

Immediately north of the intersection on Steel River Boulevard there is a stopping bay approximately 40 metres in length.

Cycle lanes are provided in both directions on the shoulder of all three arms of the intersection, with provisions to the right of the of the left turn bay on Industrial Drive and the stopping bay on Steel River Boulevard.

Figure 3-1 illustrates the turning movements adopted for the purpose of this study. **Table 3-3** summarises the results for the intersection analyses for the AM and PM peak hours.

3 Existing Conditions

Figure 3-1 Peak Traffic Volumes, Industrial Drive / Steel River Boulevard Intersection

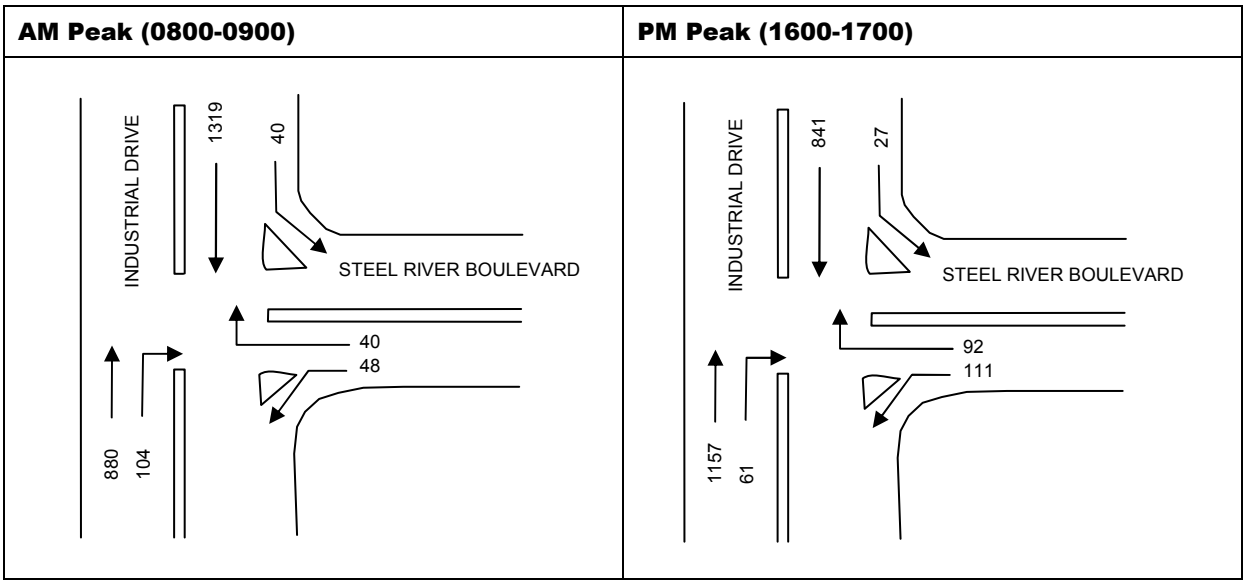

Table 3-3 SIDRA Intersection Analysis, Industrial Drive / Steel River Boulevard Existing Condition

Peak	Level of Service	Average Delay (seconds)	Degree of Saturation (v/c)	95% Back of Queue Length (metres)	Worst Movement
AM	B	19.7	0.83	171	D (Right from Industrial Drive)
PM	B	15.8	0.69	96	C (Right from Industrial Drive)

Source: URS, 22 May 2009, using SIDRA Intersection, version 3.2.

The intersection analyses for the Steel River Boulevard / Industrial Drive intersection indicate that the intersection is operating at Level of Service B for both the AM and PM peak hours, which is an acceptable Level of Service.

Industrial Drive / Maitland Road (Pacific Highway) Intersection

The Industrial Drive / Maitland Road intersection is signalised with a left-turn slip lane from Maitland Road onto Industrial Drive. Maitland Road consists of two through lanes in each direction with a right-turn bay of approximately 40 metres on the south approach and a left-turn bay of approximately 200 metres on the north approach. The left-turn bay on the north approach also serves as a deceleration lane for accessing commercial properties on the eastern side of Maitland Road.

Industrial Drive consists of two lanes in each direction. The lanes on the approach to the intersection do not indicate dedicated left or right-turn lanes. Heavy vehicles were observed turning right onto Maitland Road from the left lane.

Figure 3-2 illustrates the turning movements adopted for the purpose of this study. **Table 3-4** summarises the results for the intersection analyses for the AM and PM peak hours.

