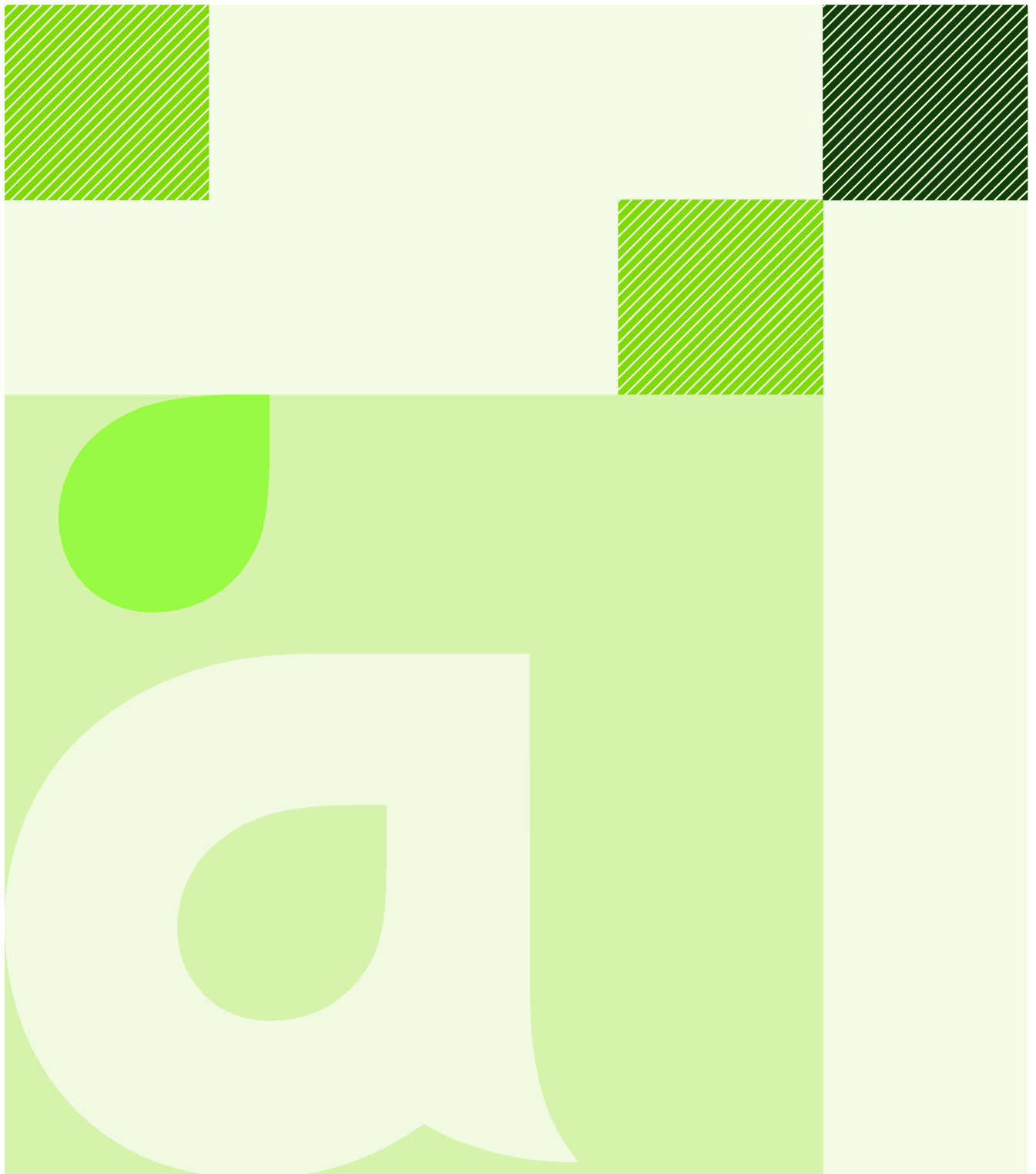




**Northern Australia Beef Roads
Programme – Funding Submission**

**Road Train Type 1 Route: Biloela to
Gladstone**

Gladstone Regional Council

23 October 2015
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1 Introduction

1.1 Context

The Australian Government has adopted a growth target of doubling food production by 2040 and has developed strategic papers with respect to development within Northern Australia (Our North, Our Future – White paper on Developing Northern Australia). The beef production industry is a significant primary industry within Northern Australia, and has been identified as an important sector within these future growth strategies. To better understand the transport of cattle and associated costs within the beef industry, Government has commissioned CSIRO (Land & Water and Agriculture Business Units) to develop the TRANsport Network Strategic Investment Tool (TRANSIT) and reference is made to their Report: TRANsport Network Strategic Investment Tool (TRANSIT) – Overview and Applications Version 1.0, 1 September 2015.

The federal government has announced a \$100 million infrastructure upgrade package, known as the Northern Australia Beef Roads Programme (NABRP), to upgrade key beef supply chain corridors. Submission of potential projects to be considered and assessed for inclusion and funding under the NABRP are to be submitted by COB Friday 23 October 2015 to CSIRO, with copies sent to the relevant state road authority, namely the Queensland Department of Transport and Main Roads (TMR) for Queensland based submissions.

The submissions will identify the route that is to be considered for re-designation, i.e. from B-Double to Road Train Type 1, the infrastructure that is required to be upgraded to meet the guidelines for the use by these vehicles and the order of costs associated with the upgrade. CSIRO will utilise the TRANSIT model to determine the potential transport costs savings to the industry, which together with the capital cost for the upgrades, can be used for a benefit cost type assessment and prioritisation of projects for funding.

Gladstone Regional Council has identified potential benefits to the Gladstone Region economy associated with establishment of new beef industry facilities, inclusive of:

- Live cattle export through the Port of Gladstone or Port Alma
