Appendix L Road Impact Assessment Study

URS

QUEENSLAND COKE & ENERGY

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Queensland Coke and Power Plant Project

Prepared for URS Australia Pty Ltd

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1.0 INTRODUCTION

1.1 Project Background

Eppell Olsen & Partners has been commissioned by URS Australia Pty Ltd to undertake a Road Impact Assessment Study (RIAS) as part of the Environmental Impact Assessment (EIA) for the proposed Queensland Coke and Power Plant Project to be constructed in the Stanwell Energy Park located on land approximately 19km south-west of Rockhampton. The site is located on Power Station Road and will be accessed primarily via the existing single access road to the site.

1.2 Study Methodology

This study has been prepared generally in accordance with the "*Guidelines for Assessment of Road Impacts of Development Proposals"* (Department of Main Roads (DMR) Queensland, 2000). These guidelines identify the procedures for assessment of traffic related impacts of major projects. The objective of this assessment is to evaluate the traffic impacts of the Queensland Coke and Power Plant Project on the adjacent road network. Traffic impacts considered include any effects on intersection and link operations along the extent of the haulage and private vehicle traffic routes. To address these impacts, the following tasks have been undertaken and are discussed in detail in the following sections of this report:

- inspection of the site and surrounding road network between Rockhampton and the Stanwell Energy Park;
- review of existing operation of the study network including measurement of existing traffic demand;
- estimation of the likely traffic generation of the plant and distribution of this additional traffic to the surrounding road network;
- consideration of historic growth patterns within the study area;
- estimation of future traffic levels with and without the proposal;
- analysis of intersection operation for each of the design scenarios identified;
- identification of any road network improvements or works necessary to improve network performance or conditions with and without the proposal.

2.0 EXISTING SITUATION

2.1 Existing Road Network

The proposed Queensland Coke and Power Plant Project is to be constructed in the existing Stanwell Energy Park. This location has been chosen to make use of the existing services and resources such as water, rail and road infrastructure. The Stanwell Energy Park is located approximately 17km south-west of Rockhampton and access is via a single access road for private vehicles on Power Station Road and a number of secondary access locations for truck and heavy vehicle movements.

The proposed plant will primarily generate private vehicle traffic relating to the operation and construction of the facility (i.e. plant and construction personnel), with low volumes of heavy vehicle traffic during the operational stages of the facility. Large volume resources to the process will be transported to the site via rail (e.g. coking coal from the Bowen Basin) and outputs will be transported from the site via rail to dock facilities at Gladstone.

The majority of project related traffic is anticipated to travel to and from the east and hence this route provides the major focus of this assessment. The study area, which includes Power Station Road, the Capricorn Highway east to the Bruce Highway, Gavial - Gracemere Road (through Gracemere) and the Bruce Highway between Capricorn Highway and Port Curtis Road, is shown on Figure 2.1.

The key sections of the study road network are described in the following paragraphs.

Power Station Road is a sealed, 6.5m wide undivided roadway posted at 80km/h at the access to the Stanwell Energy Park. It connects to the Capricorn Highway via a grade separated interchange.

The Capricorn Highway forms part of the State controlled road network and extends east to the Bruce Highway, and west to smaller communities and further a field, to Central Queensland. For the most part, the Capricorn Highway is a two lane, undivided roadway, with several overtaking lane sections provided along the study section. The section is generally posted with a speed limit of 100km/h, however some sections are posted at 80km/h.

N

TO ROCKHAMPTON

Prospect St

Upper Dawson St

Lower Dawson

Port Curtis Rd

Jellicoe St

Titman Rd

Newnham Rd

Nelson St

Fairy Bower Rd

CAPRICORN HIGHWAY

BRUCE HIGHWAY

TO GLADSTONE

McLaughlin St

Old Capricorn

CAPRICORN HIGHWAY

O'Shanesy St

Lawrie St

Whitman St

Bland St

Conaghan St

Gavial-Gracemere Rd

Kabra Scrubby Creek Rd

Somerset Rd

Buchholz Rd

Cecil St

Morgan St

Williams Dr

Neerkol Rd

Durham Dr

To Duaringa

CAPRICORN HIGHWAY

Off Ramp

Power Station Rd

SITE

EPPELL OLSEN & PARTNERS

DRAWING TITLE:

Road Network

FIGURE No: 2.1

PROJECT No: 5038

DATE: 25.10.05

The Bruce Highway forms part of the National Highway system and where it meets the Capricorn Highway, is a sealed, two lane roadway posted at 60km/h. The Bruce Highway connects Gladstone to the south and feeds directly to the Rockhampton CBD to the north.

2.2 Planned Road Infrastructure Improvements

Information contained in the Department of Main Roads' "*Roads Implementation Program 2004-2005 to 2008-2009"* (2004) indicates that there are some improvements scheduled for the next five financial year periods along the route to the east or west of the project site.

The works that are scheduled that are located on the study network are located within the Fitzroy Shire. The only project located on the study network is project number 54/16A/34 and is located at the Capricorn Highway crossing of Scrubby Creek in Gracemere.

2.3 Intersection Geometry

The scope of the assessment is limited to the routes identified in Section 2.1 of this report.

With respect to traffic operations, a number of key intersections between Rockhampton and the proposed project site have been included in this assessment:

- Gladstone Road/Lower Dawson Road/Port Curtis Road;
- Bruce Highway/Capricorn Highway;
- Capricorn Highway/Gavial - Gracemere Road;
- Old Capricorn Highway/Gavial - Gracemere Road/Lawrie Street/O'Shanesy Street;
- Capricorn Highway/Power Station Road.

Existing lane configurations for each of these intersections are shown on Figure 2.2.

N

A

Free Left Turn

Continuous Left Turn

Via Off Ramp

Capricorn Highway

B

Note: Right turn from minor approach becomes priority lane downstream

Capricorn Highway

Free Left Turn

McLaughlin St

C

McLaughlin St

Lawrie St

D

Capricorn Hwy

Bruce Hwy

E

Free Left Turn

Port Curtis Rd

Lower Dawson

50m

Free Left Turn

Titman Rd

Newnham Rd

Nelson St

Fairy Bower Rd

CAPRICORN HIGHWAY

Upper Dawson St

Prospect St

Lower Dawson

Port Curtis Rd

Jellicoe St

BRUCE HIGHWAY

TO GLADSTONE

CAPRICORN HIGHWAY

McLaughlin St

Old Capricorn

O'Shanesy St

Lawrie St

Whitman St

Bland St

Conaghan St

Gavial-Gracemere Rd

Kabra Scrubby Creek Rd

Somerset Rd

Buchholz Rd

Cecil St

Morgan St

Williams Dr

Neerkol Rd

Durham Dr

To Duaringa

Off Ramp

CAPRICORN HIGHWAY

Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:

Existing Lane Configurations

FIGURE No: 2.2

PROJECT No: 5038

DATE: 25.10.05

2.3.1 Gladstone Road/Lower Dawson Road/Port Curtis Road

The intersection of the Bruce Highway and Port Curtis Road is located to the south of the Rockhampton CBD in the suburb of Allenstown. The intersection comprises an unsignalised T-intersection with Gladstone Road (Bruce Highway) - Lower Dawson Road forming the priority north-south leg of the intersection.
Gladstone Road - Lower Dawson Road is a four lane carriageway with median separation at the intersection with Port Curtis Road. Turning movements into Port Curtis Road are provided with a 50m right turn lane on the southern leg and a free left turn lane on the northern approach. The Port Curtis Road leg of the intersection comprises of a right turn lane and a free left turn lane with capacity to store a number of vehicles without blocking the right turn lane.

2.3.2 Bruce Highway/Capricorn Highway

The Bruce Highway/Capricorn Highway intersection is constructed as a three leg, single lane roundabout. The Bruce Highway forms the north-east (towards Rockhampton) and south-east (towards Gladstone) approach legs with the western approach leg being the Capricorn Highway (towards Gracemere and Stanwell).

The roundabout island is in the order of 80m in diameter.

2.3.3 Capricorn Highway/Gavial - Gracemere Road

The intersection is a high speed seagull intersection that provides priority to westbound through movements along the Capricorn Highway, which has a posted speed limit of 80km/h at the intersection. The seagull form of the intersection provides a right turn deceleration lane into Gavial - Gracemere Road, and an acceleration lane for the right turn movement out of the latter. This lane becomes the priority lane downstream (east) of the intersection and eastbound through traffic along the Capricorn Highway merges with this traffic. A left turn deceleration lane is provided for westbound traffic entering Gavial - Gracemere Road.

2.3.4 Old Capricorn Highway/Gavial - Gracemere Road/Lawrie Street/O'Shanesy Street

The intersection is constructed as a four leg, single lane roundabout with a circulating island diameter of approximately 20m and provides an entry to the township of Gracemere.

2.3.5 Capricorn Highway/Power Station Road

Access to Power Station Road from the Capricorn Highway is partially grade separated via a flyover ramp. Westbound left turning vehicles are provided an off ramp with sufficient deceleration length prior to an unsignalised T-intersection. Vehicles turning into Power Station Road from the west first turn left at the unsignalised Capricorn Highway/Power Station Road T-intersection and then travel via the overpass to a stop control with the westbound left turn vehicles (i.e. vehicles leaving the Capricorn Highway via the off ramp).

Eastbound traffic from Power Station Road uses the overpass and then a left turn acceleration lane onto Capricorn Highway. Outbound westbound traffic turns right out of Power Station Road onto the Capricorn Highway. Site observations showed that there were a number of large road vehicles (i.e. greater than 12 axles) travelling to and from the west entering Power Station Road.

The Capricorn Highway in this section is posted at 100km/h and consists of a two lane, 6.5m wide undivided carriageway with 1.8m to 2.3m wide sealed shoulders.

2.4 Existing Traffic Demand

2.4.1 Intersection Turning Movements

Peak hour traffic volumes at the subject intersections were sourced from the following:

- turning movement counts collected by Australasian Traffic Surveys on Thursday 4 April 2005;

- previous turning movement counts conducted by the Department of Main Roads on Wednesday 9 March 2005 (Capricorn Highway/Power Station Road and Capricorn Highway/Gavial - Gracemere Road intersections).

A summary of existing traffic volumes at each of the study intersections is provided on Figure 2.3.

2.4.2 Link Volumes

Average Annual Daily Traffic (AADT) link volumes for various sections of the study road network have been obtained from DMR traffic counts collected in 2003. These results are summarised in Table 2.1.

Table 2.1 ***2003 AADT Link Volumes***

Link	Road	Point 1	Point 2	AADT*
1	Lower Dawson Road	Capricorn Highway	Port Curtis Road	15,909
2	Capricorn Highway	Bruce Highway	Gavial - Gracemere Rd	10,969
3	Capricorn Highway	Gavial - Gracemere Rd	Kabra Road	3,586
4	Capricorn Highway	Kabra Road	Power Station Road	3,137

* AADT measured in vehicles per day (vpd).

Table 2.2 presents the breakdown by vehicle type for the road sections along the haulage route (using the same link information as in Table 2.1).