3 Existing Conditions

Figure 3-2 Peak Traffic Volumes, Industrial Drive / Maitland Road Intersection

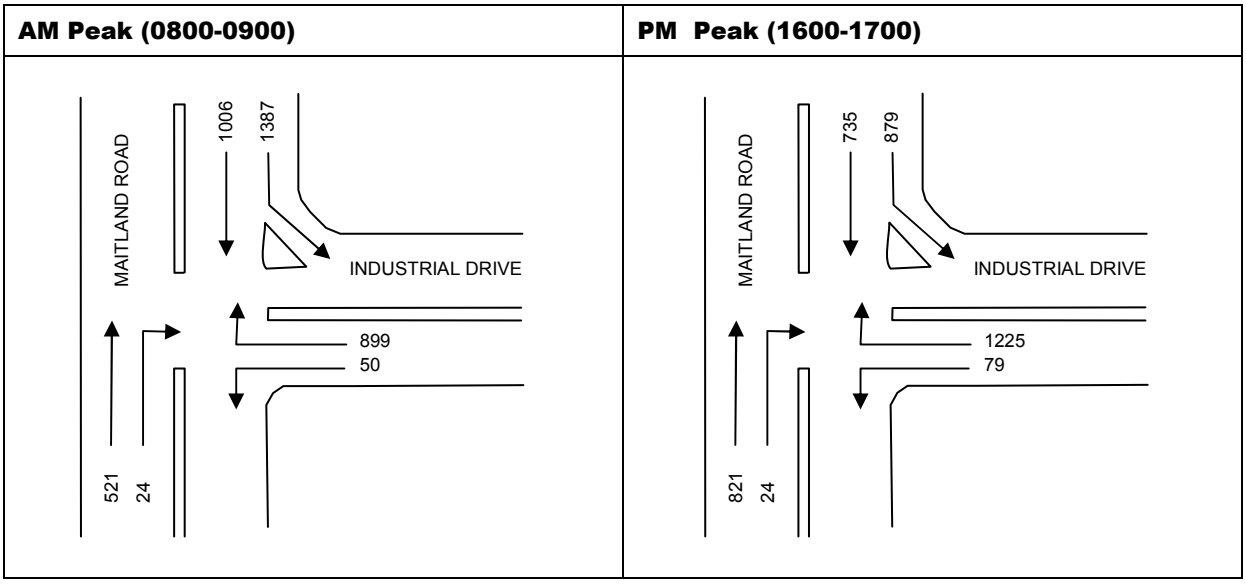

Table 3-4 SIDRA Intersection Analysis, Industrial Drive / Maitland Road Existing Condition

Peak	Level of Service	Average Delay (seconds)	Degree of Saturation (v/c)	95% Back of Queue Length (metres)	Worst Movement
AM	B	25.8	0.90	215	D (Industrial Drive left and right turns)
PM	B	26.0	0.89	172	C (Industrial Drive left and right turns and through on Maitland Road north approach)

Source: URS, 22 May 2009, using SIDRA Intersection, version 3.2.

The intersection analyses for the Industrial Drive / Maitland Road intersection indicate that the intersection is operating at Level of Service B for both the AM and PM peak hours, which is an acceptable Level of Service.

Steel River / Maitland Road (Pacific) Intersection – DA Approved

The intersection of an access road from Steel River Estate with Maitland Road (Pacific Highway) was approved as part of the DA consent for Stages 9 and 10 of the development (RTA, 11 March 2008). The RTA confirmed its concurrence for a left-in only intersection to be constructed under Section 138 of the *Roads Act 1993*, subsequent to the following conditions:

- Left-out movements would not be permitted. All vehicular exit movements from the site are to be via the local road network and Steel River Boulevard to Industrial Drive.
- A deceleration lane is to be designed in accordance with the RTA's Road Design Guide.
- All road works are to be at full cost to the developer and no cost to RTA or Newcastle City Council.

4

Traffic Generation

4.1 Route Selection

When assessing the route for the transportation of materials and distribution of the product, the following elements are considered:

- grade along each route;
- width of cross-section;
- degree of works required to accommodate over-mass, over-dimensional vehicles;
- cost; and
- directness of route.

It is anticipated that the heavy vehicle movements associated with the transportation of materials and distribution of the product would be primarily via the existing arterial road network, namely Industrial Drive and the Pacific Highway with minimal transportation on the local road network. These two routes provide links between Sydney and Newcastle and access to the industrial land uses along Steel River banks and are therefore designed to accommodate heavy vehicles.

Once the exact sources of raw materials and destinations for the distribution of the product are confirmed, the route selection process involves a survey of the entire haulage route, which would be conducted by the haulage contractor and would include the following factors:

- detailed maps;
- load limits on roads and structures;
- curves and grades along route;
- width and heights of tunnels along route;
- location of overhead powerlines;
- identification of areas that could be used for short-term parking; and
- any obstructions that could restrict the transportation of the equipment and facility components.

The final route selection would be the responsibility of the haulage contractor and would be based on the findings from the survey of the entire route.

4.2 Equipment Transportation (Construction Phase)

The large equipment components required for the Project are likely to be imported into Australia and transported to the site by special road convoy, from a port in Sydney, Newcastle or Brisbane. It is assumed that up to 12 over-dimensional and / or over-mass vehicle trips carrying components, plus 20 truck-loads of containerised components for the Project would occur during the construction phase.

It is anticipated that the majority of the heavy plant equipment for construction would be transported from Sydney or Newcastle metropolitan area along the Pacific Highway and Industrial Drive during the construction phase.

An estimate of the vehicles required to deliver the components and equipment is summarised in **Table 4-1**. The traffic generation associated with equipment transportation is assumed to be conducted during site establishment and limited to off-peak traffic periods. This component of traffic generation is considered a minimal aspect of the Project, since the traffic volumes are insignificant and are expected to occur of a relatively short period. The traffic generated by equipment transportation has not been included in the construction traffic generation estimates.

