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Dyno Nobel Asia Pacific Limited

Moranbah Ammonium Nitrate Project

Pavement Impact Assessment

August 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

1.1 Project Description

Dyno Nobel Asia Pacific Limited (DN) is seeking to construct and operate a new Ammonium Nitrate Plant (AN) and an emulsion manufacturing plant in Queensland to complement the production of their existing plant at Moura. The proposed location of the new plant is approximately 4 km northwest of the Moranbah Township in central Queensland.

It is anticipated that the new plant will produce approximately 280,000 tonnes per annum (tpa) of prill and 70,000 tpa of emulsion, which will be shipped to the locations as indicated in Table 1.

Table 1 Production Volumes and Destinations

General Location (Main Roads District Maps (No./Title)	Prill (tonnes/year)	Emulsion (tonnes/year)
8 Mackay (Eastern Basin)	109,668	25,572
9 Northern	31,320	6,500
10 North Western	18,270	3,792
15 Central Highlands	120,742	33,582
Bowen Basin (Moranbah) Total	**280,000**	**69,445**

1.2 Scope and Context of Report

This report examines the impact of the proposed development on the state and local government controlled road network, assessed in accordance with the Department of Mains Roads (DMR) publication "*Guidelines for Assessment of Road Impacts of Development Proposals".* In particular, this report will ascertain the effect of the proposed AN plant on the pavement life of identified haul routes and will determine the required developer contribution to mitigate any adverse conditions. The generated traffic used in the determination of pavement impacts will be a result of:

- Supply of construction materials during the construction phase;
- Supply of raw materials to the plant; and
- Transport of AN prill and emulsion to the sites detailed in Table 1.

The design life of the plant is thirty-five years, with commissioning planned for 2008. Through discussions with DMR it has been advised that five annual assessments be conducted, starting in 2008 with the premise of revisiting the assessment every 5 years.

The impact of additional traffic on the existing intersections of Mills Avenue/Goonyella Road and the Peak Downs Highway/Moranbah-Access Road has been addressed in a separate report.

2. Development Road Use Profile

2.1 Location of Haul Routes

The routes considered for road haulage of prill and emulsion includes the following state controlled road network elements:

- Flinders Highway – 14B (Charters Towers – Hugenden);
- Flinders Highway – 14C (Hugenden – Richmond);
- Flinders Highway – 14D (Richmond – Julia Creek);
- Flinders Highway – 14E (Julia Creek – Cloncurry);
- Capricorn Highway – 16B (Duaringa – Emerald);
- Gregory Highway – 27B (Emerald – Clermont);
- Gregory Highway – 27C (Clermont – Mt Douglas);
- Peak Downs Highway – 33A (Clermont – Nebo);
- Peak Downs Highway – 33B (Nebo – Mackay);
- Suttor Development Road – 82A (Nebo – Mt Coolon);
- Bowen Development Road – 88B (Collinsville – Mt Douglas);
- Gregory Developmental Road – 98A (Clermont – Belyando Crossing);
- Gregory Developmental Road – 98B (Belyando Crossing – Charters Towers);
- Blackwater Cooroorah Road – 513;
- Dysart Middlemount Road – 519;
- Yan Yan Road – 5108;
- Collinsville Elphinstone Road – 5307; and
- Cerito Road;

The following local government roads were included:

- Peak Downs Dysart Road – R44 (Belyando Shire and Broadsound Shire);
- Moranbah Access Road (Belyando Shire);
- Goonyella Road (Belyando Shire); and
- Yan Yan Road (Peak Downs Shire)

The haul routes are shown in Appendix A

2.2 Haulage Regime – Days and Times of Operation

In this report, the haulage of prill and emulsion is shown on a 24 hour 320 day per year operation.

2.3 Descriptions of Proposed Vehicles

The following vehicles, described in Table 1 of the *"Guidelines for Multi-combination Vehicles",* (Queensland Transport, 2004), are proposed for the haulage:

» Prill: AB Triple –articulated vehicle hauling two B Double trailers connected by a converter dolly, maximum length 36.5m, vehicle category Type 1 Road Train. AB Triple combinations have a payload capacity of 65 tonnes.

» Emulsion: B Triple – prime mover hauling three semitrailers, maximum length 36.5m, vehicle category Type 1 Road Train. B Triple combinations have a payload capacity of 52 tonnes.

» Construction materials: B Double – maximum length 31.5m, vehicle category Type 1 Road Train. B Double combinations have a payload capacity of 34 tonnes.

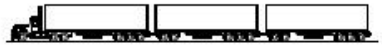
Vehicle combinations	Maximum length (metres)	Vehicle category	Combination diagram (Refer to section 5.1.4 for permitted axle groups)
A rigid truck hauling one trailer (total length exceeding 19 m)	31.5	Type 1	
An articulated vehicle hauling one trailer	36.5	Type 1	
B-triple - A prime mover hauling three semitrailers	36.5	Type 1	
AB-triple - An articulated vehicle hauling two B-double trailers connected by a converter dolly	36.5	Type 1	
AB-triple as above	44	Type 2	as above
A rigid truck hauling two trailers	47.5	Type 2	
An articulated vehicle hauling two trailers	53.5	Type 2	

Figure 1: Typical Vehicle Combinations

(Source: Table 1 *"Guidelines for Multi-combination Vehicles"* Queensland Transport)

2.4 Traffic Generation of the Haulage Activity

With the exception of the vehicles used for construction, the additional haulage generated has been calculated from the annual output for each mine (Table 1) and the payloads for the vehicles described in Section 2.3.

The distribution of the vehicles generated on the road network (shown in Appendix A) is based on the anticipated demand from the customers located within Central Queensland.

The traffic generated along particular elements of the state and local government controlled road network is set out in Appendix A.

2.5 Roads Implementation Program

Analysis of the *Road Implementation Program* (RIP) from DMR, revealed that works are proposed for some roads which are being proposed as haulage routes. Table 2 details the proposed haulage roads, which have works schedules for them. In order to properly assess these roads, it has been assumed that the roughness for the sections indicated will be set to 60 NRM for their indicated year of works.

Table 2 RIP Works Proposed on Haulage Routes

Year of works	Road Section		Chainage
Peak Downs Highway - 33A, 33B			
2006	North east of Moranbah	Clermont - Nebo	93.5 - 98.5
2008	South of Logan Ck	Clermont - Nebo	56
2008	North of Gregory Highway	Clermont - Nebo	11
2007-	Cherwell Ck North	Clermont - Nebo	74.5
2006	115 – 155 (Clermont-Nebo)	Clermont - Nebo	115 - 155
2007	150 – 160 (Clermont-Nebo)	Clermont - Nebo	150 - 160
Gregory Developmental Road - 98A			
2006	Disney North (section 1)	Clermont - Belyando Crossing	163.8 - 192.650
2007	Towards Belyando River 147.66 – 163.8 (section 2)	Clermont - Belyando Crossing	147.66 - 163.8
2008	2km North of Victoria Ck - 2km south of Victoria Downs	Belyando Crossing - Charters Towers	110.2 - 130
2008	North of Cape River - 2km north of Victoria River	Belyando Crossing - Charters Towers	86.61 - 110.2
2006	South of Victoria Downs - North of Merri Ck	Belyando Crossing - Charters Towers	130 - 136.52
2006	Policeman Ck - 1.5km south of Windsor Rd	Belyando Crossing - Charters Towers	162.5 -