Table 2.2 ***2003 AADT Vehicle Classification Along Haulage Route***

Link	Classified Vehicle Volumes (vpd)					
	Light	Rigid Truck	Articulated	B Doubles	Heavy Vehicle Percentage (%)	Total
1	14,205	876	625	202	10.7	15,909
2	10,064	516	265	122	8.3	10,969
3	3,062	244	174	105	14.6	3,586
4	2,615	224	181	116	16.6	3,137

N

CAPRICORN HIGHWAY

BRUCE HIGHWAY

TO GLADSTONE

Prospect St

Upper Dawson St

Lower Dawson

Port Curtis Rd

Jellicoe St

Titman Rd

Newnham Rd

Nelson St

Fairy Bower Rd

Bruce Highway

Port Curtis Rd

515 (1123)
51 (66)
1144
(780)
10
(6)
46
(107)
0
(13)

(172)
131
(482)
183
190
(171)
4
(14)
528 (205)
7 (9)
Capricorn Highway
McLaughlin St

(16)
(407)
(11)
McLaughlin St
Old Capricorn
(7)
(15)
(109)
(6)
(16)
(56)
O'Shanesy St
Lawrie St
(72)
(211)
(46)

(448) 858
(12) 3
Capricorn Highway
Lower Dawson
376 (790)
216 (289)
310 (188)
19 (22)
Bruce Highway

(1)
0
(63)
3
(1) 2
(168) 91
Capricorn Highway
101 (117)
18 (7)
Off Ramp

CAPRICORN HIGHWAY
McLaughlin St
Old Capricorn
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd

Kabra Scrubby Creek Rd

Somerset Rd

Buchholz Rd
Cecil St
Morgan St
Williams Dr

Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2005 Volumes
(Scenario A)

FIGURE No: 2.3
PROJECT No: 5038
DATE: 25.10.05

2.5 Crash History

A review of the crash history of the study road network has been conducted based on information provided by Queensland Transport summarising crash location, type and severity for incidents recorded between the four-year period 2000 – 2004. This data, as well as a description of Queensland Transport's crash type coding, is included at Appendix A.

All crash locations are plotted on Figure 2.4 and a tabulation of crash type, severity, and frequency is provided for locations recording high crash frequencies (i.e. more than 3 crashes).

Six crashes were observed during the period at the Capricorn Highway/Gavial - Gracemere Road intersection that involved a right turning vehicle being struck by the adjacent through movement. The incident descriptions provided are not detailed enough to identify if these occurrences are related to a pattern in approach, time of day, etc.

The Bruce Highway/Capricorn Highway intersection recorded nine crashes involving vehicles mounting the traffic island (i.e. vehicles driving off the designated carriageway and into traffic island areas). The incident descriptions provided are not detailed enough to identify any consistency in approach, time of day, weather conditions, etc to determine if there is an existing deficiency at the intersection contributing to this crash type.

All other locations shown on Figure 2.4 show no consistent pattern in crash types and have therefore not been reviewed further herein.

Although high crash frequency has not been recorded during the past five years, a review of the Capricorn Highway/Fairy Bower Road intersection was undertaken during a site visit in May 2005. The intersection is an unsignalised four way intersection, however adequate sight distance and appropriate speed limits have been provided at the intersection. It is thought that the design of this intersection is adequate for current and anticipated (with the addition of project related vehicles) traffic levels.

1 Capricorn Highway/Malchi Nine Mile Road

Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
303			1		1	2
308	1					1

2 Capricorn Highway/O'Shanesy Street

Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
104	1					1
303			1			1
506		1				1

3 Capricorn Highway/Old Capricorn Highway

Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
104		1	1	1		3

4 Capricorn Highway/Gavial Gracemere Road

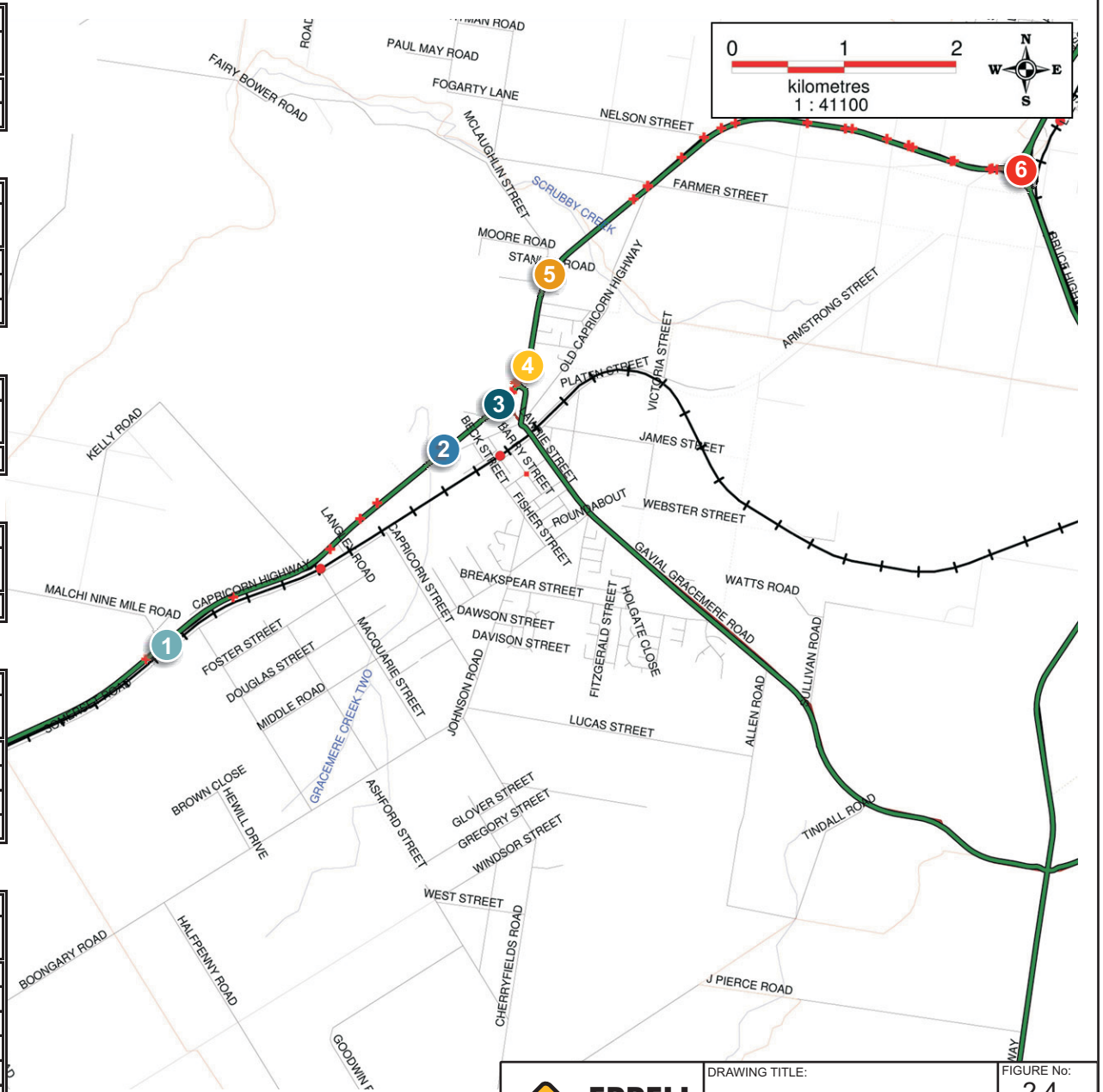
Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
104	2	1		3		6

5 Capricorn Highway/Mclaughlin Street

Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
104	1					1
105	1					1
202				1		1
308				1		1

6 Bruce Highway/Capricorn Highway

Type	Severity					
	PDO	Minor injury	Medical treatment	Hospitalisation	Fatal	Total
301	1		1			2
600	1					1
702		1				1
704	1					1
706			1			1
708	7			2		9
801	1					1
805				1		1



EPPELL OLSEN & PARTNERS

DRAWING TITLE:
Crash Data Matrices
Capricorn Highway
(Bruce Hwy - Meteor Park Rd)

FIGURE No: 2.4
PROJECT No: 5038
DATE: 26.05.05

3.0 PROPOSED DEVELOPMENT

3.1 Queensland Coke and Power Plant Proposal

The site of the proposed Queensland Coke and Power Plant Project is located within the existing Stanwell Energy Park, approximately 19km south-west of Rockhampton. The intent of the project is to "employ modern heat recovery coke making technology to produce a superior quality blast furnace coke for the export market" (Macarthur Coal Limited 2004). Surplus heat from the process will be captured for use in the generation of electricity.

The plant comprises of coking coal, power and materials handling components with the entire facility to be constructed over two phases. The first stage, at maximum capacity is expected to produce in the order of 1.6Mtpa of coking coal and approximately 151MW of electricity. The second stage is expected to produce a doubling of the outputs of Stage 1. Peak average employment for some 1,200 people and 125 people is expected during construction and operational (Stages 1 and 2) phases respectively. A maximum peak work force of approximately 1,600 people is expected for a short period toward the end of the construction phase.

The process will result in a more refined coking coal product that will be transported by rail to a purpose built export facility at Fisherman's Landing, Gladstone. Some by-product and waste materials will result from the refining process. Waste coal dust output will be processed at a facility likely to be located within the Stanwell Energy Park. This will represent approximately 12 vehicles per day (vpd) (6vpd in/6vpd out).

The major input to the process is raw coking coal. This will be delivered to the site via rail from the Bowen Basin and will not result in any vehicle trips on the road network. Other inputs are likely to be minor and will represent very few vehicle trips. For the purposes of this assessment, these have been estimated as approximately 4vph (2vph in/2vph out) applied only to the peak hour periods, on the haulage route to the east of the Capricorn Highway/Power Station Road intersection.

No ramp up period following the commencement of operation has been assumed for the purposes of our assessment. As such, maximum traffic generation for construction and operation stages of the coke and power plant have been considered and are discussed in the following section.

3.2 Construction Traffic Demands

3.2.1 Light Vehicle Traffic

Construction of Stage 1 of the plant is programmed to start in 2006 and continue until around the end of 2007. Operation of Stage 1 is expected to commence in early 2008. Construction will occur in a number of phases from which a peak of around 1,600 staff is expected at the Stanwell site.

Given the daily operation schedules likely to be adopted during the construction phase, it is likely that vehicle traffic generated during peak construction will result in the majority of traffic arriving and departing outside the defined road peaks. However for the purpose of intersection capacity analysis, it is assumed that this traffic will coincide with the road peak, hence this adopts an element of conservatism to the analysis.

Construction staff are to be housed in construction camps or private accommodation to the east of the project site (Gracemere, Rockhampton, etc.) and transported to the site via 45 seat passenger buses. Assuming all staff are to be employed on the site at the same time, this would represent in the order of 74 bus trips per hour (37vph in/37vph out) during the AM and PM peak hours (see Table 3.1).

Construction will be undertaken over 6 day work weeks (Monday to Saturday) with the hours of construction work being between 6:00am to 6:00pm.

3.2.2 Heavy Vehicle Traffic

Information provided to us has indicated that material inputs to the construction phase of Stage 1 will represent approximately 560 vehicle trips per week (280 in/280 out). Assuming that these vehicles arrive consistently throughout any given day, and that a 6 day work week and a 12 hour work day is employed (as currently proposed), it is expected that construction inputs will represent approximately 8 vehicle trips per hour (4vph in/4vph out). Information provided assumes that deliveries will be made by B-double vehicles though it has been noted that the availability of such type of vehicle in the region may be limited and as such the use of conventional semi-trailers may be required. It is unknown what proportion of deliveries will be made by semi-trailer or B-double (see Table 3.1).