Table 4-1 Assumed Equipment Transportation and Delivery Vehicle Requirements

Component	Traffic Generation			
	Purpose	Semi-Trailer	Over-Size	Over-Mass
Piling rigs	Piling		2	
Bulldozers	Removal of topsoil, development of internal roads, drainage swales and basins		1	
Scrapers	Removal of topsoil, development of internal roads, drainage swales and basins		1	
Graders	Site levelling		1	
Excavators	Excavation of topsoil, grading and levelling the site		5	
Backhoe excavators	Trenching		3	
Compactor, rollers	Road base, foundation and pad compaction		3	
Trucks	Transportation of machinery components from ports, including containerised equipment and over-size / over-mass preassembled components			12[1]
Total		**0**	**16**	**12**

Note:

1. It is estimated that approximately 12 trucks will carry over-mass / over-sized loads for the duration of the Project. For the purpose of this study, it is assumed that the loads will be over-mass. However, this may include some over-size loads.

4.3 Construction Traffic

Construction of the Project is expected to take up to 15 months. An estimate of the number of construction vehicle movements is based on typical construction practices and activities and the anticipated number of personnel expected for the peak construction phase. These estimates include construction personnel, potential removal of construction waste / excavated material and delivery of construction materials. **Table 4-2** summarises the assumptions for the number of heavy vehicle movements and the purpose.

This assessment uses the AM peak hour as its basis for construction traffic generation to provide a worst-case scenario. The AM peak hour typically has a higher concentration of traffic than the PM peak, which is generally more staggered in times when people leave work and often comprises a higher proportion of multi-purpose trips.

4 Traffic Generation

Table 4-2 Heavy Vehicle Assumptions for Construction

Type of Heavy Vehicle	Purpose	Estimate of Total Heavy Vehicles Per Day (one-way)
Mobile Cranes		1
Backhoe Excavators	Trenching	3
Concrete trucks	Foundations and pavement within site	8
General Trucks	Concrete reinforcement (1), gravel (2), other building materials (10) and potential construction waste / spoil removal (10)	23
Total		**35**
		70 (two-way traffic)

Note: The estimate of total heavy vehicles per day is based on the average over the whole construction period.

It is expected that the number of construction personnel during the peak construction period will reach 250 personnel per day. The vehicle movements associated with construction personnel assumes a vehicle occupancy rate of 1.2 persons per vehicle. All construction personnel are assumed to arrive to the site between 0630 and 0700 hours (prior to the normal AM peak hour) and leave in the normal PM peak hour.

Table 4-3 summarises the peak construction vehicle movements associated with construction personnel and heavy vehicles based on the aforementioned assumptions.

Table 4-3 Construction Traffic Generation

Vehicle Movements per Month		Vehicle Movements per Week		Vehicle Movements per Day	
Heavy	**Light**	**Heavy**	**Light**	**Heavy**	**Light**
1,540	9,196	350	2,090	70	418

Note: The vehicle movements specified in **Table 4-3** includes the trips to and from the site.

Summary of Construction Traffic Generation

For the purpose of the impact assessment, the construction traffic generation summarised in **Table 4-4** has been adopted.

Table 4-4 Summary of Construction Traffic Generation

Vehicle Movements per Day		Vehicle Movements AM Peak Hour	
Heavy	**Light**	**Heavy**	**Light**
70	418	9[1]	0[2]

Note:

1. Heavy vehicle movements in the AM peak hour were calculated based on the assumption that the 66 daily vehicle movements are spread equally over an eight-hour working period.

2. Light vehicle movements assume that all construction personnel are assumed to arrive to the site between 0630 and 0700 hours, prior to the AM peak hour and leave in the PM peak hour

For the purpose of this assessment, it is assumed that approximately 70 percent of construction traffic would originate from Newcastle, with 30 percent of construction traffic originating from the Maitland direction, based on existing traffic volumes into Steel River Boulevard from Industrial Drive in the AM peak (refer to **Figure 3-1**).

4.4 Operational Traffic

The facility will operate 24 hours per day, seven days per week. The plant is expected to have a total of 120 personnel working over four shifts, plus 15 administration personnel during regular office hours, which are assumed to be from 0900 to 1700 hours. The distribution of personnel over the four shifts is likely to have more personnel during the day than during the night-time shifts. For the purpose of this study, it is assumed that 33 percent of personnel would be rostered during the day, with the remaining 67 percent spread across the remaining three shifts.

Based on the nearby BHP industrial site estimates, it assumed that 95 percent of employees would travel by car, which equates to a vehicle occupancy rate of 1.2 persons per car (Varga Traffic Planning Pty Ltd, 7 July 2006). This occupancy rate has been adopted for the calculation of the vehicle movements for personnel travelling to and from the site.

Table 4-5 summarises the estimates of personnel and the associated traffic generation for operation.

This assessment uses the AM peak hour as its basis for operational traffic generation to provide a worst-case scenario. The AM peak hour typically has a higher concentration of traffic than the PM peak, which is generally more staggered in times when people leave work and often comprises a higher proportion of multi-purpose trips.