Year of works	Road Section		Chainage
Gregory Highway - 27B			
2008	Emerald Downs – Theresa Ck	Emerald - Clermont	6 - 11
Yan Yan Rd - 5108			
2006	0.03 – 8.5	-	0.03 - 8.5
Flinders Highway - 14			
2006	86 - 97	Julia Creek - Cloncurry	86 - 97
2007	3.5 - 22.5	Julia Creek - Cloncurry	3.5 - 22.5
2009	15 - 30	Julia Creek - Cloncurry	15 - 30
2009	31.88 - 46	Julia Creek - Cloncurry	31.88 - 46
2006	Sloanes - Namoi Creek	Hughenden - Richmond	65 - 80
Collinsville Elphinstone Road - 5307			
2007	Newlands Mine - Glenden	-	-

3. Pavement Impact Assessments

3.1 Current Pavement Loadings

The current pavement loadings on each of the identified haul routes have been assessed using 2005 traffic count volumes and heavy vehicle proportions provided by the respective DMR District. In terms of growth, advice from DMR indicates that growth rates less than 2% are not indicative of actual growth patterns and over 5% are unsustainable. The growth rates used in this assessment have been obtained from growth rate analysis supplied by DMR and have been confined to between 2% and 5%, where applicable. Calculations for the current pavement loadings adopt the value of 3.2 ESAs (Equivalent Standard Axles) per commercial vehicle as used by the Central Region for roads in Central Queensland.

In order to assess development impacts annually, current and base case pavement loadings have been calculated for the following periods.

- 2008 – 2009 1st year of operations;
- 2009 – 2010 2nd year of operations;
- 2010 – 2011 3rd year of operations;
- 2011 – 2012 4th year of operations;
- 2012 – 2013 5th year of operations.

3.2 Proposed Haulage Development Loadings

The ESAs per vehicle have been calculated in accordance with Chapter 7 *"Design Traffic"* of Austroads *"Pavement Design"* publication. The number of standard axle repetitions caused by each loaded and unloaded vehicle type has been calculated using the following formula:

$$SAR_{ijk} = \left(\frac{L_{ij}}{SL_i} \right)^m \qquad \text{Equation 1}$$

(Source: Equation 7.3 Austroads *"Pavement Design"*)

Where:

SAR_{ijk}	=	Number of Standard Axle Repetitions (or passages of the Standard Axle) which causes the same amount of type k damage as a single passage of axle group i with load L_{ij};
L_{ij}	=	Load on the axle group;
SL_i	=	Standard Load for axle group type i (Refer to Table 7.6 Austroads *"Pavement Design"*)
k	=	Damage designation for damage type (Refer to Table 7.7 Austroads *"Pavement Design"*)

m = An exponent which is specific to the type k damage (Refer to Table 7.7 Austroads *"Pavement Design"*)

In order to utilise Equation 1, each of the development's nominated vehicle types have been broken down into the axle groupings presented in Table 3. The subsequent ESAs for the vehicles used are presented in Table 4:

Table 3 Standard Axle Groups

	Single Axle Single Tyres	Single Axle Dual Tyres	Tandem Axle Single Tyres	Tandem Axle Dual Tyres	Triaxle Dual Tyres
kN	53	80	90	135	181
Tonnes	5.40	8.15	9.17	13.76	18.45

Table 4 ESAs per Loaded/Unloaded Vehicle

		Steer	Dual Tandem Drive	Triaxle Trailer	Triaxle Trailer	Triaxle Trailer	Triaxle Trailer	Total
AB Triple	Loaded Weight (tonnes)	6	17	20	20	20	20	103
	Unloaded Weight (tonnes)	5	8	7	7	5	5	36
	Loaded ESAs	1.521	2.067	1.381	1.381	1.381	1.381	9.112
	Unloaded ESAs	0.734	0.088	0.015	0.015	0.005	0.005	0.862
B Triple	Loaded Weight (tonnes)	6	17	20	20	20	-	83
	Unloaded Weight (tonnes)	5	8	7	7	5	-	31
	Loaded ESAs	1.521	2.067	1.381	1.381	1.381	-	7.731
	Unloaded ESAs	0.734	0.088	0.015	0.015	0.005	-	0.857
B Double	Loaded Weight (tonnes)	6	17	20	20	-	-	63
	Unloaded Weight (tonnes)	5	9	8	8	-	-	29
	Loaded ESAs	1.521	2.067	1.381	1.381	-	-	6.350
	Unloaded ESAs	0.734	0.146	0.027	0.027	-	-	0.934

3.3 Pavement Impact Assessment

As specified in the Department of Main Roads *"Guidelines for Assessment of Road Impacts of Development Proposals"* publication, significant pavement impact is deemed to occur where development generated traffic results in a greater than or equal to 5% increase in ESAs. In order to maintain the state controlled road network at an acceptable standard, the developer is obliged to contribute to road preservation proportionally wherever significant impact occurs.

Based on these principles, an assessment of the proposed haul routes for the site was conducted. Section 4 sets out the assessment of the additional haulage on the pavements on the various elements of the state and local government controlled road network. The traffic loading for the plant has been calculated for a typical year of operations, which has been assessed annually for a 5-year period starting in 2008 (i.e. the proposed year of the plant's commissioning). Where the generated pavement loading is less than 5% of the existing annual traffic the impact has been deemed insignificant. Conversely the road elements where the impact is assessable (i.e. 5% or greater) are listed as follows:

- Flinders Highway 14C (Saleyards Road – Richmond)
- Flinders Highway 14D (INT 5803 – Julia Creek)
- Flinders Highway 14E (INT 78A – INT 13H)
- Peak Downs Highway 33A (INT 27C – INT 514)
- Suttor Development Road 82A (INT 33B – Hail Creek Access)
- Bowen Development Road 88B (CH10.5 – INT Cerito Road)
- Gregory Development Road 98A (INT 5309 – District Boundary)
- Gregory Development Road 98B (Belyando – CH143)
- Collinsville Elphinstone Road 5307 (Newlands Mine Turnoff – INT 82A)
- Peak Downs Dysart Road R44 (INT 33A – Peak Downs Mine)
- Moranbah Access Road (INT 33A – INT Goonyella Road)
- Goonyella Road (Moranbah Access – Rail Crossing)
- Yan Yan Road (INT 519 – INT Lillyvale Road)

Whilst it is recognised that based on the 5% trigger these controlled roads will be significantly impacted by the development, the currently low AADTs (< 500) on some routes appear to exaggerate the development impacts. These links include:

- Flinders Highway 14C (Saleyards Road – Richmond)
  AADT = 302
- Flinders Highway 14D (INT 5803 – Julia Creek)
  AADT = 244
- Flinders Highway 14E (INT 78A – INT 13H)
  AADT = 271

- Peak Downs Highway 33A (INT 27C – INT Dysart Road)
  AADT = 441 – 461
- Gregory Development Road 98A (INT 5309 – District Boundary)
  AADT = 26 – 115
- Gregory Development Road 98A (INT 5309 – District Boundary)
  AADT = 283
- Gregory Development Road 98B (Belyando – CH143)
  AADT = 282
- Collinsville Elphinstone Road 5307 (Newlands Mine Turnoff – INT 82A)
  AADT = 447
- Yan Yan Road (INT 519 – INT Lillyvale Road)
  AADT = 200

Additionally, considering the low traffic volumes on these links, it is assumed that the existing pavement structure would have been designed to a higher AADT level than that which currently traffics the road. The percentage increase in ESA's would therefore be out of proportion, which in turn should result in lower maintenance and rehabilitation contributions to those sections of road. As such it is suggested that these links be assessed, in conjunction with the respective DMR district, on a case-by-case basis to determine an appropriate contribution scheme.