It is expected that a reduction in construction traffic volumes during the construction of Stage 2 will result in comparison to stage 1 as a result of construction set-up, etc being minimised. As such, a 10% reduction has been applied for Stage 2 (see Table 3.1).

3.3 Operation Traffic Demand

3.3.1 Light Vehicle Traffic

The proposed Queensland Coke and Power Plant Project is expected to employ in the order of 125 staff upon commencement of operation of both stage 1 and 2. These staff are likely to employ private vehicle transport to the site and an occupancy factor of 1.2 persons per vehicle has been assumed.

The facility requires approximately 50 personnel to man the Stage 1 operations, with approximately 75 personnel required to man the Stage 2 facility (i.e. 75 staff for both stages combined). The plant will operate continuously and comprise of three 8 hour shifts, with shifts assumed to start at 7:00am, 3:00pm and 11:00pm.

It is assumed that any operational personnel changeover will occur within a 1 hour peak window with all staff not working driving to the plant, with a similar number of personnel travelling home from the plant. This results in a peak generation of 50vph (25vph in and 25vph out) for Stage 1 and 84vph (42vph in and 42vph out) for Stage 2 (see Table 3.1).

A nominal amount of visitor traffic has been assumed as 5% of staff based traffic. (See Table 3.1)

3.3.2 Heavy Vehicle Traffic

Inputs to the refining process are not likely to generate significant heavy vehicle traffic volumes. Coking coal is to be transported via rail to the site from the Bowen Basin. Other inputs are expected to be minimal and a nominal figure of 4vph (2vph in/2vph out) has been assumed and applied only to the peak periods for the purposes of this assessment.

The refined coking coal product is to be transported via rail to the purpose-built export facility at Gladstone. Waste material in the form of coal dust will be processed at a site within the Stanwell Energy Park. There may be some additional outputs from the process, such as waste, etc. This is expected to represent only minor traffic volumes and have been nominally assumed as 4vph (2vph in/2vph out) during the peak hours (see Table 3.1).

3.4 Traffic Generation Summary

Traffic expected to be generated by the various stages of the project is summarised in Table 3.1.

Table 3.1 ***Peak Hour Traffic Generation***

Item	Quantity	Peak Hour Traffic Generation (vph)			Notes
		Total	In	Out	
Stage 1 Construction					
Staff	1600 people	74	37	37	900 person camp at Gracemere; 45 seat bus transport.
Materials	280 vehicles/week	12	6	6	B-doubles; 5 day week/10 hour day.
Stage 2 Construction					
Staff	1485 people	66	33	33	10% reduction from Stage 1.
Materials	225 vehicles/week	12	6	6	
Stage 1 Operations					
Staff	80 Employee Pool, 50 Operations Staff	50	25	25	Private vehicle occupancy 1.2 persons/vehicle
Visitors		6	3	3	Represents 5% of shift staff
Inputs		4	2	2	Nominal
Outputs		2	1	1	Nominal
Stage 1 and 2 Operations					
Staff	125 Employee Pool, 75 Operations Staff	84	42	42	Private vehicle occupancy 1.2 persons/vehicle
Visitors		8	4	4	Represents 5% of shift staff
Inputs		8	4	4	Nominal
Outputs		4	2	2	Nominal

The volumes above have been applied only to the peak periods (i.e. not over the period of a day) and represent the total volumes irrespective of vehicle class.

3.5 Project Traffic Distribution and Assignment

Light vehicle traffic will consist of a number of components that has been distributed to the traffic network as follows:

- construction staff: will be housed in construction camps and/or private accommodation proposed to be built in Gracemere (55%) and Rockhampton (45%) for Stage 1. Stage 2 has been assumed 60% for Gracemere and 40% for Rockhampton. This traffic has been distributed to the road network according to these percentages. These assumptions are based on an 900 person camp proposed at Gracemere;
- operational staff: will likely reside in Gracemere (20%) or Rockhampton and beyond (e.g. Yeppoon) (75%). There may also be a small component living to the west of the project site (5%). This traffic has been distributed to the road network according to these percentages;
- operational visitors: will consist of couriers, deliveries, occasional site visitors, etc and will likely source from Rockhampton.

Heavy vehicle traffic has been assumed to be distributed as follows:

- construction materials:
  - 50% Rockhampton;
  - 50% Gladstone.
- operation inputs:
  - 50% Rockhampton;
  - 50% Gladstone.
- operation outputs:
  - 25% Rockhampton;
  - 25% Gladstone.
  - 50% Gracemere

Traffic generated by the project has been assigned to the road network in accordance with the above generation and distribution assumptions. Figures 3.1 and 3.2 show the assignment of generated traffic along the haulage route in terms of Stage 1 construction and operation traffic volumes respectively.

Stage 2 construction traffic represents a reduction compared to Stage 1 construction traffic.

3.6 Impact on Existing School Bus Services

Discussions with Young's Coaches representatives have indicated that there are school bus services that run between Rockhampton and Gracemere along the Capricorn Highway. These services operate between 7:15am and 8:15am in the morning, and 3:00pm and 4:15pm during afternoon. Additional school services are provided by other operators, and generally operate within approximately the same time frame.

As construction is scheduled to proceed from 6:00am to 6:00pm six days a week, the transport of construction workers to and from the site is unlikely to coincide with the operation of school bus services.

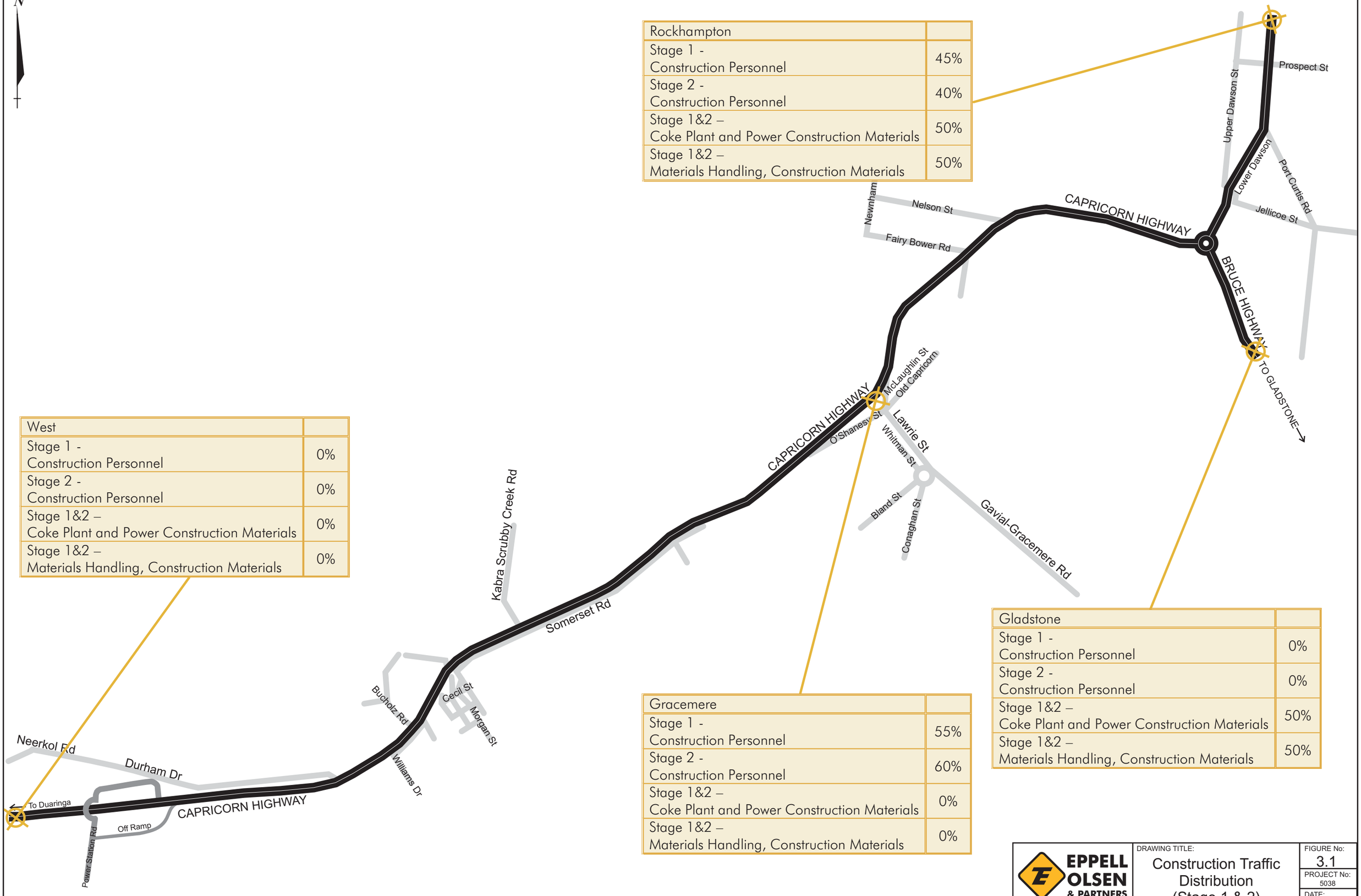
N

Rockhampton	
Stage 1 - Construction Personnel	45%
Stage 2 - Construction Personnel	40%
Stage 1&2 – Coke Plant and Power Construction Materials	50%
Stage 1&2 – Materials Handling, Construction Materials	50%

West	
Stage 1 - Construction Personnel	0%
Stage 2 - Construction Personnel	0%
Stage 1&2 – Coke Plant and Power Construction Materials	0%
Stage 1&2 – Materials Handling, Construction Materials	0%

Gracemere	
Stage 1 - Construction Personnel	55%
Stage 2 - Construction Personnel	60%
Stage 1&2 – Coke Plant and Power Construction Materials	0%
Stage 1&2 – Materials Handling, Construction Materials	0%

Gladstone	
Stage 1 - Construction Personnel	0%
Stage 2 - Construction Personnel	0%
Stage 1&2 – Coke Plant and Power Construction Materials	50%
Stage 1&2 – Materials Handling, Construction Materials	50%



EPPELL OLSEN & PARTNERS

DRAWING TITLE: Construction Traffic Distribution (Stage 1 & 2)

FIGURE No: 3.1

PROJECT No: 5038

DATE: 25.10.05

N

Rockhampton	
Stage 1&2 - Operational Personnel	75%
Stage 1&2 - Visitors	100%
Stage 1&2 – Inputs / Consumables	50%
Stage 1&2 – Outputs / Waste	25%

West	
Stage 1&2 - Operational Personnel	5%
Stage 1&2 - Visitors	0%
Stage 1&2 – Inputs / Consumables	0%
Stage 1&2 – Outputs / Waste	0%

Gracemere	
Stage 1&2 - Operational Personnel	20%
Stage 1&2 - Visitors	0%
Stage 1&2 – Inputs / Consumables	0%
Stage 1&2 – Outputs / Waste	50%

Gladstone	
Stage 1&2 - Operational Personnel	0%
Stage 1&2 - Visitors	0%
Stage 1&2 – Inputs / Consumables	50%
Stage 1&2 – Outputs / Waste	25%

Prospect St
Upper Dawson St
Lower Dawson
Port Curtis Rd
Jellicoe St
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
BRUCE HIGHWAY
TO GLADSTONE
McLaughlin St
Old Capricorn
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
CAPRICORN HIGHWAY
O'Shanesy St
Kabra Scrubby Creek Rd
Somerset Rd
Cecil St
Morgan St
Bucholz Rd
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
Operation Traffic Distribution

FIGURE No: 3.2
PROJECT No: 5038
DATE: 25.10.05

4.0 FUTURE TRAFFIC VOLUMES

4.1 Background Traffic Growth (Without Project)

Historic traffic patterns have been reviewed from AADT data provided by the Department of Main Roads. Over the last ten years, background traffic growth on the Capricorn Highway has been recorded as approximately 5 - 6%p.a. between the Bruce Highway and Gracemere and approximately 2%p.a. west of Gracemere.