- Cattle processing facilities (abattoir/feedlot) within the Gladstone State Development Area (GSDA)
- Boxed Beef Export Facility through the Port of Gladstone (Port Central)

Aurecon has been commissioned by Gladstone Regional Council (GRC) to prepare a submission for assessment and inclusion within the NABRP as part of GRC's strategy to enable and promote beef industry development within the region. GRC's broader strategy is to identify and support the provision of critical infrastructure that will provide a higher level of service and competitiveness for:

- Existing industries and agribusiness

- The establishment of new industries and agribusiness
- The growth of the Port of Gladstone in accordance with their strategic plan

1.2 Live Cattle Transport - Road Train Type 1

1.2.1 General Description

Live cattle movements are typically associated with movements between properties, to sale yards, to feedlots, to abattoirs and to live cattle export facilities (typically comprising a quarantine/holding yard and a port wharf load out). The Gladstone region is currently serviced by local facilities at Miriam Vale (Sale yards) and wider regional facilities at Gracemere (Sale yards), Rockhampton (two abattoirs) and Biloela (abattoir). A live cattle export facility has recently been approved, with a Holding Yard located adjacent the Bruce Highway near Raglan and port facility at Port Alma.

Live cattle movements in the Gladstone Region are currently restricted to rigid body truck, semi-trailer and B-Doubles. Road Train Type 1 vehicles are currently restricted to roads west of Biloela (Dawson Highway) and north into Gracemere (Capricorn Highway). Refer to Map 1 for the extent of approved Road Train Type 1 and B-Double Routes.

In the current scenario modelling undertaken by CSIRO “TRANSIT Scenario Type 1 access Biloela to Gladstone” a minimal transport saving of \$20,000 was identified associated with the designation of the Dawson Highway to a Road Train Type 1 from Biloela through to Gladstone (intersection with Glen Lyon Road). This minimal saving in the transport of live cattle is due to the fact that there is currently little movement of cattle on this route that could benefit. The upgrade would not attract from other routes any movements from the west into the existing destinations, as Road Trains into Gracemere / Rockhampton would not be able to travel from Calliope north on the Bruce Highway.