It should be noted that Cerito Road is still under construction and may not be fully sealed before the opening of the plant. This link will be open before the plant commences operation, however, due to the uncertainties of its construction level, this road should be assessed individually upon its completion or the opening of the plant.

4. Impact Summary for State Controlled Roads

4.1 Cost / Contribution Methodology

4.1.1 Overview

The proposed upgrade of the AN plant is expected to increase traffic loading on selected haul routes which will subsequently result in structural damage to the existing pavement and a reduction in the pavement life.

In accordance with DMR cost-sharing policies, the expansion of the plant will require contributions to the operational pavement maintenance and pavement rehabilitation of those state controlled roads affected by the development. In terms of contribution percentage, the Department of Main Roads *"Guidelines for Assessment of Road Impacts of Development Proposals"* indicates that contributions to roadworks should be made in accordance with the following:

- Where Main Roads intended to provide the roadworks at a future date then the developer contribution would be based on the "bring forward cost" methodology, or more plainly, the cost of advancing the roadworks due to the development generated heavy vehicles;
- Where the roadworks are unlikely to be provided by Main Roads in the absence of developer activity, or the estimation of the timing of the works is too speculative, then the developer would be required to meet the full cost of the roadworks.

Based on these guidelines contributions to pavement rehabilitation shall be determined via the "bring forward cost" approach. Conversely for operational maintenance, which is an ongoing cost rather than an up-front capital item, this study assumes a contribution that is proportional to the increase in ESAs due to the development. Therefore a 25% increase in ESAs demands a 25% contribution to annual maintenance.

Traditionally cost-contributions by developers to state controlled roads are made as an upfront payment prior to the commissioning of the development. However considering the volatility and extent of impacts associated with mining developments, it is often more appropriate to assess the development on an annual basis for a fixed 5-year period.

This type of assessment is also compatible with a tariff based contribution scheme whereby the developer pays contributions using a $/tonne rate which is invoiced on a monthly/annual basis. Through discussions and agreement with DMR District 6 (Central), an annual assessment approach for a fixed 5-year period has been adopted as part of this study. Subsequently the results of this study will provide an assessment of the development's impacts and a corresponding dollar contribution for the following periods:

- 2008 – 2009 1st year of operations;
- 2009 – 2010 2nd year of operations;

» 2010 – 2011 3rd year of operations;

» 2011 – 2012 4th year of operations;

» 2012 – 2013 5th year of operations.

4.1.2 Detailed Procedure

In order to identify the locality and severity of impacts, DN has provided the following information:

» Proposed haulage vehicle types and approximate payloads; and

» Annual production increases (tonne/year).

Given that the development is to be assessed on an annual basis this data was used to determine the generated ESAs on each of the identified routes for a typical year of operations. These figures were then compared to existing traffic data provided by DMR to determine the overall percentage increase in ESAs on each haul route. As per the Department of Main Roads *"Guidelines for Assessment of Road Impacts of Development Proposals"* only routes with an increase of more than 5% will require a contribution.

In order to determine the relative contribution costs Department of Main Roads District 6 (Central) has provided approximate maintenance costs for pavement rehabilitation and annual routine maintenance based on seal width. It should be noted that the provided annual routine maintenance costs only include those items which are affected by traffic volumes i.e. line marking, patching etc. Furthermore the costs presented in Table 5 are estimates only and thus each link must be assessed individually by the respective DMR district as the pavement structure is not only dictated by seal width.

Table 5 Pavement Rehabilitation and Annual Maintenance Costs (2005)

Seal Width (m)	Rehabilitation Costs ($/km)	Annual Routine Maintenance ($/km)
3.6	$90,000	$3,600
5	$125,000	$4,300
6	$150,000	$7,500
7	$175,000	$7,000
8	$200,000	$7,700
9	$225,000	$8,300
10	$250,000	$9,000
11	$275,000	$9,600
12	$300,000	$10,300

In addition to costs DMR have also provided the following input parameters which have been used accordingly:

» Approximate seal widths, 2005 roughness measurements (NRM), traffic growth rates, AADT and %CV for each of the identified haul routes;

» ESAs/HV (i.e. 2.8 for the Bruce Highway and 3.2 for all other roads)

» Annual road roughness increase = 3 NRM

» Terminal road roughness = 120 NRM

» Inflation rate = 2.5%

» Discount rate = 6.0%

Based on these costs and parameters the following steps outline the basic procedure for determining the "Bring Forward Cost" of pavement rehabilitation and thus the developers approximate contributions:

1. Determine the remaining pavement life of the subject link in ESAs and years

As indicated by DMR District 6, the condition/age of a road's pavement is measured in roughness (i.e. NRM). Generally a pavement is due to be rehabilitated once it reaches a roughness of 120 NRM. Using 2005 roughness counts and assuming any given road will gain 3 NRM per year the approximate age of a pavement in years can be determined. Equation 2 displays the formula for approximating remaining pavement life:

$$PLY_i = \frac{120 - \mu_i}{3} \qquad \text{Equation 2}$$

Where:

PLY_i = Remaining Pavement Life in year i (years);

μ_i = Roughness in year i (NRM).

Age in ESAs can then be calculated by determining the total cumulative ESAs over the subject road for the calculated number of years. This calculation should be based on the current traffic volumes and an assumed growth rate of 3% per annum.

$$PLE_i = AADT_i \times \frac{(1+R)^{PLY_i} - 1}{R} \qquad \text{Equation 3}$$

(Source: Equation 7.2 Austroads *"Pavement Design"*)

Where:

PLE_i = Remaining Pavement Life in year i (ESAs);

$AADT_i$ = AADT in year i (NRM);

R = Traffic growth rate (assume 3%)

2. Determine the % reduction of the remaining pavement life due to the development traffic.

For example if the remaining pavement life is 1.14E+06 ESAs over a 10 year period and the proposed development will produce 1.49E+05 ESAs in 10 years, then the % reduction in pavement life = 1.49E+05 /1.14E+06 = 13%.

3. Covert the % reduction of pavement life to years.

For the example above 13% reduction in 10 years is 1.3 years.

4. Determine the total cost of rehabilitating the subject link based on the per kilometre costs provided by the respective DMR district (Refer to Table 5);
5. Determine the Present Value (assessment year) of the cost of rehabilitation the road without the development (i.e. no reduction in pavement life).

For example given a subject road with an approximate seal width of 9m the corresponding cost per kilometre is $225,000 in 2005. If the assessment year is 2012 then the 2005 cost must be adjusted using the specified inflation rate of 2.5% for 7 years resulting in a 2012 cost of $267,454. For seal widths not identified in Table 5, interpolation has been used.