Historic growth on the section of the Capricorn Highway between the Bruce Highway and Gracemere is likely a result of increased development activity in Gracemere. This will likely continue for the immediate future, however over the longer term (i.e. to the design horizon of 2020) will settle to a lower level. To account for this expected periodic decline in background traffic growth, an average 3% annual traffic growth has been adopted for this section. Further, some future growth within Gracemere will be accounted for in calculations of project related traffic, particularly given the project's interest in housing staff in this community.

Background traffic growth of the section of Capricorn Highway west of Gracemere will likely remain constant throughout the design horizon at approximately 2%p.a.

For the purposes of this analysis, a background traffic growth rate of 3%p.a has been applied linearly to all movements at the study intersections throughout the design horizon.

4.2 Traffic Scenarios

The following traffic scenarios have been formulated based on available staging information:

- **Scenario A** – 2005 Existing traffic volumes.
- **Scenario B** – 2006 Base traffic volumes.
- **Scenario C** – 2006 Base plus project. *Represents construction of stage 1.*
- **Scenario D** – 2008 Base traffic volumes.
- **Scenario E** – 2008 Base plus project. *Represents commencement of operation of Stage 1 and construction of Stage 2*

- **Scenario F –** 2010 Base traffic volumes.
- **Scenario G -** 2010 Base plus project. *Represents full operation of Stages 1 & 2.*
- **Scenario H -** 2020 Base traffic volumes.
- **Scenario I -** 2020 Base plus project. *Represents a ten year design horizon from the first year of full operation.*

Traffic volumes for each of the above scenarios are documented at Appendix B.

5.0 NETWORK OPERATION

5.1 Intersection Operation

The identified study intersections (as outlined in Section 2.3 of this report) have been assessed for the relevant design traffic scenarios (as discussed in Section 4.2 of this report). Note that some scenarios have been omitted where the analysis results are not considered to be relevant to the conclusions drawn herein.

The worst case scenario intersection capacity is Scenario I which combines the operational traffic from Stage 1 and Stage 2 with the 2020 background traffic. Where the capacity analysis for this scenario shows acceptable operation under the existing intersection layout, the other "with project" scenarios have not been analysed.

Intersection operation has been assessed using the aaSIDRA modelling software for all intersections. Analysis results for the AM and PM peak periods are summarised in Tables 5.1 and 5.2.

Desirable maximum degree of saturation (DOS) values of 0.90, 0.85 and 0.8 for signalised, roundabout and priority intersections respectively have been adopted for this assessment in accordance with AUSTROADS practice guidelines. Where traffic volumes create performance levels above these thresholds, improvements have been considered to maintain acceptable safety and operational conditions.

The results shown in Tables 5.1 and 5.2 represent traffic operations for the existing intersection configurations.

Table 5.1 ***AM Peak Network Operation***

Intersection	Deficiency DOS	Intersection Degree of Saturation (DOS%)								
		ScenarioA	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	Scenario G	Scenario H	Scenario I
Gladstone Road/Lower Dawson Road/Port Curtis Road	0.80	0.96	>1.0	-	>1.0	-	>1.0	-	>1.0 0.59[1]	-
Bruce Highway/ Capricorn Highway	0.85	0.61	0.63	-	0.68	-	0.73	0.76	1.00 0.40[2] 0.52[3]	1.04 0.41[2] 0.54[3]
Capricorn Highway/ Gavial - Gracemere Road	0.80	0.29	0.30	-	0.32	-	0.34	-	0.43	0.43
Old Capricorn Hwy/ Gavial - Gracemere Road/ Lawrie Street/ O'Shanesy Street	0.85	n/a*	-	-	-	-	-	-	-	-
Capricorn Highway/ Power Station Road	0.80	0.06	0.06	-	0.06	-	0.07	-	0.08	0.08

* AM Peak hour count not available at this intersection.

[1] DOS for an upgraded signalised intersection form.

[2] DOS with an upgrade allowing for the western approach left turns and northern approach through movements to bypass the roundabout.

[3] DOS for a two lane roundabout (without slip lanes).

Table 5.2 *PM Peak Network Operation*

Intersection	Deficiency DOS	Intersection Degree of Saturation (DOS%)								
		ScenarioA	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	Scenario G	Scenario H	Scenario I
Gladstone Road/Lower Dawson Road/Port Curtis Road	0.80	0.95	>1.0	-	>1.0	-	>1.0	-	>1.0 0.68[1]	-
Bruce Highway/ Capricorn Highway	0.85	0.60	0.61	-	0.65	-	0.69	0.71	0.87 0.66[2] 0.50[3]	0.90 0.69[2] 0.52[3]
Capricorn Highway/ Gavial - Gracemere Road	0.80	0.48	0.49	-	0.53	-	0.55	-	0.70	0.70
Old Capricorn Hwy/ Gavial - Gracemere Road/ Lawrie Street/ O'Shanesy Street	0.85	0.35	0.36	-	0.38	-	0.41	-	0.53	0.54
Capricorn Highway/ Power Station Road	0.80	0.09	0.10	-	0.10	-	0.11	-	0.14	0.17

[1] DOS for an upgraded signalised intersection form.

[2] DOS with an upgrade allowing for the western approach left turns and northern approach through movements to bypass the roundabout.

[3.] DOS for a two lane roundabout (without slip lanes).

The results summarised in Tables 5.1 and 5.2 show that all intersections operate below capacity under 2005 existing traffic conditions (Scenario A) with the exception of the Gladstone Road/Lower Dawson Road/Port Curtis Road intersection, which exceeds desirable capacity limits.

Under base traffic volumes (i.e. without the addition of project generated traffic volumes) at 2006, 2008, 2010 and 2020 (Scenarios B, D, F and H respectively) the following intersections operate beyond desirable capacity limits in their existing form:

- Gladstone Road/Lower Dawson Road/Port Curtis Road (2005 onwards);
- Bruce Highway/Capricorn Highway (2015 onwards).

All other intersections operate within desirable capacity limits under base traffic volumes for the AM and PM peaks throughout the design horizon.

For both the AM and PM peak periods, the degree of saturation at the Gladstone Road/Lower Dawson Road/Port Curtis Road intersection is approaching or expecting the theoretical capacity (i.e. DOS = 1.0) and requires upgrade irrespective of the presence of project related traffic. The critical movement at the intersection is the right turn out of Port Curtis Road, which is opposed by through movements along Gladstone Road in the order of 1,650vph and 1,900vph during the AM and PM peak hours respectively. The proposed project will only introduce through traffic to the intersection. Therefore the project will not increase the critical intersection movements and should not be responsible for any works at the intersection.

The existing Bruce Highway/Capricorn Highway roundabout will reach its maximum desirable capacity (0.85) at approximately 2015 under background traffic volumes alone. The critical movements at the intersection are Capricorn Highway (west) – Bruce Highway (north), inbound during the AM peak and outbound during the PM peak. With the project traffic, the intersection capacity (0.85) is exceeded at approximately 2014. As such the project is responsible for bringing forward the intersection upgrading works by approximately one year.

Upgrading the intersection to include turn and/or bypass lanes to accommodate this traffic would be required to achieve adequate intersection operation. Alternatively, the intersection could be upgraded to a two lane roundabout (i.e. two circulating lanes and two approach lanes on each leg). Under either option, satisfactory operation is achieved. The two lane roundabout is likely to be the most appropriate treatment.

The Capricorn Highway/Gavial - Gracemere Road junction operates at the 2020 horizon with project (Scenario I). Degree of saturation results are no more than 0.70.

The existing roundabout at Old Capricorn Highway/Gavial - Gracemere Road/Laurie Street/O'Shanesy Street has a forecast degree of saturation less than 0.54 in all scenarios at the PM peak. Volumes for the AM peak were unavailable, however it is anticipated that capacity/operation would be similar. Accordingly, no works are required at this intersection.

The intersection/interchange at Capricorn Highway/Power Station Road will operate with degree of saturation results less than 0.17 under all scenarios. Therefore, no works are required.

6.0 PAVEMENT IMPACT ASSESSMENT

Heavy vehicle demand by vehicle classification generated as a result of the proposed plant has been estimated from information supplied as part of the proposal. The resulting breakdown of heavy vehicle types generated by the plant is documented in Section 3 of this report. Heavy vehicle traffic generated by the project is distributed to the road network as per Section 3.5 of this report.

The average Equivalent Standard Axle (ESA) loading for each heavy vehicle along the study network has been determined from ESA loadings per heavy vehicle type and existing classified link counts (provided by the Department of Main Roads) for a number of locations along the study network as shown in Table C.1 at Appendix C. Based upon this information, an estimate of existing annual ESA loading along the study network has been calculated as shown in Tables C.2, C.3 and C.4 at Appendix C.

The classification of heavy vehicles generated by the proposed coke and power plant has been used to determine the additional annual ESA loadings produced along the study network as a result of the additional project related traffic. A percentage change in annual ESA loadings along each link was then determined. This has been done for three scenarios as follows:

- Stage 1 construction – Table C.2;
- Stage 2 construction – Table C.3;
- combined Stage 1 and Stage 2 operation – Table C.4.

A comparison of the percentage change in each road section under each scenario will show those sections where further pavement impact assessment and potential contribution by the project is required. Under the Department of Main Roads impact assessment guidelines, the latter is to occur where a subject developments traffic ESAs is more than 5% of existing traffic ESAs.

This comparison identifies that during the operations phase of the plant, ESA loadings will be increased by greater then 5% and therefore has been included in the analysis.

Pavement impact assessment (and potential project contribution to pavement works) is required for the Stage 1 and Stage 2 construction over the following road sections:

- Capricorn Highway – Bruce Highway to Gracemere;
- Capricorn Highway – Gracemere to Kabra;
- Capricorn Highway – Kabra to Power Station Road;
- Lawrie Street – Capricorn Highway to Ranger Street;
- Lawrie Street – Ranger Street to Bland Street Roundabout.

Table C.5 outlines detailed characteristics of the assessed portions of the study network with Table 6.1 outlining the pavement impacts and bring forward time periods caused by the construction of the proposed coke and power plant project.

Table 6.1 ***Study Network Bring Forward Times***

Road	**Section**	**Bring Forward Time Period (Years)**
16A – Capricorn Highway	10E Bruce Highway to 450 Gavial Gracemere	0.3
16A – Capricorn Highway	450 Gavial Gracemere to Kabra	0.9
16A – Capricorn Highway	Kabra to Power Station Rd	0.4
450 – Gavial Gracemere Rd	Capricorn Highway to Ranger Street	0.8
450 – Gavial Gracemere Rd	Ranger Street to Bland Street	0.0

The portion of Gavial – Gracemere Road from Ranger Street to Bland Street has exceeded its 30 year life and therefore no contribution is required.