Table 4-5 Operational Traffic Generation Estimates - Personnel, Light Vehicles

Personnel	Daily Vehicle Movements	AM Peak Trips to Site	AM Peak Trips from Site (Shift Change)
Shift Staff	200	33	22
Administration Staff	26	13	0
Total	**226**	**46**	**22**

Source: CPS, 8 May 2009.

The operational process of the facility involves the trucking of raw materials to the site for processing and the trucking of the final product for distribution. Based on the process and raw material requirements, the number of heavy vehicle movements associated with the plant are summarised in **Table 4-6**. The total number of trucks provided by KI included loading mass relevant to European standards, which is a load limit of 27 tonnes per truck. With reference to the RTA's *National Heavy Vehicle Reform, Vehicle Operations*, the load limit of 27 tonnes per truck is slightly less than the comparable NSW mass limits for general access vehicles, which allow loads of up to around 32 tonnes (allowing for vehicle mass). However, it is likely that components imported for the Project will be consolidated around the European load limit and therefore a conservative assumption that the commercial vehicle generation in NSW will be the same as that based on the lower mass limit has been adopted. In reality, it is likely that commercial vehicle generation for the site will be less than this.

4 Traffic Generation

Under the national mass and loading arrangements, general access vehicles are those with unrestricted access to the road network. General access vehicles do not exceed the following limits:

- Articulated vehicle length of 19 metres;
- Height of 4.3 metres;
- Width of 2.5 metres; and
- Gross mass of 42.5 tonnes.

These limits would allow for trucks to carry loads of up to 27 tonnes and remain within the maximum loaded mass limit of 42.5 tonnes and remain within the general access vehicle parameters.

Table 4-6 Operational Traffic Generation Estimates – Heavy Vehicles

Task	Total Vehicle Movements[1]			
	Day	Week	Month	Year
Incoming raw material	24[2]	116	496	6,046
Outgoing finished product	84[2]	416	1,782	21,692

Source: KI, 26 March 2009.

Note:

1. Total vehicle movements include the trip to and from the site.
2. It is assumed that the heavy vehicle movements associated with the incoming of raw materials and outgoing of finished product would be spread equally over an eight-hour working period.

Summary of Operational Traffic Generation

For the purpose of the impact assessment, the operation traffic generation summarised in **Table 4-7** has been adopted.

Table 4-7 Summary of Operational Traffic Generation

Vehicle Movements per Day		Vehicle Movements AM Peak Hour	
Heavy	Light	Heavy	Light
108	226	14[1]	68[2]

Note:

1. Heavy vehicle movements in the AM peak hour were calculated based on the assumption that the 108 daily vehicle movements are spread equally over an eight-hour working period.
2. Light vehicle movements in the AM peak hour account for 46 trips to the site for day-shift personnel and 22 trips from the site for night personnel shift-changes.

For the purpose of this assessment, it is assumed that approximately 70 percent of operational traffic would originate from Newcastle, with 30 percent of operational traffic originating from the Maitland direction, based on existing traffic volumes into Steel River Boulevard from Industrial Drive in the AM peak (refer to **Figure 3-1**).

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Impact Assessment of Traffic Generation

5.1 Access Arrangements

The access to the site for shift personnel and administration staff would be via Channel Road and the access for heavy vehicles required for the transportation of raw materials and product distribution would be via Pambalong Drive (drawing number MBA-5-A-H59148, revision G). These two locations provide separate accesses for heavy vehicle and light vehicle movements associated with the operation of the Project, which would reduce potential vehicular conflicts. Additionally, pedestrian movements from the staff and visitor parking area would be segregated from heavy vehicle movements within the site, minimising the risk of pedestrian and heavy vehicular conflicts.

Access and circulation arrangements for heavy vehicles within the site have been designed in accordance with B-double turning circles, which would accommodate the largest vehicle expected to access the site. There will be sufficient turning provisions for B-doubles within the internal access roads, which allows for trucks to enter the site in the forward direction, turn fully within the site and exit again in the forward direction.

Previous Development Applications for the Steel River Estate comprised a cycleway connecting the on-road cycle lanes on Industrial Drive (existing), Tourle Street (potential future) and sections of the Pacific Highway (existing) via the three main accesses to the site, namely Steel River Boulevard, the access onto Tourle Street and the access onto the Pacific Highway (Coslton Budd Hunt and Twiney, June 1997). KI does not propose to construct the access from Pacific Highway and therefore would not comply with the cycleway provisions of previous Development Applications for the Steel River Estate. An alternative cycleway “loop” has been identified to provide access to the Steel River foreshore, which connects the existing on-road cycleway along Riverside Drive with the foreshore via links adjacent to Pond 2 and adjacent to the existing water quality pond at the north-eastern end of Steel River Boulevard, as illustrated in **Figure 5-1**. The development of this cycleway would be the responsibility of the Steel River Estate developer, Domaine Steel River.

Existing cycle lanes within the site consist of marked cycleways within the wide shoulders on both sides of the roads, including Channel Road, Riverside Drive and Steel River Boulevard. Any cycling trips to and from the Project site would use the existing on-road cycleways along Channel Road, Riverside Drive and Steel River Boulevard.