6. Determine the Present Value (assessment year) of the cost of rehabilitation the road with the development (i.e. including reduction in pavement life) as per step 5.
7. The difference between the PV of works with and without the development equals the "bring forward cost" and thus the developer's contribution.

It should be noted that the "bring forward costs" methodology has been applied as stipulated in Appendix G of Main Roads *"Guidelines for Assessment of Road Impacts of Development Proposals"*.

4.2 Impacts

As stipulated in the Department of Main Roads *"Guidelines for Assessment of Road Impacts of Development Proposals"* this study assumes that a significant pavement impact occurs where the existing heavy vehicle traffic volumes (in ESAs) increase by 5% or more. Based on this premise, Table 6 presents the haulage routes where development generated traffic exceeds the 5% threshold in any given 1 year period between 2008 and 2013 for roads over 500 AADT.

Table 6 2008 – 2013 Max Development Generated ESA Increase per Route

District	Link Start	Link End	Increase in ESAs From Plant	Increase in ESAs Towards Plant
Peak Downs Highway 33A				
Central Highlands	INT Dysart Rd	Moranbah Access	8.7%	< 5%
Central Highlands	Moranbah Access	District Boundary	7.0%	< 5%
Mackay	District boundary	Coppabella	8.1%	< 5%
Mackay	Coppabella	INT 85C	6.5%	< 5%
Mackay	INT 85C	INT 514	5.4%	< 5%
Suttor Development Road 82A				
Mackay	INT 33B	Hail Ck access	12.4%	< 5%
Peak Downs Dysart Road R45				
Belyando Shire	INT 33A	Peak Downs Mine	6.6%	< 5%
Moranbah Access Road				
Belyando Shire	INT 33A	INT Goonyella Rd	10.0%	< 5%
Goonyella Road				
Belyando Shire	Moranbah Access	Moranbah	10.0%	< 5%
Belyando Shire	Moranbah	Rail Crossing	8.9%	< 5%

4.3 Cost / Contribution Results

The following section outlines the results of the contribution calculations. Contributions have been derived for 5 annual periods starting in 2008 at the time of the proposed plant's commissioning. It should be noted that values have been inflated using a 2.5% rate to reflect the cost at the time of payment.

4.3.1 Operational Maintenance Contributions

Table 7 displays the operational maintenance contributions per annum for the significant sections of each route. These are the operational maintenance costs on a per annum basis, required as a contribution to each respective DMR region, by DN. This covers the routine maintenance of the roads and is proportional to the increase in traffic loading. A detailed breakdown of contributions per district is provided in Table 7.

Table 7 Operational Maintenance Contributions 2008 – 2013

District	Link Start	Link End	2008 – 2009	2009 – 2010	2010 – 2011	2011 – 2012	2012 – 2013
Peak Downs Highway 33A							
Central Highlands	INT Dysart Rd	Moranbah Access	$2,736	$2,670	$2,604	$2,545	$2,484
Central Highlands	Moranbah Access	District Boundary	$1,709	$1,669	$1,629	$1,599	$1,552
Mackay	District boundary	Coppabella	$9,468	$9,243	$9,023	$8,808	$8,598
Mackay	Coppabella	INT 85C	$6,323	$6,172	$6,025	$5,882	$5,742
Mackay	INT 85C	INT 514	$3,368	$3,287	-	-	-
Suttor Development Road 82A							
Mackay	INT 33B	Hail Ck access	$20,289	$19,806	$19,335	$18,874	$18,425
Peak Downs Dysart Road R45							
Belyando Shire	INT 33A	Peak Downs Mine	$5,959	$5,817	$5,679	$5,544	$5,412
Moranbah Access Road							
Belyando Shire	INT 33A	INT Goonyella Rd	$4,986	$4,868	$4,752	$4,639	$4,258
Goonyella Road							
Belyando Shire	Moranbah Access	Moranbah	$1,205	$1,176	$1,148	$1,121	$1,094
Belyando Shire	Moranbah	Rail Crossing	$1,515	$1,523	$1,530	$1,538	$1,545

4.3.2 Pavement Rehabilitation Contributions

Table 8 presents the annual pavement rehabilitation contributions for each haul route assuming that the plant will be commissioned in 2008 and operate for a 5-year period. It should be noted that the calculated costs have taken into account inflation (2.5%/year) in order to approximate costs at the time of payment.

Table 8 Pavement Rehabilitation Contributions 2008 – 2013

District	Link Start	Link End	2008 – 2009	2009 – 2010	2010 – 2011	2011 – 2012	2012 – 2013
Peak Downs Highway 33A							
Central Highlands	INT Dysart Rd	Moranbah Access	$1,155	$1,140	$1,212	$1,295	$1,382
Central Highlands	Moranbah Access	District Boundary	$480	$519	$552	$589	$629
Mackay	District boundary	Coppabella	$3,263	$3,516	$3,740	$3,993	$4,263
Mackay	Coppabella	INT 85C	$2,152	$2,279	$2,424	$2,587	$2,759
Mackay	INT 85C	INT 514	$1,062	$1,248	-	-	-
Suttor Development Road 82A							
Mackay	INT 33B	Hail Ck access	$17,318	$17,829	$18,917	$20,237	$21,640
Peak Downs Dysart Road R45							
Belyando Shire	INT 33A	Peak Downs Mine	$2,317	$2,739	$2,911	$3,105	$3,311
Moranbah Access Road							
Belyando Shire	INT 33A	INT Goonyella Rd	$3,938	$3,420	$6,632	$3,880	$4,144
Goonyella Road							
Belyando Shire	Moranbah Access	Moranbah	$815	$827	$878	$938	$1,001
Belyando Shire	Moranbah	Rail Crossing	$1,149	$1,244	$1,338	$1,448	$1,566

4.4 Cost Breakdown

Given that the proposed development will impact roads falling under the jurisdiction of four separate Main Roads districts and 2 Local Governments it is necessary to breakdown the developer contributions accordingly. Table 9 provides a summary of each district's due contributions for pavement maintenance and rehabilitation. Additionally, to facilitate a tariff based system a $/tonne rate for product has also been provided assuming that the proposed plant will produce 350,000 tonnes of product a year:

Table 9 Cost Breakdowns per District

Cost Breakdown by District	2008 - 2009	2009 - 2010	2010 - 2011	2011 - 2012	2012 - 2013
Central Highlands District - Maintenance	$ 4,445	$ 4,339	$ 4,236	$ 4,135	$ 4,036
Central Highlands District - Pavement Rehab	$ 1,635	$ 1,659	$ 1,765	$ 1,884	$ 2,011
Central Highlands District Total	$ 6,080	$ 5,998	$ 6,000	$ 6,019	$ 6,047
Central Highlands District Cost / Tonne	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02
Mackay District - Maintenance	$ 39,448	$ 38,509	$ 34,383	$ 33,564	$ 32,765
Mackay District - Pavement Rehab	$ 23,816	$ 24,872	$ 25,081	$ 26,817	$ 28,662
Mackay District Total	$ 63,264	$ 63,380	$ 59,463	$ 60,381	$ 61,427
Mackay District Cost / Tonne	$ 0.18	$ 0.18	$ 0.17	$ 0.17	$ 0.18
Belyando Shire - Maintenance	$ 13,666	$ 13,380	$ 13,109	$ 12,841	$ 12,579
Belyando Shire - Pavement Rehab	$ 7,652	$ 8,229	$ 8,759	$ 9,371	$ 10,023
Belyando Shire Total	$ 21,318	$ 21,613	$ 21,868	$ 22,212	$ 22,602
Belyando Shire Cost / Tonne	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06