The costs of the bring forward as a result of the construction of the coke and power plant project will be provided by DMR as a cost per unit length of road, and may be subject to negotiation. The total contribution can be calculated once a contribution rate has been agreed upon.

7.0 CONCLUSIONS

This Road Impact Assessment Study has been conducted in order to determine the impact of the proposed Queensland Coke and Coal Plant Project on the external road network. The proposed project consists of the construction of a Coking Coal Plant, Power Station and Materials Handing facilities over two stages.

During the construction phase of Stage 1 of the facility, there will be a peak employment rate of approximately 1,600 personnel with a maximum average of approximately 1,200 personnel. Stage 2 construction comprises the doubling of the plant capacity for both power generation and coke production with the number of construction personnel expected to be approximately 90% of the Stage 1 personnel numbers.

Stage 1 operations will require approximately 50 personnel to operate the facility, with combined Stage 1 and 2 operations requiring approximately 75 personnel to operate the facility.

The main input to the plant will be coking coal from the Bowen Basin and will be delivered to the site by rail. The main coal output will also be transported to the Gladstone Shipping Terminals by rail. Therefore there is minimal heavy vehicle traffic during the operational phases of the plant.

Traffic generation of the project has been conservatively estimated from the information provided as part of the project proposal regarding the expected operation of the facility. Light vehicle traffic has been assumed to be proportional to anticipated operational staff numbers at the facility and has been distributed and assigned to the network in accordance to the probable residence of plant employees and assumes that a majority of employees will reside within Rockhampton.

Construction of the plant is planned to commence in 2006 with construction of the entire facility anticipated to finish approximately 2009. Operation of the plant is expected to commence in 2008 with full production at 2010. No 'ramp up' period to full production potential has been used in this assessment.

A number of assessment scenarios have been formulated and are based on various construction and operation phases of the project. A planning horizon of 10 years after completion (2020) was adopted to gauge the impact of the fully operational coke and power plant. All assessment scenarios assume a background traffic growth rate of 3%p.a. applied linearly to the 2005 base volumes.

Assessment of the key intersections along the study network to the east of the project site along the Capricorn Highway was carried out using the aaSIDRA computer programme. Intersection performance was measured using the critical Degree Of Saturation (DOS) parameter.

The Gladstone Road/Port Curtis Road/Lower Dawson Road intersection will exceed the desirable DOS under background growth. The project will not add traffic to the critical movement at the intersection, and as such is not responsible for any works required at the intersection.

The addition of project traffic to the roundabout located at the intersection of the Bruce Highway and Capricorn Highway will cause an increase in the DOS of the intersection. Additional power and coke plant traffic will bring forward the year at which the intersection would exceed the desirable DOS. As such the project should be responsible for the bring forward cost (by approximately one year) of upgrading to a two lane roundabout.

All other intersections assessed herein experience no significant impact, and therefore do not require works, due to the Queensland Coke and Power Plant Project.

In terms of pavement impact, the Queensland Coke and Power Plant Project will increase the annual Equivalent Standard Axle (ESA) loading on a number of links between Power Station Road the Bruce Highway. The increase in heavy vehicle traffic is attributed to the transport of materials for the construction of Stage 1 and Stage 2 of the project. During the operational phases of the project, heavy vehicle traffic will decrease significantly from the construction phases of the facility although the operational ESA loading will be greater then 5%.

As such the significant pavement impacts on the road network will occur during the construction phases, with low impact during the operational phases. This increase in heavy vehicle traffic is expected to bring forward the need for pavement rehabilitation on the following sections of the study road network:

- Capricorn Highway – Bruce Highway to Gracemere;
- Capricorn Highway – Gracemere to Kabra;
- Capricorn Highway – Kabra to Power Station Road;
- Lawrie Street – Capricorn Highway to Ranger Street;
- Lawrie Street – Ranger Street to Bland Street Roundabout.

The bring forward time periods for the above portions of the study are in the order of 0.3 to 0.9 years and are detailed in Table 6.1 and Table C.5 in Appendix C. The total contribution to be made by the project will depend on the cost per unit length to upgrade each portion of the study network. This cost per unit length will be provided by DMR and may be subject to negotiations.

The portion of the study network from Ranger Street to Bland Street has currently exceeded the nominal 30 year pavement life and therefore no contribution is necessary.

APPENDIX A

Crash Data

DEFINITIONS FOR CODING ACCIDENTS

NOTE :- **1 = Key vehicle direction.** **ie; The direction in which the key vehicle was travelling as it approached the crash location.**

	00..	10..	20..	30..	40..	50..	60..	70..	80..	90..
	PEDESTRIAN onfootorintoy/pram	INTERSECTION vehiclesfrom adjacentapproaches	VEHICLES from opposingdirections	VEHICLES from onedirection	MANOEUVRING	OVERTAKING	ONPATH	OFFPATH ONSTRAIGHT	OFFPATH ONCURVE	PASSENGERS& MISCELLANEOUS
1	NEARSIDE 001	THRU-THRU 101	HEAD-ON 201	REAREND 301	LEAVINGPARKING 401	HEAD-ON 501	PARKED 601	OFFCARRIAGEWAY TOLEFT 701	OFFCARRIAGEWAY RIGHTBEND 801	FELLIN/FROM VEHICLE 901
2	EMERGING 002	RIGHT-THRU 102	THRU-RIGHT 202	LEFTREAR 302	PARKING 402	OUTOFCONTROL 502	DOUBLEPARKED 602	OFFCARRIAGEWAY TORIGHT 702	OFFCARRIAGEWAY LEFTBEND 802	
3	FARSIDE 003	LEFT-THRU 103	RIGHT-LEFT 203	RIGHTREAR 303	PARKINGVEHICLES ONLY 403	PULLINGOUT 503		LEFTOFFCARRIAGEWAY INTOOBJECT 703	OFFRIGHTBEND INTOOBJECT 803	STRUCKTRAIN 903
4	PLAYING,WORKING, LYING,STANDING ONCARRIAGEWAY 004	THRU-RIGHT 104	RIGHT-RIGHT 204	U TURN 304	REVERSINGIN TRAFFIC 404	CUTTINGIN 504	CARDOOR 604	RIGHTOFFCARRIAGEWAY INTOOBJECT 704	OFFLEFTBEND INTOOBJECT 804	STRUCKRAILWAY X-INGFURNITURE 904
5	WALKING WITHTRAFFIC 005	RIGHT-RIGHT 105	THRU-LEFT 205	LANESIDESWIPE 305	REVERSINGINTO FIXEDOBJECT 405	PULLINGOUT REAREND 505	PERMANENT OBSTRUCTION 605	OUTOFCONTROL ONCARRIAGEWAY 705	OUTOFCONTROL ONCARRIAGEWAY 805	HITANIMALOFF CARRIAGEWAY 905
6	FACINGTRAFFIC 006	LEFT-RIGHT 106	LEFT-LEFT 206	LANECHANGERIGHT 306	LEAVINGDRIVEWAY 406	OVERTAKING RIGHTTURN 506	TEMPORARY ROADWORKS 606	LEFTTURN 706	LEFTTURN 806	PARKEDCAR RANAWAY 906
7	DRIVEWAY 007	THRU-LEFT 107	UTURN 207	LANECHANGELEFT 307	FROMLOADINGBAY 407		TEMPORARYOBJECT ONCARRIAGEWAY 607	RIGHTTURN 707	RIGHTTURN 807	VEHICLEMOVEMENTS NOTKNOWN 907
8	ONFOOTWAY 008	RIGHT-LEFT 108		RIGHTTURNSIDESWIPE308	FROMFOOTWAY 408		ACCIDENTOR BROKENDOWN 608	MOUNTS TRAFFICISLAND 708	MOUNTS TRAFFICISLAND 808	
9	STRUCKWHILEBOARDING ORALIGHTING 009	LEFT-LEFT 109		LEFTTURNSIDESWIPE309			ANIMAL 609			
0	OTHER 000	OTHER 100	OTHER 200	PULLINGOUT 310	OTHER 400	OTHER 500	LOADHITS VEHICLE 610	OTHER 700	OTHER 800	OTHER 900