For significant benefits to be realised associated with the movement of live cattle within the Gladstone Region, destinations within the Gladstone region would need to be established that would attract movements from western Queensland into Gladstone via the Dawson Highway. The establishment of a Road Train Type 1 route from Biloela into Gladstone destinations, in lieu of utilising the existing B-Double network, may then achieve significant savings across the road network.

1.2.2 Live Cattle Export

Shipping for live cattle transport varies significantly in size, with smaller vessels in the order of 3 - 6,000 head and newer larger vessels over 20,000 head. Ships come into the wharf facility and are typically loaded with cattle over a period of one to two days, usually on a continuous basis. At the same time the ship takes on board fodder for the sea trip. Wharf facilities ideally comprise a land backed wharf where the transport vehicle can pull up parallel and in close proximity to the ship, and cattle taken from road transport onto the ship by purpose built ramps. Fodder can either be loaded by ship mounted or wharf based cranes.

The Port Central Precinct of the Port of Gladstone currently provides land backed wharf facilities with planned expansion to provide for future growth. The wharfs can accommodate the range of vessels that may be utilised for the live export. Port Central is currently serviced by B-Double road access, with the Port Access Road (Stage 1 Glen Lyon Street to Port) constructed in 2004 as a dedicated freight route to avoid use of local roads within the CBD of Gladstone.

Planning and preliminary design has been undertaken by TMR in 2014 to extend the Port Access Road from Glen Lyon Street west to Blain Drive (Stage 2) and further west to Red Rover Road (Stage 3). The construction of Stages 2 and 3 would allow for the provision of a dedicated freight route into Port Central that avoids the urban areas and traffic movements within Gladstone. The provision of live cattle export through Port Central could be achieved now utilising B-Double or semi-trailer movements from the Holding Facility through to the ship. If the trip length is relatively short this may be



an acceptable transport cost to the industry. It should be noted that to utilise the existing road network, trucks would typically use Gladstone Mt Larcom Road from the west (Hanson Road, Glen Lyon Road) to access the Port Access Road Stage 1. This route is typically through industrial and commercial sectors of town and may be acceptable with regards to impacts on other road users and surrounding uses.