Client: CROWN PROJECT SERVICES PTY LTD	Project: KNAUF INSULATION WOOL MANUFACTURING PLANT, TRANSPORT AND ACCESSIBILITY ASSESSMENT	Title: **FUTURE CYCLEWAY ROUTE**
URS	Drawn: AJW · Approved: NV · Date: 25/06/2009 Job No: **43177672** · File No: 43177672.006.wor	Figure: **5-1**

5.2 Parking Requirements

The planning document used for the basis of parking provision is the Newcastle Land and Environment Plan 2003 that refers back to the Steel River Strategic Impact Assessment Study for parking provision requirements. In accordance with this study, parking provision for the site is based on the greater of the following allocations:

- One space for every 100 metres squared GFA; or
- One space for every two employees.

Based on the parking allocation required with the total building area equating to 22,280 metres squared, the total number of parking spaces required is 223. However, the maximum number of staff on site at a given time would be 84, which is considerably lower than the 223 required by the Steel River Strategic Impact Assessment Study. For this reason, parking provision for the site has been reduced to:

- 90 staff parking spaces;
- 32 visitor parking spaces (including four disabled spaces); and
- 17 truck parking spaces (for B-doubles).

This parking allocation is considered adequate for the Project.

5.3 Impacts on Existing Transport Network

Based on the existing conditions and the traffic generated by the construction and operation of the Project, the impacts on the local road network, relative to their Levels of Service, are summarised in the following subsections. A background growth rate of two percent per annum on all roads has been assumed for the assessment year 2010, based on a growth rate identified by the RTA (Varga, 7 July 2006).

Construction Phase

The construction phase of the Project is likely to generate up to 209 light vehicle movements between 0630 and 0700 hours, which is outside the normal AM peak hour and nine heavy vehicle movements within the AM peak hour. This equates to a daily volume of 418 light vehicle movements and 70 heavy vehicle movements.

The main impacts from construction are likely to occur:

- outside the normal morning peak between 0630 and 0700 when construction staff and early delivery vehicles arrive to the site via Maitland Road, Industrial Drive and Steel River Boulevard;
- through regular daily traffic generated by delivery trucks for equipment, plant and materials with intermittent peaks associated with works; and
- outside of peak periods, through delivery of large equipment and facility components from Port to the site, which is likely to be a one-off occurrence.

The impact of construction traffic on the road network surrounding the site has been assessed with respect to:

- traffic capacity on the roads surrounding the site;
- access for over-mass, over-dimension vehicles; and
- safety for all road users.

Operational Phase

The operational phase of the Project is assumed to generate regular daily vehicle trips of up to 226 light vehicle movements and 108 heavy vehicle movements. This translates to up to 68 light vehicles per hour and 14 heavy vehicles per hour within the peak periods. The daily heavy vehicle movements are associated with the delivery of raw materials and distribution of the final product.

5.3.2 Steel River Site Locality

This assessment uses the AM peak hour as its basis for construction traffic generation to provide a worst-case scenario. The AM peak hour typically has a higher concentration of traffic than the PM peak, which is generally more staggered in times when people leave work and often comprises a higher proportion of multi-purpose trips.

Maitland Road (Pacific Highway)

Based on the RTA count station on Maitland Road, west of Maud Street, the traffic generated by the construction and operation of the Project would be negligible compared to the existing traffic volumes and impacts are likely to be insignificant. The Pacific Highway is an existing freight route between Sydney and Newcastle and is therefore designed to accommodate significant portions of heavy vehicles.

Industrial Drive

Based on the RTA count stations on Industrial Drive, west of Werribi Street and west of Woodstock Street, the traffic generated by the construction and operation of the Project would be negligible compared to the existing traffic volumes and impacts are likely to be insignificant. Industrial Drive provides a link to the industrial area and developments along the banks of the Hunter River and is therefore designed to accommodate significant heavy vehicle volumes.

Steel River Boulevard

The impact on Steel River Boulevard with respect to the increased traffic volumes summarised in **Tables 4-4** and **4-7** are indicated in **Table 5-1**.

Table 5-1 Estimated AM Peak (2010) Impacts on Steel River Boulevard

Activity	**AM Peak During Construction Phase**	**AM Peak During Operational Phase**
No Development		
Traffic Flow	240[1]	240[1]
Level of Service	A	A
With KI Development		
Construction Traffic Flow	9[2]	0
Operational Traffic Flow	0	82[3]
Total Traffic Flow	249[4]	322[5]
Percentage Change from No Development	+4%	+34%
Level of Service (mid-block)	A	A

Notes:

1. 2009 Two-way traffic flow (232 vehicles per hour) with an increase of two percent per annum (rounded to the nearest ten) for background traffic increase;
2. Two-way construction traffic volume, accounting for no light vehicle movements and nine heavy vehicle movements (into the site);
3. Accounts for two-way operational traffic movements, including 68 light vehicle movements (46 in / 22 out of site), and 14 heavy vehicle movements (seven in / seven out of the site);
4. Heavy vehicle proportion approximately seven percent of total traffic; and
5. Heavy vehicle proportion approximately seven percent of total traffic.