April1999

Rockhampton Coking Coal Plant

Year	Month	Day	Time	Severity	Num Units	Car	Rigid Truck	Artic Truck	Road Train /Bdouble /Triple	Bus	Motorcycle	Special Purpose Vehicle (eg. Tractor)	Towed Device	Bicycle	Pedestrian	Animal	Railway Unit	Other	DCA	DCA Code Description	Street	Intersecting street	Dist	Unit	Dir	Landmark	Area
2000	April	Saturday	10am	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Mclaughlin St		M			GRACEMERE
2000	April	Sunday	3pm	Hospitalisation	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd		M			GRACEMERE
2000	April	Tuesday	11am	Hospitalisation	1	0	0	1	0	0	0	0	0	0	0	0	0	0	805	OFF PATH-CURVE: OUT OF CONTROL ON CWAY	BRUCE HWY	Capricorn Hwy		M			ROCKHAMPTON
2000	June	Friday	9am	Minor injury	2	1	0	0	0	0	1	0	0	0	0	0	0	0	506	VEH'S OVERTAKING: OVERTAKE-RIGHT TURN	CAPRICORN HWY	O'Shanesy St		M			GRACEMERE
2000	August	Monday	6am	Hospitalisation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	904	PASS & MISC: HIT RAILWAY XING FURNITURE	CAPRICORN HWY			100	M	East	of SALEYARDS ROAD	GRACEMERE
2000	August	Saturday	4am	Hospitalisation	3	1	0	0	1	0	0	0	0	0	0	1	0	0	609	PASS & MISC: HIT ANIMAL	CAPRICORN HWY			100	M	West	of HALL ROAD (2 KM W GRACEMERE)	GRACEMERE
2000	September	Thursday	6am	Property damage	2	1	0	1	0	0	0	0	0	0	0	0	0	0	201	VEH'S OPPOSITE APPROACH: HEAD ON	CAPRICORN HWY	Somerset Rd			M			KABRA
2000	September	Wednesday	7pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	308	VEH'S SAME DIRECTION: RIGHT TURN S/SWIPE	CAPRICORN HWY	Malchi Nine Mile Rd			M			GRACEMERE
2000	October	Friday	7am	Medical treatment	1	0	1	0	0	0	0	0	0	0	0	0	0	0	706	OFF PATH-STRAIGHT: LEFT TURN	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2000	November	Friday	8am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	704	OFF PATH-STRAIGHT:RIGHT OFF CWAY HIT OBJ	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2000	November	Thursday	7am	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	207	VEH'S OPPOSITE APPROACH: U-TURN	CAPRICORN HWY			200	M	North	of BUCHOLZ ROAD	KABRA
2001	January	Friday	4pm	Hospitalisation	2	2	0	0	0	0	0	0	0	0	0	0	0	0	202	VEH'S OPPOSITE APPROACH: THRU-RIGHT	CAPRICORN HWY	Mclaughlin St			M			GRACEMERE
2001	January	Sunday	10am	Fatal	3	2	1	0	0	0	0	0	0	0	0	0	0	0	303	VEH'S SAME DIRECTION: RIGHT REAR	CAPRICORN HWY	Malchi Nine Mile Rd			M			GRACEMERE
2001	February	Wednesday	Noon	Property damage	1	0	0	0	1	0	0	0	0	0	0	0	0	0	600	VEH'S ON PATH: OTHER	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2001	March	Thursday	8am	Property damage	3	3	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			20	M	West	of NELSON ST	GRACEMERE
2001	April	Thursday	7am	Hospitalisation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	704	OFF PATH-STRAIGHT:RIGHT OFF CWAY HIT OBJ	CAPRICORN HWY			40	M	East	of KABRA-SCRUBBY CREEK ROAD	KABRA
2001	April	Tuesday	6pm	Hospitalisation	2	1	0	0	0	0	0	0	0	0	0	1	0	0	005	PED'N: HIT WALKING WITH TRAFFIC	CAPRICORN HWY			500	M	West	of BRUCE HWY ROUNDABOUT	ROCKHAMPTON
2001	July	Friday	9am	Minor injury	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Old Capricorn Hwy			M			GRACEMERE
2001	July	Saturday	11pm	Property damage	2	1	0	0	0	0	0	0	0	0	0	1	0	0	609	PASS & MISC: HIT ANIMAL	CAPRICORN HWY			1.5	KM	West	of BRUCE HWY	ROCKHAMPTON
2001	August	Saturday	4am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2001	August	Tuesday	9am	Medical treatment	3	1	1	0	1	0	0	0	0	0	0	0	0	0	610	PASS & MISC: LOAD HIT VEHICLE	CAPRICORN HWY			1600	M	East	of POWER STATION ROAD	STANWELL
2001	September	Sunday	1am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2001	October	Saturday	8am	Minor injury	1	0	0	0	1	0	0	0	0	0	0	0	0	0	702	OFF PATH-STRAIGHT: RIGHT OFF CWAY	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2001	October	Saturday	Noon	Medical treatment	3	3	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			1	KM	West	of BRUCE HIGHWAY	ROCKHAMPTON
2001	October	Wednesday	8pm	Property damage	3	2	0	0	0	0	0	0	0	0	0	1	0	0	609	PASS & MISC: HIT ANIMAL	CAPRICORN HWY			200	M	West	of MCLAUGHLIN STREET	GRACEMERE
2001	November	Saturday	5pm	Medical treatment	1	1	0	0	0	0	0	0	0	0	0	0	0	0	702	OFF PATH-STRAIGHT: RIGHT OFF CWAY	CAPRICORN HWY			200	M	West	of WIGGINGTON ROAD	KABRA
2001	November	Thursday	4pm	Medical treatment	2	2	0	0	0	0	0	0	0	0	0	0	0	0	303	VEH'S SAME DIRECTION: RIGHT REAR	CAPRICORN HWY	O'Shanesy St			M			GRACEMERE
2001	November	Thursday	4pm	Property damage	3	3	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			15	M	West	of BRUCE HWY	ROCKHAMPTON
2001	November	Wednesday	2pm	Property damage	1	0	0	0	0	0	1	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2001	November	Wednesday	9am	Hospitalisation	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd			M			GRACEMERE
2002	January	Thursday	2pm	Medical treatment	2	1	1	0	0	0	0	0	0	0	0	0	0	0	303	VEH'S SAME DIRECTION: RIGHT REAR	CAPRICORN HWY	Malchi Nine Mile Rd			M			GRACEMERE
2002	February	Tuesday	7pm	Minor injury	2	0	0	0	0	0	1	0	0	0	0	1	0	0	609	PASS & MISC: HIT ANIMAL	CAPRICORN HWY			1	KM	West	of YEPPEN ROUNDABOUT	ROCKHAMPTON
2002	March	Tuesday	9am	Medical treatment	2	2	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2002	May	Tuesday	6pm	Hospitalisation	2	2	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			2	KM	West	of BRUCE HIGHWAY	GRACEMERE
2002	June	Saturday	5am	Medical treatment	1	1	0	0	0	0	0	0	0	0	0	0	0	0	702	OFF PATH-STRAIGHT: RIGHT OFF CWAY	CAPRICORN HWY			100	M	North	of MCLAUGHLIN STREET	GRACEMERE
2002	June	Thursday	2pm	Medical treatment	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Old Capricorn Hwy			M			GRACEMERE
2002	June	Tuesday	3pm	Hospitalisation	2	1	0	0	1	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			60	M	West	of MILSON STREET	GRACEMERE
2002	August	Wednesday	4pm	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	400	VEH'S MANOEUVRING: OTHER	CAPRICORN HWY			2	KM	West	of YEPPEN ROUNDABOUT	ROCKHAMPTON
2002	October	Saturday	Midnight	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Saleyards Rd			M			GRACEMERE
2002	November	Friday	1am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2002	November	Monday	5pm	Property damage	2	0	2	0	0	0	0	0	0	0	0	0	0	0	506	VEH'S OVERTAKING: OVERTAKE-RIGHT TURN	CAPRICORN HWY			40	M	West	of POWER STATION RD	STANWELL
2002	November	Thursday	Noon	Hospitalisation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2002	December	Thursday	6am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2003	March	Tuesday	5am	Hospitalisation	2	1	0	0	0	0	1	0	0	0	0	0	0	0	308	VEH'S SAME DIRECTION: RIGHT TURN S/SWIPE	CAPRICORN HWY	Mclaughlin St			M			GRACEMERE
2003	April	Friday	2pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	105	VEH'S ADJACENT APPROACH: RIGHT-RIGHT	CAPRICORN HWY	Mclaughlin St			M			GRACEMERE
2003	April	Thursday	Midnight	Property damage	1	0	0	1	0	0	0	0	0	0	0	0	0	0	702	OFF PATH-STRAIGHT: RIGHT OFF CWAY	CAPRICORN HWY			1	KM	East	of WIGGINGTON STREET	KABRA
2003	May	Friday	11am	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd			M			GRACEMERE
2003	May	Thursday	2pm	Minor injury	1	1	0	0	0	0	0	0	0	0	0	0	0	0	700	OFF PATH-STRAIGHT: OTHER	CAPRICORN HWY			200	M	West	of MALCHI-NINE MILE ROAD	KABRA
2003	June	Saturday	6am	Hospitalisation	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Old Capricorn Hwy			M			GRACEMERE
2003	August	Friday	8pm	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2003	August	Thursday	1pm	Minor injury	1	1	0	0	0	0	0	0	0	0	0	0	0	0	703	OFF PATH-STRAIGHT: LEFT OFF CWAY HIT OBJ	CAPRICORN HWY			400	M	East	of OLD CAPRICORN HIGHWAY	GRACEMERE
2003	September	Sunday	10am	Property damage	2	1	0	0	0	0	0	0	1	0	0	0	0	0	305	VEH'S SAME DIRECTION: LANE SIDE SWIPE	CAPRICORN HWY			30	M	East	of ENTRANCE TO KABRA HOTEL	KABRA
2003	September	Thursday	5pm	Hospitalisation	2	1	0	1	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd			M			GRACEMERE
2003	September	Tuesday	5pm	Hospitalisation	3	2	0	0	0	1	0	0	0	0	0	0	0	0	501	VEH'S OVERTAKING: HEAD ON	CAPRICORN HWY			100	M	West	of HALL ROAD	GRACEMERE
2004	January	Saturday	7pm	Hospitalisation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	701	OFF PATH-STRAIGHT: LEFT OFF CWAY	CAPRICORN HWY			200	M	South	of OLD CAPRICORN HIGHWAY	GRACEMERE
2004	January	Wednesday	3pm	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	800	OFF PATH-CURVE: OTHER	CAPRICORN HWY			20	M	South	of FAIRYBOWER ROAD	GRACEMERE
2004	February	Wednesday	Midnight	Property damage	1	0	1	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2004	March	Friday	4pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			800	M	West	of BRUCE HIGHWAY	GRACEMERE
2004	March	Sunday	5am	Fatal	2	1	0	0	0	0	0	0	0	0	1	0	0	0	006	PED'N: HIT FACING TRAFFIC	CAPRICORN HWY			1400	M	West	of BRUCE HWY	GRACEMERE
2004	March	Thursday	4am	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	703	OFF PATH-STRAIGHT: LEFT OFF CWAY HIT OBJ	CAPRICORN HWY			0	M	West	of 524 PROPERTY NUMBER 524	GRACEMERE
2004	April	Monday	5pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	O'Shanesy St			M			GRACEMERE
2004	April	Thursday	8am	Medical treatment	1	1	0	0	0	0	0	0	0	0	0	0	0	0	800	OFF PATH-CURVE: OTHER	CAPRICORN HWY			400	M	West	of R/BOUT I/SECTION WITH BRUCE HWAY	GRACEMERE
2004	July	Thursday	5pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2004	August	Thursday	7am	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd			M			GRACEMERE
2004	August	Tuesday	10pm	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	801	OFF PATH-CURVE: OFF CWAY RIGHT BEND	BRUCE HWY	Capricorn Hwy			M			ROCKHAMPTON
2004	September	Thursday	1pm	Property damage	2	2	0	0	0	0	0	0	0	0	0	0	0	0	301	VEH'S SAME DIRECTION: REAR END	CAPRICORN HWY			200	M	North	of MCLAGHLIN STREET	GRACEMERE
2004	September	Tuesday	3pm	Property damage	1	1	0	0	0	0	0	0	0	0	0	0	0	0	703	OFF PATH-STRAIGHT: LEFT OFF CWAY HIT OBJ	CAPRICORN HWY			5	KM	West	of GRACEMERE	GRACEMERE
2004	September	Wednesday	5pm	Hospitalisation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	708	OFF PATH-STRAIGHT: MOUNTS TRAFFIC ISLAND	BRUCE HWY	Capricorn Hwy						ROCKHAMPTON
2004	October	Sunday	4am	Property damage	2	1	0	0	1	0	0	0	0	0	0	0	0	0	608	VEH'S ON PATH: ACCIDENT OR BROKEN DOWN	CAPRICORN HWY			100	M	East	of TURNER ROAD	GRACEMERE
2004	November	Friday	3pm	Minor injury	2	2	0	0	0	0	0	0	0	0	0	0	0	0	104	VEH'S ADJACENT APPROACH: THRU-RIGHT	CAPRICORN HWY	Gavial - Gracemere Rd						GRACEMERE
2004	November	Thursday	2pm	Fatal	2	1	0	0	0	1	0	0	0	0	0	0	0	0	201	VEH'S OPPOSITE APPROACH: HEAD ON	CAPRICORN HWY			300	M	East	of NELSON ST	GRACEMERE

71 rows selected.