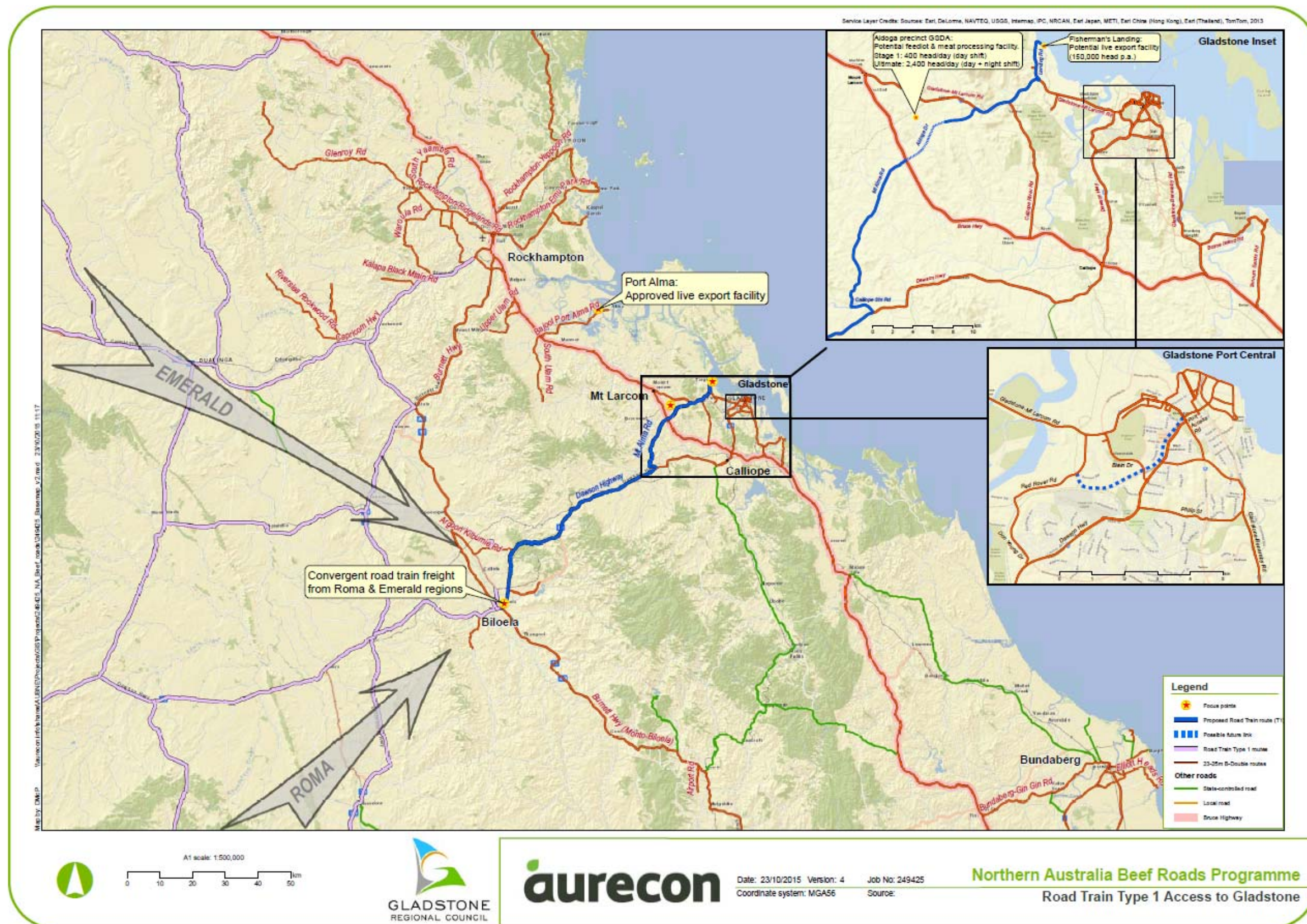
The development of live cattle export facilities to the north of the city within the Port of Gladstone may be viable at Fisherman's Landing Port Precinct. Whilst there are currently no existing land backed wharf facilities and none proposed under the strategic plan, GPC has previously given consideration to the use of Wharf 5, which currently has berthing capacity but with the wharf serviced by a jetty approximately 200 m long. Road transport can easily access the start of the jetty, with cattle movements from road transport to the ship requiring the provision of a race (narrow fenced path) along the jetty. Fisherman's Landing is located in an industrial environment where cattle movements would not impact on the surrounding land use or mix with urban traffic.

Live cattle export from Port Alma can utilise the existing land backed wharf facilities with access via Bajool Port Alma Road from the Bruce Highway, both approved B-Double routes.

The benefits for the provision of a Road Train Type 1 route into the port facility for live cattle export are highly dependent on the proximity of the Holding Yard to the port, if this distance is relatively short, economical movements may be achieved utilising B-Doubles or single trailer units. It is noted that the Port of Townsville is serviced by Road Train Type 1 and 2 with cattle typically held in Charters Towers, approximately 120 km away.

Movement of Road Train Type 1 vehicles on the Bruce Highway have previously been avoided by TMR, which would preclude the introduction of Road Trains Type 1 to service the Port Alma project, ie cattle trucks into the Holding Yard would need to break down from Road Train Type 1 at either Gracemere or Biloela.

For live cattle export from Port of Gladstone, the Holding Yard would typically need to be located west of Calliope or north of the Calliope River to avoid the higher density residential areas. The Gladstone State Development Area was established for major heavy industrial development, however there may be components of the GSDA that could be utilised for new agribusiness.