Analysis of **Table 5-1** for the Project indicates the following key elements:

- Peak traffic during the construction phase of the Project would be approximately four percent higher than the existing traffic volumes. The Level of Service for Steel River Boulevard remains unchanged at A.
- Peak traffic during operation of the Project would be approximately 34 percent higher than the existing traffic volumes. The Level of Service would remain unchanged at A.

Channel Road

The impact on Steel River Boulevard with respect to the increased traffic volumes summarised in **Tables 4-4** and **4-7** are indicated in **Table 5-2**.

Table 5-2 Estimated AM Peak (2010) Impacts on Channel Road

Activity	**AM Peak During Construction Phase**	**AM Peak During Operational Phase**
No Development		
Traffic Flow	60[1]	60[1]
Level of Service	A	A
With KI Development		
Construction Traffic Flow	9[2]	0
Operational Traffic Flow	0	82[3]
Total Traffic Flow	69[4]	142[5]
Percentage Change from No Development	+15%	+237%
Level of Service (mid-block)	A	A

Notes:

6. 2009 Two-way traffic flow with an increase of two percent per annum (rounded to the nearest ten) for background traffic increase;
7. Two-way construction traffic volume, accounting for no light vehicle movements and nine heavy vehicle movements;
8. Accounts for two-way operational traffic movements, including 68 light vehicle movements (46 in / 22 out of site), and 14 heavy vehicle movements (seven in / seven out of the site);
9. Heavy vehicle proportion approximately 16 percent of total traffic; and

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10. Heavy vehicle proportion approximately 11 percent of total traffic.

Analysis of **Table 5-2** for the Project indicates the following key elements:

- Peak traffic during the construction phase of the Project would be approximately 15 percent higher than the existing traffic volumes. The Level of Service for Channel Road remains unchanged at A.
- Peak traffic during operation of the Project would be approximately 237 percent higher than the existing traffic volumes. Despite this increase, the Level of Service would remain unchanged at A, which is an acceptable Level of Service.
- The heavy vehicle proportion during the construction phase of the Project would increase to approximately 16 percent during the AM peak hour. This increase in heavy vehicle proportion is not considered to have a significant impact on the operation of Channel Road, since the construction period would occur over a relatively short period of time.
- The heavy vehicle proportion during the operational phase of the Project would increase to approximately 11 percent during the AM peak hour.

Channel Road / Steel River Boulevard Intersection

Table 5-3 summarises the impacts of construction and operational traffic associated with the Project during the AM peak hour on the Channel Road / Steel River Boulevard intersection.

Table 5-3 Estimated AM Peak (2010) Traffic Impacts on Channel Road / Steel River Boulevard Intersection

Activity	Level of Service	Average Delay (seconds)	Degree of Saturation (vehicle / capacity)	95% Back of Queue Length (metres)
No Development	A	3.7	0.07	3
Construction Traffic	A	4.1	0.08	3
Operational Traffic	A	5.3	0.11	3

For the purpose of this study, a background traffic growth rate of two percent per annum was assumed for all movements at this intersection, Based on a growth rate identified by the RTA (Varga, 7 July 2006). The construction and operation year of 2010 was adopted.

The results from the intersection analyses for the Project indicate that the Level of Service remains unchanged for each scenario, with a Level of Service A for the Channel Road / Steel River Boulevard intersection, with no development, with construction traffic and with operational traffic.

The impact of the construction and operational phases of the Project includes a significant increase in traffic volumes and heavy vehicle proportions turning into and out of Channel Road at the intersection of Channel Road / Steel River Boulevard. However, these increases appear to have an insignificant effect on the overall operation of the intersection.

During the site inspection it was assessed that the Channel Road / Steel River Boulevard intersection provides adequate right-turn radius from and left-turn radius into Channel Road to allow for B-double turning movements.

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Steel River Boulevard / Industrial Drive Intersection

Table 5-4 summarises the impacts of construction and operational traffic associated with the Project during the AM peak hour on the Steel River Boulevard / Industrial Drive intersection.

Table 5-4 Estimated AM Peak (2010) Traffic Impacts on Steel River Boulevard / Industrial Drive Intersection

Activity	Level of Service	Average Delay (seconds)	Degree of Saturation (vehicle / capacity)	95% Back of Queue Length (metres)
No Development	B	21.8	0.87	192
Construction Traffic	B	21.8	0.87	192
Operational Traffic	B	25.0	0.90	209

For the purpose of this study, a background traffic growth rate of two percent per annum was assumed for all movements at this intersection, Based on a growth rate identified by the RTA (Varga, 7 July 2006). The construction and operation year of 2010 was adopted.

The results from the intersection analyses for the Project indicate that the Level of Service remains unchanged for each scenario, with a Level of Service B for the Steel River Boulevard / Industrial Drive intersection, with no development, with construction traffic and with operational traffic. This outcome is in line with the predicted Level of Service for this intersection at the full-development stage of the Steel River Industrial Estate conducted by Varga Traffic Planning Pty Ltd (7 July 2006).