APPENDIX B

Volume Data

N

(1) 65
0 3
(1) 2
(173) 94
Capricorn Highway
104 (121)
19 (7)
Off Ramp

(16)
(419)
(11)
Old Capricorn
McLaughlin St
Lawrie St
O'Shanesy St
(7)
(15)
(112)
(6)
(16)
(58)
(74)
(217)
(47)

(177)
135
(496)
188
196
(176)
4
(14)
544 (211)
7 (9)
Capricorn Highway
McLaughlin St

530 (1157)
53 (68)
1178
(803)
10
(6)
47
(110)
0
(13)
Lower Dawson
Port Curtis Rd
Bruce Highway

(461) 884
(12) 3
Capricorn Highway
387 (814)
222 (298)
319 (194)
20 (23)
Lower Dawson
Bruce Highway

Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
Upper Dawson St
Prospect St
Lower Dawson
Port Curtis Rd
Jellicoe St
BRUCE HIGHWAY
TO GLADSTONE
CAPRICORN HIGHWAY
McLaughlin St
Old Capricorn
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
Kabra Scrubby Creek Rd
Somerset Rd
Bucholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
Off Ramp
CAPRICORN HIGHWAY
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS	DRAWING TITLE: 2006 Volumes (Scenario B)	FIGURE No: 1 PROJECT No: 5038 DATE: 25.10.05

N

CAPRICORN HIGHWAY

BRUCE HIGHWAY

TO GLADSTONE

Lower Dawson

Port Curtis Rd

Prospect St

Upper Dawson St

Jellicoe St

Titman Rd

Newnham Rd

Nelson St

Fairy Bower Rd

Bruce Highway

550 (1176)
53 (68)
1198
(823)
10
(6)
47
(110)
0
(13)

(200)
158
(496)
188
215
(196)
24
(35)
544 (211)
28 (30)
Capricorn Highway
McLaughlin St

(16)
(440)
(11)
Old Capricorn
McLaughlin St
Lawrie St
(7)
(15)
(112)
(6)
(16)
(58)
O'Shanesy St
(74)
(238)
(47)

(481) 903
(15) 6
407 (833)
222 (298)
Capricorn Highway
319 (194)
23 (26)

(1)(108)
0 46
(1) 2
(173) 94
104 (121)
62 (50)
Capricorn Highway
Off Ramp

Kabra Scrubby Creek Rd

Somerset Rd

Buchholz Rd

Cecil St

Morgan St

Williams Dr

Neerkol Rd

Durham Dr

To Duaringa

Off Ramp

Power Station Rd

Whitman St

Bland St

Conaghan St

Gavial-Gracemere Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2006 Base + Development Volumes (Scenario C)

FIGURE No: 2

PROJECT No: 5038

DATE: 25.10.05

N

(187) 143 (525) 199
207 (186) 4 (15)
576 (223)
8 (10)
McLaughlin St
Capricorn Highway

561 (1224)
56 (72)
1247 (850) 11 (7)
50 (117)
0 (14)
Lower Dawson
Port Curtis Rd
Bruce Highway

(17) (444) (12)
(7) (17) (61)
(8) (16) (119)
(78) (230) (50)
Old Capricorn
McLaughlin St
Lawrie St
O'Shanesy St

(488) 935 (13) 3
410 (861) 235 (315)
338 (205) 21 (24)
Capricorn Highway
Lower Dawson
Bruce Highway

(1) (69) 0 3
(1) 2 (183) 99
110 (128) 20 (8)
Capricorn Highway
Off Ramp

Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
Prospect St
Upper Dawson St
Lower Dawson
Port Curtis Rd
Jellicoe St
CAPRICORN HIGHWAY
BRUCE HIGHWAY
TO GLADSTONE
CAPRICORN HIGHWAY
McLaughlin St
Old Capricorn
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
Kabra Scrubby Creek Rd
Somerset Rd
Bucholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2008 Volumes
(Scenario D)

FIGURE No: 3
PROJECT No: 5038
DATE: 25.10.05

N

(231) 186 (525) 199
251 (230)
30 (41)
576 (223)
33 (35)
Capricorn Highway
McLaughlin St

601 (1263)
56 (72)
1286 (889)
11 (7)
50 (117)
0 (14)
Bruce Highway
Port Curtis Rd
Lower Dawson

(17)
(469)
(12)
(8)
(16)
(119)
(7)
(17)
(61)
(78)
(255)
(50)
McLaughlin St
Old Capricorn
Lawrie St
O'Shanesy St

(528) 974
(17) 8
449 (900)
235 (315)
338 (205)
25 (28)
Capricorn Highway
Lower Dawson
Bruce Highway

(2)(137)
1 72
(2) 3
(183) 99
110 (128)
88 (76)
Capricorn Highway
Off Ramp

Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
Upper Dawson St
Prospect St
Lower Dawson
Port Curtis Rd
Jellicoe St
BRUCE HIGHWAY
TO GLADSTONE
CAPRICORN HIGHWAY
Old Capricorn
McLaughlin St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
O'Shanesy St
Kabra Scrubby Creek Rd
Somerset Rd
Bucholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2008 Base + Development Volumes (Scenario E)

FIGURE No: 4
PROJECT No: 5038
DATE: 25.10.05

N

592 (1291)
59 (76)
1316
(897)
12
(7)
53
(123)
0
(15)
Lower Dawson
Port Curtis Rd
Bruce Highway
Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
Upper Dawson St
Prospect St
Lower Dawson
Port Curtis Rd
Jellicoe St
BRUCE HIGHWAY
TO GLADSTONE

(198)
151
(554)
210
197
(219)
5
(16)
607 (236)
8 (10)
Capricorn Highway
McLaughlin St

(18)
(468)
(13)
(8)
(17)
(125)
(7)
(18)
(64)
(83)
(243)
(53)
Old Capricorn
McLaughlin St
Lawrie St
O'Shanesy St

(515) 987
(14) 3
432 (909)
248 (332)
357 (216)
22 (25)
Capricorn Highway
Lower Dawson
Bruce Highway

CAPRICORN HIGHWAY
McLaughlin St
Old Capricorn
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd

(1) (72)
0
3
(1) 2
(193) 105
116 (135)
21 (8)
Capricorn Highway
Off Ramp

Kabra Scrubby Creek Rd
Somerset Rd
Buchholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS	DRAWING TITLE: 2010 Volumes (Scenario F)	FIGURE No: 5
		PROJECT No: 5038
		DATE: 25.10.05

N

CAPRICORN HIGHWAY

BRUCE HIGHWAY

TO GLADSTONE→

Prospect St

Upper Dawson St

Lower Dawson

Port Curtis Rd

Jellicoe St

Titman Rd

Newnham Rd

Nelson St

Fairy Bower Rd

Lower Dawson

Port Curtis Rd

Bruce Highway

630 (1329)
59 (76)
1354
(935)
12
(7)
53
(123)
0
(15)

(238)
191
(554)
210
259
(237)
14
(26)
607 (236)
17 (20)
McLaughlin St
Capricorn Highway

(18)
(477)
(13)
Old Capricorn
McLaughlin St
Lawrie St
(8)
(17)
(125)
(7)
(18)
(64)
O'Shanesy St
(83)
(252)
(53)

Lower Dawson
Capricorn Highway
(553) 1025
(16) 6
470 (947)
248 (332)
357 (216)
24 (28)
Bruce Highway

McLaughlin St
Old Capricorn
Lawrie St
Whitman St
O'Shanesy St
Bland St
Conaghan St
Gavial-Gracemere Rd

Kabra Scrubby Creek Rd

Somerset Rd

Buchholz Rd
Cecil St
Morgan St
Williams Dr

(3)(122)
2 53
(3) 4
(193) 105
116 (135)
71 (58)
Capricorn Highway
Off Ramp

Neerkol Rd
Durham Dr
← To Duaringa
Off Ramp
Power Station Rd
CAPRICORN HIGHWAY

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2010 Base + Development Volumes (Scenario G)

FIGURE No: 6
PROJECT No: 5038
DATE: 25.10.05

N

(1) (91)
0 4
(1) 3
(244) 132
146 (170)
26 (10)
Capricorn Highway
Off Ramp

(23)
(590)
(16)
Old Capricorn
McLaughlin St
Lawrie St
O'Shanesy St
(9)
(23)
(81)
(10)
(22)
(158)
(104)
(306)
(67)

(249)
190
(699)
265
276
(248)
6
(20)
766 (297)
10 (13)
Capricorn Highway
McLaughlin St

747 (1628)
74 (96)
1659
(1131)
15
(9)
67
(155)
0
(19)
Lower Dawson
Port Curtis Rd
Bruce Highway

(650) 1124
(17) 4
545 (1146)
313 (419)
450 (273)
28 (32)
Capricorn Highway
Lower Dawson
Bruce Highway

Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
Upper Dawson St
Prospect St
Lower Dawson
Port Curtis Rd
Jellicoe St
BRUCE HIGHWAY
TO GLADSTONE
CAPRICORN HIGHWAY
McLaughlin St
Old Capricorn
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
Kabra Scrubby Creek Rd
Somerset Rd
Buchholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2020 Volumes
(Scenario H)

FIGURE No: 7
PROJECT No: 5038
DATE: 25.10.05

N

(4)(141)
2 54
(4) 5
(244) 132
146 (170)
76 (60)
Capricorn Highway
Off Ramp

(23)
(600)
(16)
Old Capricorn
McLaughlin St
Lawrie St
(10)
(22)
(158)
(9)
(23)
(81)
O'Shanesy St
(104)
(315)
(67)

(290)
230
(699)
265
316
(288)
15
(30)
766 (297)
20 (22)
McLaughlin St
Capricorn Highway

785 (1666)
74 (96)
1697
(1169)
15
(9)
67
(155)
0
(19)
Lower Dawson
Port Curtis Rd
Bruce Highway

(688) 1282
(20) 7
Capricorn Highway
583 (1184)
313 (419)
450 (273)
30 (34)
Bruce Highway

Titman Rd
Newnham Rd
Nelson St
Fairy Bower Rd
CAPRICORN HIGHWAY
Upper Dawson St
Prospect St
Lower Dawson
Port Curtis Rd
Jellicoe St
BRUCE HIGHWAY
TO GLADSTONE
McLaughlin St
Old Capricorn
CAPRICORN HIGHWAY
O'Shanesy St
Lawrie St
Whitman St
Bland St
Conaghan St
Gavial-Gracemere Rd
Kabra Scrubby Creek Rd
Somerset Rd
Buchholz Rd
Cecil St
Morgan St
Williams Dr
Neerkol Rd
Durham Dr
To Duaringa
CAPRICORN HIGHWAY
Off Ramp
Power Station Rd

Volume Notation
AM (PM)

EPPELL OLSEN & PARTNERS

DRAWING TITLE:
2020 Base + Development Volumes (Scenario I)

FIGURE No: 8
PROJECT No: 5038
DATE: 25.10.05

APPENDIX C

Pavement Impact

EPPELL OLSEN
& PARTNERS

Queensland Coke and Power Plant Project
ESA Weighting Calculations

Table C.1

Link	Location	1 Way Volume 2004 (vpd)	% Growth	1 Way Volume 2005 (vpd)	Classified Volume									Equivalent Standard Axles (ESA)				ESA/Heavy Vehicle Ratio
					Light	Light	Truck/Bus	Truck/Bus	Articulated	Articulated	B-Double	B-Double	TOTAL HEAVY	*Truck/Bus*	*Articulated*	*B-Double*	*TOTAL ESAs*	
Lower Dawson Road	Port Curtis to Capricorn Highway	7,955*	3.00%	8,439	84.9%	7,165	5.3%	448	6.8%	571	3.0%	252	1,272	*1,057*	*1,556*	*1,250*	*3,864*	3.04
Capricorn Highway	Bruce Highway to Gracemere	5,881	3.00%	6,057	91.8%	5,559	4.8%	289	2.3%	139	1.2%	70	499	*682*	*380*	*348*	*1,409*	2.83
Capricorn Highway	Gracemere to Kabra	1,916	3.00%	1,973	84.5%	1,667	7.4%	146	4.6%	90	3.6%	70	306	*345*	*246*	*347*	*938*	3.06
Capricorn Highway	Kabra to Power Station Road	1,585	3.00%	1,633	83.4%	1,362	7.2%	117	5.2%	85	4.2%	69	271	*276*	*230*	*342*	*849*	3.14
Lawrie Street	Capricorn Highway to Ranger Street	4,228	3.00%	4,354	96.2%	4,188	3.4%	146	0.5%	20	0.0%	1	167	*345*	*53*	*4*	*403*	2.42
Lawrie Street	Ranger Street to Bland St and Conaghan St R'bout	2,157	3.00%	2,221	96.2%	2,136	2.7%	60	1.1%	23	0.1%	2	85	*141*	*64*	*9*	*214*	2.51
Average ESA/Heavy Vehicle Ratio																		**2.83**