5. Conclusions and Recommendations

This report has found that the project will generated significant heavy traffic (>5% increase in ESA's per year) on sections of the following roads:

» Flinders Highway 14C (Saleyards Road – Richmond)

» Flinders Highway 14D (INT 5803 – Julia Creek)

» Flinders Highway 14E (INT 78A – INT 13H)

» Peak Downs Highway 33A (INT 27C – INT 514)

» Suttor Development Road 82A (INT 33B – Hail Creek Access)

» Bowen Development Road 88B (CH10.5 – INT Cerito Road)

» Gregory Development Road 98A (INT 5309 – District Boundary)

» Gregory Development Road 98B (Belyando – CH143)

» Collinsville Elphinstone Road 5307 (Newlands Mine Turnoff – INT 82A)

» Peak Downs Dysart Road R44 (INT 33A – Peak Downs Mine)

» Moranbah Access Road (INT 33A – INT Goonyella Road)

» Goonyella Road (Moranbah Access – Rail Crossing)

» Yan Yan Road (INT 519 – INT Lillyvale Road)

It is recommended that due to the currently low AADT levels (<500), the following roads be analysed on a case by case basis with the relevant DMR district and local government shire to ascertain the appropriate contribution:

» Flinders Highway 14C (Saleyards Road – Richmond)

» Flinders Highway 14D (INT 5803 – Julia Creek)

» Flinders Highway 14E (INT 78A – INT 13H)

» Peak Downs Highway 33A (INT 27C – INT Dysart Road)

» Bowen Development Road 88B (CH10.5 – INT Cerito Road)

» Gregory Development Road 98A (INT 5309 – District Boundary)

» Gregory Development Road 98B (Belyando – CH143)

» Collinsville Elphinstone Road 5307 (Newlands Mine Turnoff – INT 82A)

» Yan Yan Road (INT 519 – INT Lillyvale Road)

The contributions proposed in this report are for those roads where the AADT is above 500 and the ESA's are increased by greater than 5%. These roads are listed below:

» Peak Downs Highway 33A (INT Dysart Road – INT 514)

» Suttor Development Road 82A (INT 33B – Hail Creek Access)

» Peak Downs Dysart Road R44 (INT 33A – Peak Downs Mine)

» Moranbah Access Road (INT 33A – INT Goonyella Road)

» Goonyella Road (Moranbah Access – Rail Crossing)

Due to the increase in heavy vehicle traffic on the above roads, contributions should be made to the following DMR Districts and local government shires:

» Northern District;

» North Western District;

» Central Highlands District;

» Mackay District;

» Belyando Shire; and

» Peak Downs Shire.

It is recommended that the contributions listed in Table 10 be made towards increased maintenance and bringing forward the planned rehabilitation of the road sections where the AADT is greater than 500 and the increase in ESA's per year due to the traffic generated by the plant is greater than 5%.