The impact of the construction and operational phases of the Project includes a significant increase in traffic volumes and heavy vehicle proportions turning into and out of Steel River Boulevard at the intersection of Steel River Boulevard / Industrial Drive. However, these increases appear to have an insignificant effect on the overall operation of the intersection.

During the site inspection it was assessed that the Steel River Boulevard / Industrial Drive intersection provides adequate right-turn radius into and from Steel River Boulevard and left-turn radius from Steel River Boulevard and Industrial Drive to allow for B-double turning movements.

Industrial Drive / Maitland Road (Pacific Highway) Intersection

Table 5-5 summarises the impacts of construction and operational traffic associated with the Project during the AM peak hour on the Steel River Boulevard / Industrial Drive intersection.

Table 5-5 Estimated AM Peak (2010) Traffic Impacts on Industrial Drive / Maitland Road Intersection

Activity	Level of Service	Average Delay (seconds)	Degree of Saturation (vehicle / capacity)	95% Back of Queue Length (metres)
No Development	B	26.6	0.90	213
Construction Traffic	B	24.5	0.90	180
Operational Traffic	B	25.4	0.90	205

It is noted that there is an unexpected result for the intersection analysis results, with and without construction traffic at Industrial Drive / Maitland Road intersection. The average delay reduces with construction traffic because of the phase times calculated by SIDRA. Without construction traffic the intersection has a cycle time (all signal phases) of 90 seconds, with 27 seconds of phase time for Industrial Drive traffic movements. With construction traffic the program calculates a practical cycle time of 100 seconds, with 32 seconds of phase time allocated to Industrial Drive traffic movements. The increased phase time allowed for Industrial Drive traffic movements decreases the delay for traffic on this approach for the minor increase in traffic volumes, which in-turn decreases the average delay for the intersection.

For the purpose of this study, a background traffic growth rate of two percent per annum was assumed for all movements at this intersection, Based on a growth rate identified by the RTA (Varga, 7 July 2006). The construction and operation year of 2010 was adopted.

The results from the intersection analyses for the Project indicate that the Level of Service remains unchanged for each scenario, with a Level of Service B for the Industrial Drive / Maitland Road intersection, with no development, with construction traffic and with operational traffic. This outcome is in line with the predicted Level of Service for this intersection at the full-development stage of the Steel River Industrial Estate conducted by Varga Traffic Planning Pty Ltd (7 July 2006). The Project is therefore, unlikely to have a significant impact on the intersection of Industrial Drive / Maitland Road.

5.3.3 Comparison of Impacts on Steel River Site Locality

Table 5-6 provides a comparison of the Levels of Service for the intersections under the following scenarios (operational phase of Steel River Estate):

- Without development (analysis of existing traffic volumes by URS);
- With KI development;
- With Stages 8A, 8B and 8C development (according to Colston Budd Hunt and Twiney, June 1997);
- With Stages 8A, 8B and 8C development (according to Varga Traffic Planning, 7 July 2006); and
- With Stages 8, 9 (formerly 8B) and 10 (formerly 8C) development according to Mark Waugh, September 2007.

Table 5-6 Comparison of Intersection Level of Service (AM Peak Operational Phase)

Scenario	Steel River Boulevard / Industrial Drive	Industrial Drive / Maitland Road (Pacific Highway)	DA Approved Access Road / Maitland Road (Pacific Highway)
Without Development	B	B	Not Applicable
With KI Development	B	B	Not Applicable
Colston Budd and Twiney[1]	B	D	A
Varga Traffic Planning[2]	B	B	A
Mark Waugh[3]	C	C	D

Notes:

1. Page 21, Colston Budd Hunt and Twiney Pty Ltd, June 1997;

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2. Page 24, Varga Traffic Planning Pty Ltd, 7 July 2006; and
3. Level of Service based on average delay of all movements for the intersections, as per the SIDRA Intersection Analysis, Table 5.4 (Mark Waugh, September 2007).

The concept design for the Steel River Industrial Estate included an access to be constructed from Maitland Road (Pacific Highway), adjacent to the Kooragang Goods Rail Line, north-west of Industrial Drive (Varga, 7 July 2006).

The KI development is replacing 31 smaller lots proposed in Stages 9 and 10 of the Steel River Estate development. The 31 smaller lots are estimated to generate a considerably higher volume of traffic compared to the traffic generation associated with the KI development. As shown in **Table 5-6**, the intersections of Steel River Boulevard / Industrial Drive and Industrial Drive / Maitland Road (Pacific Highway) operate at the same Level of Service B without the KI development and with the KI development. These intersections operate the same Level of Service or better, than those determined by the previous traffic studies for the site, which were based on the development of the 31 smaller lots. For this reason, the additional access to the site from Maitland Road (Pacific Highway) is not considered necessary for the purpose of the KI development.

6

Mitigation and Management Measures

6.1 Equipment Transportation

The traffic generation associated with equipment transportation is assumed to be conducted during site establishment and limited to off-peak traffic periods. This component of traffic generation is considered a minimal aspect of the Project, since the traffic volumes are insignificant and are expected to occur within a relatively short period. The transportation of equipment is likely to be via the existing arterial road network, namely Industrial Drive and the Pacific Highway with minimal transportation on the local road network. These two routes provide links between Sydney and Newcastle and access to the industrial land uses along Steel River banks and are therefore designed to accommodate heavy vehicles.