Average ESA Weightings	Two Axle Truck (Single Unit) =	2.01	2.36	Loaded ESA Weightings	Two Axle Truck (Single Unit) =	3.05	3.9027
	Three Axle Truck (Single Unit) =	2.03			Three Axle Truck (Single Unit) =	3.57	
	Four Axle Truck (Single Unit) =	3.04			Four Axle Truck (Single Unit) =	5.09	
	Articulated Vehicle (6 Axle Semi Trailer)	2.72			Articulated Vehicle (6 Axle Semi Trailer)	4.93	
	B-Double (Nine Axle B-Double)	4.95			B-Double (Nine Axle B-Double)	9.35	

* 2003 Base AADT Used for Lower Dawson Road Only

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Queensland Coke and Power Plant Project
Pavement Impact Scoping (Stage 1 Construction)

Table C.2

Link	Location	Existing Volume 2005 (vpd)		ESA Factor (No. of ESAs per Heavy Vehicle)	Existing ESA/Annum	Coking Coal Plant (2 Axle)	Average ESA per Loaded 2 Axle	Coking Coal Plant (3 Axle) - Buses	Average ESA per Loaded 3 Axle	Coking Coal Plant (4 Axle)	Average ESA per Loaded 4 Axle	Coking Coal Plant (Articulated)	Average ESA per Loaded Articulated	Coking Coal Plant (B-Doubles)	Average ESA per Loaded B-Double	Development ESA/annum	Percentage Change
		Total	Heavy														
Lower Dawson Road	Port Curtis to Capricorn Highway	8438.9	(1272)	3.04	1410247	(0)	3.05	(24)	3.57	(0)	5.09	(0)	4.93	(5)	9.35	(41295)	2.9%
Capricorn Highway	Bruce Highway to Gracemere	6057.4	(499)	2.83	514395	(0)	3.05	(24)	3.57	(0)	5.09	(0)	4.93	(9)	9.35	(52958)	10.3%
Capricorn Highway	Gracemere to Kabra	1973	(306)	3.06	342202	(0)	3.05	(54)	3.57	(0)	5.09	(0)	4.93	(9)	9.35	(86354)	25.2%
Capricorn Highway	Kabra to Power Station Road	1632.6	(271)	3.14	309763	(0)	3.05	(54)	3.57	(0)	5.09	(0)	4.93	(9)	9.35	(86354)	27.9%
Gaival to Gracemere	Capricorn Highway to Ranger Street	4354.3	(167)	2.42	147032	(0)	3.05	(30)	3.57	(0)	5.09	(0)	4.93	(0)	9.35	(33395)	22.7%
Gaival to Gracemere	Ranger Street to Bland St and Conaghan St R'bout	2221.2	(85)	2.51	78043	(0)	3.05	(30)	3.57	(0)	5.09	(0)	4.93	(0)	9.35	(33395)	42.8%

Existing flow data derived from Department of Main Roads count records

One-Way Workday Volume from Development

NB: The time period is one year from the start of construction of stage 1 and includes the construction of the Coke and Power Plant as well as the materials handling facility.

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Queensland Coke and Power Plant Project
Pavement Impact Scoping (Stage 2 Construction Only)

Table C.3

Link	Location	Existing Volume 2005 (vpd)		ESA Factor (No. of ESAs per Heavy Vehicle)	Existing ESA/Annum	Coking Coal Plant (2 Axle)	Average ESA per 2 Axle	Coking Coal Plant (3 Axle) - Buses	Average ESA per 3 Axle	Coking Coal Plant (4 Axle)	Average ESA per 4 Axle	Coking Coal Plant (Articulated)	Average ESA per Articulated	Coking Coal Plant (B-Doubles)	Average ESA per B-Double	Development ESA/annum	Percentage Change
		Total	Heavy														
Lower Dawson Road	Port Curtis to Capricorn Highway	8438.9	(1272)	3.04	1410247	(0)	3.05	(20)	3.57	(0)	5.09	(0)	4.93	(4)	9.35	(33927)	2.4%
Capricorn Highway	Bruce Highway to Gracemere	6057.4	(499)	2.83	514395	(0)	3.05	(20)	3.57	(0)	5.09	(0)	4.93	(7)	9.35	(42674)	8.3%
Capricorn Highway	Gracemere to Kabra	1973	(306)	3.06	342202	(0)	3.05	(49)	3.57	(0)	5.09	(0)	4.93	(7)	9.35	(74956)	21.9%
Capricorn Highway	Kabra to Power Station Road	1632.6	(271)	3.14	309763	(0)	3.05	(49)	3.57	(0)	5.09	(0)	4.93	(7)	9.35	(74956)	24.2%
Gaival to Gracemere	Capricorn Highway to Ranger Street	4354.3	(167)	2.42	147032	(0)	3.05	(29)	3.57	(0)	5.09	(0)	4.93	(0)	9.35	(32282)	22.0%
Gaival to Gracemere	Ranger Street to Bland St and Conaghan St R'bout	2221.2	(85)	2.51	78043	(0)	3.05	(29)	3.57	(0)	5.09	(0)	4.93	(0)	9.35	(32282)	41.4%

Existing flow data derived from Department of Main Roads count records

One-Way Workday Volume from Development

NB: The time period is one year from the start of construction of stage 2 and includes the construction of the Coke and Power Plant.

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Queensland Coke and Power Plant Project
Pavement Impact Scoping (Combined Stage 1&2 Operation)

Table C.4

Link	Location	Existing Volume 2005 (vpd)		ESA Factor (No. of ESAs per Heavy Vehicle)	Existing ESA/Annum	Coking Coal Plant (2 Axle)	Average ESA per 2 Axle	Coking Coal Plant (3 Axle) - Buses	Average ESA per 3 Axle	Coking Coal Plant (4 Axle)	Average ESA per 4 Axle	Coking Coal Plant (Articulated)	Average ESA per Articulated	Coking Coal Plant (B-Doubles)	Average ESA per B-Double	Development ESA/annum	Percentage Change
		Total	Heavy														
Lower Dawson Road	Port Curtis to Capricorn Highway	8438.9	(1272)	3.04	1410247	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(2)	9.35	(5832)	0.4%
Capricorn Highway	Bruce Highway to Gracemere	6057.4	(499)	2.83	514395	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(3)	9.35	(8747)	1.7%
Capricorn Highway	Gracemere to Kabra	1973	(306)	3.06	342202	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(6)	9.35	(17495)	5.1%
Capricorn Highway	Kabra to Power Station Road	1632.6	(271)	3.14	309763	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(6)	9.35	(17495)	5.6%
Gaival to Gracemere	Capricorn Highway to Ranger Street	4354.3	(167)	2.42	147032	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(3)	9.35	(8747)	5.9%
Gaival to Gracemere	Ranger Street to Bland St and Conaghan St R'bout	2221.2	(85)	2.51	78043	(0)	3.05	(0)	3.57	(0)	5.09	(0)	4.93	(3)	9.35	(8747)	11.2%

Existing flow data derived from Department of Main Roads count records

One-Way Workday Volume from Development

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Queensland Coke and Power Plant Project
Pavement Impact Assessment

ROUGHNESS DEFICIENCY	110	
ROUGHNESS DETERIORATION RATE	3	PER ANNUM
ROUGHNESS COUNT BASE YEAR	2005	

Table C.5

ROAD	SECTION	LENGTH (KM)	TRAFFIC GROWTH RATE	PAVEMENT AGE (YEARS)	EXIST DAILY VOLUME (vpd)	EXIST HEAVY VEHICLE VOLUME (vpd)	EXIST ANNUAL ESA (PER DIRECTION)	CUMULATIVE ESA	BASE YEAR ROUGHNESS	REHABILITATION YEAR (NO DEVELOPMENT)			ESA BREAKPOINT (NO DEVELOPMENT)	REHABILITATION YEAR (WITH DEVELOPMENT)	BRING FORWARD TIME PERIOD (YEARS)	BRING FORWARD %
										ROUGHNESS DEFICIENCY	30 YEARS LIFE	MINIMUM				
16A Capricorn Highway	10E Bruce Highway to 450 Gaival to Gracemere	5.69	3.00%	18.8	6,057	499	514,395	7,286,984	77.6	2015.8	2016.2	2015.8	14,442,937	2015.45	0.3	1%
16A Capricorn Highway	450 Gaival to Gracemere to Kabra	7.6	3.00%	20.2	1,973	306	342,202	5,243,829	53.5	2023.8	2014.8	2014.8	9,534,699	2013.91	0.9	3%
16A Capricorn Highway	Kabra to Power Station Road	4.44	3.00%	28.0	1,633	271	309,763	5,986,808	73.7	2017.1	2007.0	2007.0	6,944,255	2006.58	0.4	2%
450 Gaival to Gracemere	16A Capricorn Highway to Ranger Street	0.97	3.00%	19.3	4,354	167	147,032	2,169,244	86.9	2012.7	2015.7	2012.7	3,606,574	2011.85	0.8	3%
450 Gaival to Gracemere	Ranger Street to Bland St and Conaghan St R'bout	0.4	3.00%	40.6	2,221	85	78,043	1,575,559	86.9	2012.7	1994.4	1994.4	0	1994.40	0.0	0%

Notes:

1) Existing pavement age extracted from ARMIS
2) Existing daily volumes recorded via TARS
3) Existing annual ESA loading calculated based upon existing daily volumes recorded via TARS
4) Cumulative ESA calculated assuming an increase in ESAs of 3% per annum for the life of the pavement
5) Existing pavement roughness tested by DMR on 10 September 2004 for 16A Capricorn Highway and 7 September 2004 for 450 Gaival to Gracemere
6) Rehabilitation year calculated by determining the year at which the pavement roughness will reach the deficiency limit assuming a consistent deterioration rate of 3 counts per annum or when the pavement reaches 30 years old, whichever is the lesser.
7) ESA Breakpoint (No development) is the anticpated ESA loading at the time of rehabiltation assuming an increase in ESAs of 3% per annum for the life of the pavement.
8) The Rehabiltation year with development identifies the year at which the ESA breakpoint (no development) is reached with the additional ESA loading generated by the development
9) Bring forward percentage is the difference in net present value percentage between the 2 rehabiltation years identified (with and without development)
10) Total upgrading cost calculated based upon unit upgrading costs identified by DMR
11) Contribution is the proportion of cost borne by the development as a result of the bring forward of works.

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Our Ref: 5038 Queensland Coke and Power Plant

Date: 25 October 2005

DESIGN NOTE

Reference List for Queensland Coke and Power Plant

Guidelines for Assessment of Road Impacts of Development Proposals, Queensland Department of Main Roads. November 2000.

Roads Implementation Program 2004-05 to 2008-09, Queensland Department of Main Roads, 2004.