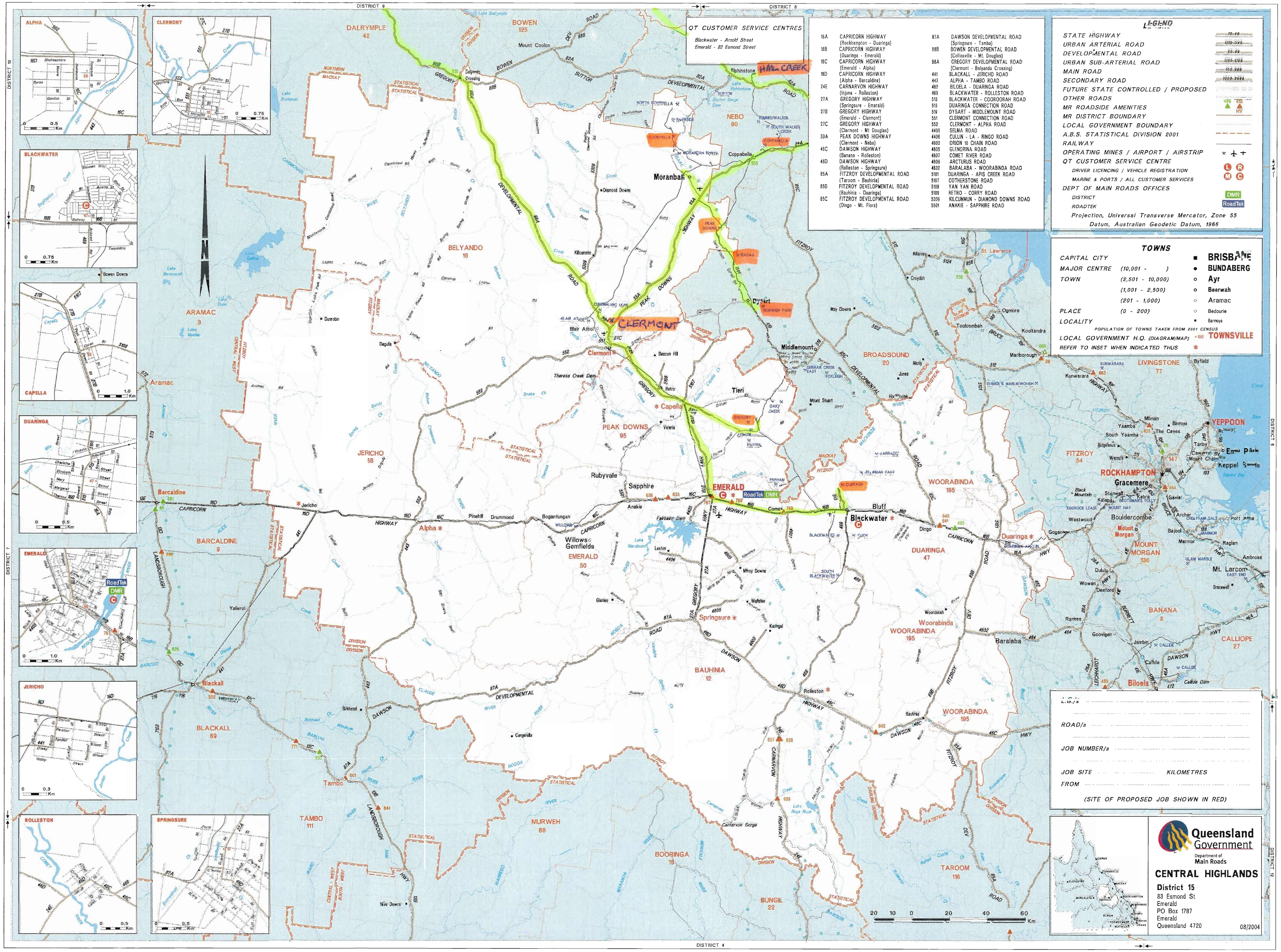
Table 10 Costs Summary

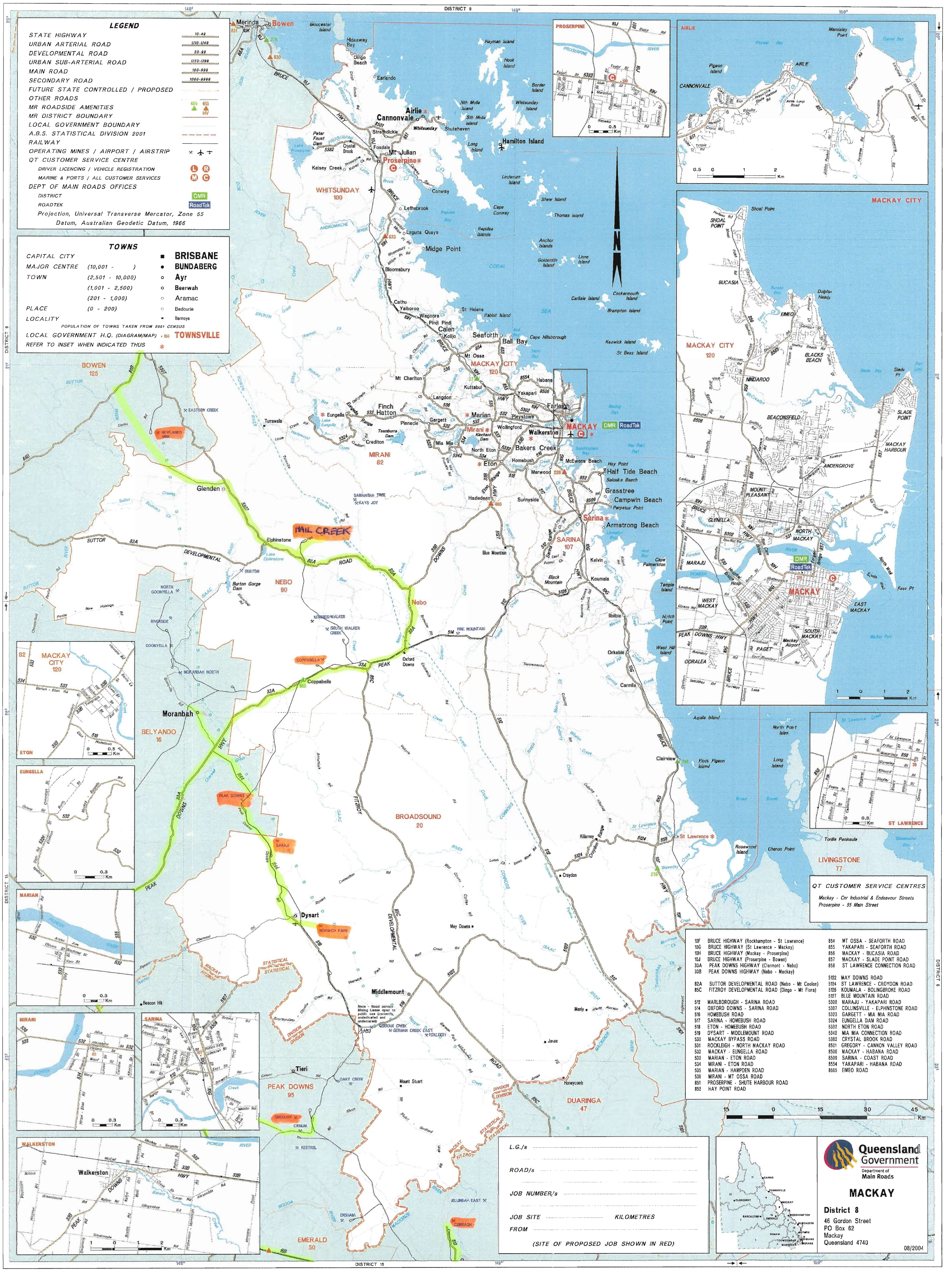
Cost Breakdown by District	2008 - 2009	2009 - 2010	2010 - 2011	2011 - 2012	2012 - 2013
Central Highlands District Total	$ 6,080	$ 5,998	$ 6,000	$ 6,019	$ 6,047
Central Highlands District Cost / Tonne	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02
Mackay District Total	$ 63,264	$ 63,380	$ 59,463	$ 60,381	$ 61,427
Mackay District Cost / Tonne	$ 0.18	$ 0.18	$ 017	$ 0.17	$ 0.18
Belyando Shire Total	$ 21,318	$ 21,613	$ 21,868	$ 22,212	$ 22,602
Belyando Shire Cost / Tonne	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06
Total Cost	$ 90,662	$ 90,990	$ 87,331	$ 88,611	$ 90,076
Total Cost / Tonne	$ 0.26	$ 0.26	$ 0.25	$ 0.25	$ 0.26

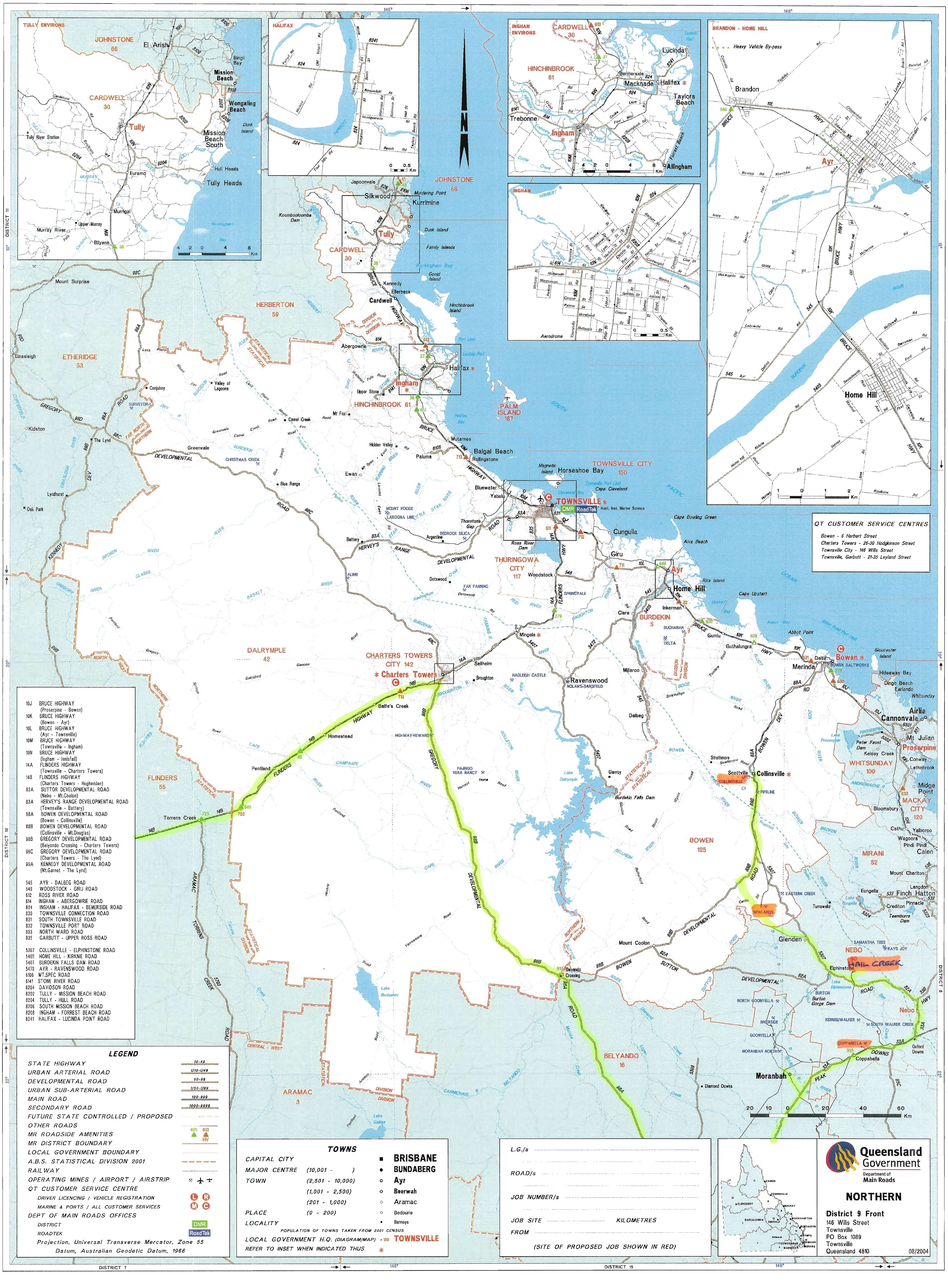
It is recommended that the roads listed as below 500 AADT in section 3.3 be assessed individually through discussions with the relevant DMR district.