Once the exact sources of equipment are confirmed, the haulage contractor would be responsible for the final route selection process, which involves a survey of the entire haulage route. The haulage contractor would be responsible for developing the Transport Plan, identifying and obtaining approvals required from the RTA and Council. Preliminary mitigation measures proposed for the minimising the impacts associated with the transportation of equipment and components for the Project include:

- Commissioning a licensed haulage contractor, with the experience and equipment required to transport over-mass and over-dimension loads. The contractor would have a working knowledge of the appropriate process and an established relationship with the relevant road authorities.
- Complying with approvals and permits obtained from the relevant road authorities;
- Meeting the requirements of the Transport Plan, for example, the implementation of warning signs at key locations along the haulage route where required and adhering to safety principles throughout the haulage activities.
- Designing and constructing internal road access that is suitable for over-mass, over-dimension vehicle access.

6.2 Construction Traffic

A detailed Traffic Management Plan would be developed for the construction phase of the Project in accordance with *Traffic Control at Worksites*, Version 3.1 (RTA, April 2006). The Traffic Management Plan would include:

- Hours of haulage, which are to be minimised not to coincide with peak periods, school pick-up and drop-off times, limiting the number of vehicular movements per day.
- Haulage routes, including the source locations and their access points as well as access points to the site.
- Design and construction of the access from Pambalong Road in accordance with RTA and Council requirements.
- Design and construction of site access to allow safe movement within the site.
- A community consultation plan to ensure Steel River Estate commercial property owners are informed prior to and during haulage activities.
- The design of temporary works to accommodate haulage vehicles along the haulage route, including intersection treatments, speed zoning, traffic control devices such as signage and linemarking and modification to street furniture and structures.
- Deviation of traffic, pedestrians and cyclists during haulage at sensitive or busy locations.
- Designated areas within the site for truck turning movements, parking, loading and unloading.
- Sequence for implementing traffic works and traffic management devices.

- Safety principles for haulage activities, such as speed limits around the site and procedures for specific activities.
- Procedures for inspections and record keeping for maintaining traffic control measures.

6.3 Operational Traffic

Operational traffic is likely to have minimal impact on the existing arterial road network, namely Maitland Road and Industrial Drive. These two routes provide links between Sydney and Newcastle and access to the industrial land uses along Steel River banks, respectively and are therefore designed to accommodate significant traffic volumes and proportions of heavy vehicles. The impacts on Pambalong Drive, Channel Road and Steel River Boulevard include a significant increase in the total traffic volume and the proportion of heavy vehicle movements.

At the commencement of the operational phase, a mitigation measure associated with operational traffic involves the development of a detailed Traffic Management Plan for the operational phase, which details the procedures for moving around the site, transportation of raw materials and the distribution of the final product, loading and unloading procedures, parking provisions for delivery vehicles, employees, visitors and maintenance staff. The Traffic Management Plan would be the responsibility of KI.

6.4 Summary of Mitigation Measures

Table 5-1 summarises the mitigation and management measures to minimise the impacts of traffic generated by the Project.

Table 6-1 Summary of Mitigation and Management Measures

Mitigation Measure	Implementation		
	Design	Construction	Operation
Development of a detailed Transport Plan (including obtaining approvals) for the transportation of facility components and equipment.	✓	✓	
Haulage contractor to develop a Traffic Management Plan for the operational phase, detailing traffic management measures for: • safety for all modes of transport; • potential hazards; • maintenance of road network; and • cumulative impacts of traffic movements		✓	
Construction of access from Channel Road and Pambalong Drive and internal access roads in accordance with Australian Standards, RTA and Newcastle City Council requirements, to accommodate the design vehicles required for delivery of raw materials and distribution of final product.	✓		

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References

Akcelik and Associates Pty Ltd, *SIDRA Intersection User Guide*, July 2007

Colston Budd Hunt and Twiney Pty Ltd, *Report on Transport Aspects of Proposed "Steel River" Industrial Development, Mayfield West*, June 1997

Crown Project Services Pty Ltd, Key Information Requests, 8 May 2009

Mark Waugh Pty Ltd, *Steel River Development, Mayfield West, Newcastle NSW, Traffic Impact Assessment – Paramics Modelling*, September 2007

Monteath and Powys Pty Ltd, *Stages 9 and 10 Subdivision Plan – Steel River Estate, Profile of Neighbouring Developments*, September 2006

Norton, Alan, *Steel River Background Note, Access and Traffic Issues*, Domaine Steel River

Roads and Traffic Authority, NSW, *Guide to Traffic Generating Developments*, version 2.2, October 2002

Roads and Traffic Authority, NSW, SCATS data, 1 May 2008 to 30 April 2009

Roads and Traffic Authority, NSW, *Traffic Control at Worksites*, version 3.1, April 2006

Varga Traffic Planning Pty Ltd, *Steel River Industrial Development, Mayfield West, Traffic Report*, 7 July 2006

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Limitations

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The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

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