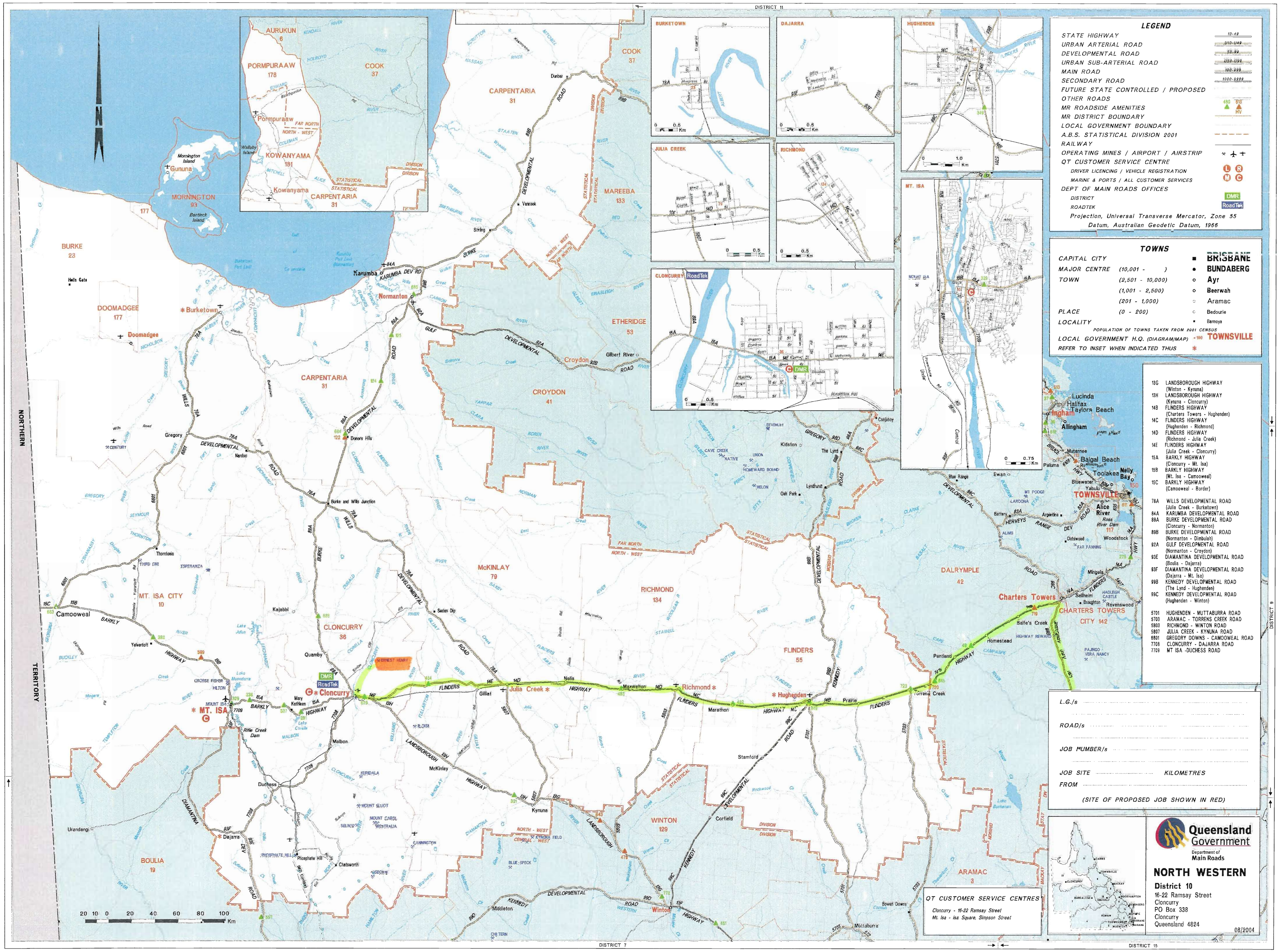
Appendix A

Haul Routes




DISTRICT 9
LEGEND
STATE HIGHWAY 10-49
URBAN ARTERIAL ROAD U10-U49
DEVELOPMENTAL ROAD 50-99
URBAN SUB-ARTERIAL ROAD U50-U99
MAIN ROAD 100-999
SECONDARY ROAD 1000-9999
FUTURE STATE CONTROLLED / PROPOSED
OTHER ROADS
MR ROADSIDE AMENITIES
MR DISTRICT BOUNDARY
LOCAL GOVERNMENT BOUNDARY
A.B.S. STATISTICAL DIVISION 2001
RAILWAY
OPERATING MINES / AIRPORT / AIRSTRIP
QT CUSTOMER SERVICE CENTRE
DRIVER LICENCING / VEHICLE REGISTRATION
MARINE & PORTS / ALL CUSTOMER SERVICES
DEPT OF MAIN ROADS OFFICES
DISTRICT DMR
ROADTEK RoadTek
Projection, Universal Transverse Mercator, Zone 55
Datum, Australian Geodetic Datum, 1966
TOWNS
CAPITAL CITY BRISBANE
MAJOR CENTRE (10,001 -) BUNDABERG
TOWN (2,501 - 10,000) Ayr
(1,001 - 2,500) Beerwah
(201 - 1,000) Aramac
PLACE (0 - 200) Bedourie
LOCALITY Barmoya
POPULATION OF TOWNS TAKEN FROM 2001 CENSUS
LOCAL GOVERNMENT H.Q. (DIAGRAM/MAP) TOWNSVILLE
REFER TO INSET WHEN INDICATED THUS *
PROSERPINE
AIRLIE
MACKAY CITY
BOWEN 125
WHITSUNDAY 100
MIRANI 82
MACKAY CITY 120
NEBO 90
SARINA 107
BELYANDO 16
BROADSOUND 20
PEAK DOWNS 95
DUARINGA 47
EMERALD 50
LIVINGSTONE 77
HAIL CREEK
NEWLANDS MINE
COPPABELLA
PEAK DOWNS
SARAJI
NORWICH PARK
GREGORY
CURRAGH
EUNGELLA
MARIAN
MIRANI
SARINA
WALKERSTON
ST LAWRENCE
QT CUSTOMER SERVICE CENTRES
Mackay - Cnr Industrial & Endeavour Streets
Proserpine - 55 Main Street
10F BRUCE HIGHWAY (Rockhampton - St Lawrence)
10G BRUCE HIGHWAY (St Lawrence - Mackay)
10H BRUCE HIGHWAY (Mackay - Proserpine)
10J BRUCE HIGHWAY (Proserpine - Bowen)
33A PEAK DOWNS HIGHWAY (Clermont - Nebo)
33B PEAK DOWNS HIGHWAY (Nebo - Mackay)
82A SUTTOR DEVELOPMENTAL ROAD (Nebo - Mt Coolon)
85C FITZROY DEVELOPMENTAL ROAD (Dingo - Mt Flora)
512 MARLBOROUGH - SARINA ROAD
514 OXFORD DOWNS - SARINA ROAD
516 HOMEBUSH ROAD
517 SARINA - HOMEBUSH ROAD
518 ETON - HOMEBUSH ROAD
519 DYSART - MIDDLEMOUNT ROAD
530 MACKAY BYPASS ROAD
531 ROCKLEIGH - NORTH MACKAY ROAD
532 MACKAY - EUNGELLA ROAD
533 MARIAN - ETON ROAD
534 MIRANI - ETON ROAD
535 MARIAN - HAMPDEN ROAD
536 MIRANI - MT OSSA ROAD
851 PROSERPINE - SHUTE HARBOUR ROAD
852 HAY POINT ROAD
854 MT OSSA - SEAFORTH ROAD
855 YAKAPARI - SEAFORTH ROAD
856 MACKAY - BUCASIA ROAD
857 MACKAY - SLADE POINT ROAD
858 ST LAWRENCE CONNECTION ROAD
5122 MAY DOWNS ROAD
5124 ST LAWRENCE - CROYDON ROAD
5126 KOUMALA - BOLINGBROKE ROAD
5127 BLUE MOUNTAIN ROAD
5302 MARAJU - YAKAPARI ROAD
5307 COLLINSVILLE - ELPHINSTONE ROAD
5323 GARGETT - MIA MIA ROAD
5324 EUNGELLA DAM ROAD
5332 NORTH ETON ROAD
5342 MIA MIA CONNECTION ROAD
5382 CRYSTAL BROOK ROAD
8501 GREGORY - CANNON VALLEY ROAD
8506 MACKAY - HABANA ROAD
8509 SARINA - COAST ROAD
8554 YAKAPARI - HABANA ROAD
8565 EIMEO ROAD
L.G./s
ROAD/s
JOB NUMBER/s
JOB SITE KILOMETRES
FROM
(SITE OF PROPOSED JOB SHOWN IN RED)
Queensland Government
Department of Main Roads
MACKAY
District 8
46 Gordon Street
PO Box 62
Mackay
Queensland 4740
08/2004
DISTRICT 15




LEGEND
STATE HIGHWAY
URBAN ARTERIAL ROAD
DEVELOPMENTAL ROAD
URBAN SUB-ARTERIAL ROAD
MAIN ROAD
SECONDARY ROAD
FUTURE STATE CONTROLLED / PROPOSED
OTHER ROADS
MR ROADSIDE AMENITIES
MR DISTRICT BOUNDARY
LOCAL GOVERNMENT BOUNDARY
A.B.S. STATISTICAL DIVISION 2001
RAILWAY
OPERATING MINES / AIRPORT / AIRSTRIP
QT CUSTOMER SERVICE CENTRE
DRIVER LICENCING / VEHICLE REGISTRATION
MARINE & PORTS / ALL CUSTOMER SERVICES
DEPT OF MAIN ROADS OFFICES
DISTRICT
ROADTEK
Projection, Universal Transverse Mercator, Zone 55
Datum, Australian Geodetic Datum, 1966
TOWNS
CAPITAL CITY BRISBANE
MAJOR CENTRE (10,001 -) BUNDABERG
TOWN (2,501 - 10,000) Ayr
(1,001 - 2,500) Beerwah
(201 - 1,000) Aramac
PLACE (0 - 200) Bedourie
LOCALITY Barmoya
POPULATION OF TOWNS TAKEN FROM 2001 CENSUS
LOCAL GOVERNMENT H.Q. (DIAGRAM/MAP) TOWNSVILLE
REFER TO INSET WHEN INDICATED THUS *
13G LANDSBOROUGH HIGHWAY (Winton - Kynuna)
13H LANDSBOROUGH HIGHWAY (Kynuna - Cloncurry)
14B FLINDERS HIGHWAY (Charters Towers - Hughenden)
14C FLINDERS HIGHWAY (Hughenden - Richmond)
14D FLINDERS HIGHWAY (Richmond - Julia Creek)
14E FLINDERS HIGHWAY (Julia Creek - Cloncurry)
15A BARKLY HIGHWAY (Cloncurry - Mt. Isa)
15B BARKLY HIGHWAY (Mt. Isa - Camooweal)
15C BARKLY HIGHWAY (Camooweal - Border)
78A WILLS DEVELOPMENTAL ROAD (Julia Creek - Burketown)
84A KARUMBA DEVELOPMENTAL ROAD
89A BURKE DEVELOPMENTAL ROAD (Cloncurry - Normanton)
89B BURKE DEVELOPMENTAL ROAD (Normanton - Dimbulah)
92A GULF DEVELOPMENTAL ROAD (Normanton - Croydon)
93E DIAMANTINA DEVELOPMENTAL ROAD (Boulia - Dajarra)
93F DIAMANTINA DEVELOPMENTAL ROAD (Dajarra - Mt. Isa)
99B KENNEDY DEVELOPMENTAL ROAD (The Lynd - Hughenden)
99C KENNEDY DEVELOPMENTAL ROAD (Hughenden - Winton)
5701 HUGHENDEN - MUTTABURRA ROAD
5703 ARAMAC - TORRENS CREEK ROAD
5803 RICHMOND - WINTON ROAD
5807 JULIA CREEK - KYNUNA ROAD
6801 GREGORY DOWNS - CAMOOWEAL ROAD
7708 CLONCURRY - DAJARRA ROAD
7709 MT ISA -DUCHESS ROAD
L.G./s
ROAD/s
JOB NUMBER/s
JOB SITE KILOMETRES
FROM
(SITE OF PROPOSED JOB SHOWN IN RED)
QT CUSTOMER SERVICE CENTRES
Cloncurry - 16-22 Ramsay Street
Mt. Isa - Isa Square, Simpson Street
Queensland Government
Department of Main Roads
NORTH WESTERN
District 10
16-22 Ramsay Street
Cloncurry
PO Box 338
Cloncurry
Queensland 4824
08/2004
DISTRICT 11
DISTRICT 7
DISTRICT 15
DISTRICT 9
NORTHERN TERRITORY
BURKETOWN
DAJARRA
HUGHENDEN
JULIA CREEK
RICHMOND
CLONCURRY
MT. ISA
Cloncurry
Julia Creek
Richmond
Hughenden
Charters Towers
TOWNSVILLE
Mt. Isa
Camooweal
Normanton
Karumba
Burketown
Croydon
Winton
Boulia
Dajarra
ERNEST HENRY
FLINDERS HIGHWAY
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