Map 1: Road Train Type 1 Access to Gladstone

1.2.3 Meat Processing Facility

A proponent is currently undertaking feasibility studies for the development of a feedlot and abattoir within the Aldoga Precinct of the GSDA, which requires the transport of live cattle as input into the process and boxed beef as products for export. Initial studies for the project have been on the basis of utilising the existing B-Double road network for the movement of cattle and products. The introduction of a Road Train Type 1 route from Biloela into the facility would allow for transport cost savings associated with negating the need for vehicle break down at Biloela.

1.2.4 Route Constraints

1.2.4.1 Town of Calliope

Calliope is situated adjacent to the and west of the Bruce Highway and straddles the Dawson Highway. Planning had allowed for the Dawson Highway to bypass Calliope to the north, however this was not adopted in the recent implementation of the grade separated interchange for the Bruce Highway and Dawson Highway, which effectively locks the Dawson Highway through the town into the longer term. The section through town is an approved B-Double route, with time restrictions, however it is anticipated that the re-designation of this to Road Train Type 1 would receive very negative feedback from the community.

1.2.4.2 Bruce Highway

No sections of the Bruce Highway are currently approved for Road Train Type 1 use and therefore a precedent would need to be established to allow designation of sections of the Bruce Highway as Road Train Type 1.

1.2.4.3 Town of Yarwun

The town of Yarwun straddles the northern end of the Calliope River Road, which links the Bruce Highway to the Gladstone Mt Larcom Road. This road was upgraded from a low standard local road to a major freight corridor in 2004, principally to service expansion of industry into the GSDA and northern port precincts, negating the need for the traffic to access this area through Gladstone. Whilst this is an approved heavy vehicle transport route, there may still be opposition to the introduction of Road Train Type 1 vehicles through the town

1.2.4.4 Urban Areas of Gladstone

The Dawson Highway passes through the urban parts of west Gladstone and carries significant traffic. The introduction of Road Train Type 1 into this section of the Dawson Highway would not be support by the community. A heavy vehicle route was established along Don Young Drive/Red Rover Road to allow movements from the Dawson Highway north of the town onto Gladstone Mt Larcom Road (Hanson Road).

1.2.5 Opportunities

In land use and infrastructure planning undertaken for the GSDA, the potential for the development of an intermodal transport hub was identified, located within the Aldoga Precinct adjacent the Bruce Highway and opposite to the Mt Alma Road intersection. The hub was identified due to proximity to:

- Bruce Highway, Dawson Highway, Aldoga Drive as major road links
- Moura Link Rail which is planned to connect from the Moura Rail across to the Main North Coast Line near the town of Mt Larcom and be located to the east of and adjacent the Bruce Highway in the vicinity of the hub
- Port of Gladstone
- Major industries within the GSDA

The introduction of a Road Train Type 1 access into this area would benefit the viability of establishing such a hub.

1.2.6 Identified Road Train Type 1 Route

The route identified by GRC for assessment extends from Biloela to Port of Gladstone and is approximately 120 kilometres in length, utilising a combination of both state controlled and local roads. The route in its entirety can be seen in Map 1.

The route follows the Dawson Highway east from Biloela before turning off onto Calliope Station Road and continuing along Mt Alma Road to the Bruce Highway. From there, it would continue through the GSDA via Aldoga Drive (requires western section to be constructed through to Bruce Highway), connecting to and heading east on Gladstone Mt Larcom Road to Landing Road and into the Fisherman's Landing Precinct within the Port of Gladstone.

It should be noted that the proposed route can be differentiated by either state controlled or local council controlled roads, as per Table 1.

The route could be established in stages, with priority given to extending the Road Train Type 1 access Bruce Highway via Calliope Station Road/Mt Lama Road. A breakdown facility would need to be provided at the Bruce Highway to allow use of the existing B-Double routes to reach final destinations.

Table 1: Hierarchy of Roads within the Study Area

Street Name	Hierarchy
Dawson Highway (Gladstone to Biloela)	State Controlled (TMR)
Calliope Station Road	Local Road (GRC)
Mt Alma Road	Local Road (GRC)
Aldoga Drive	Local Road (GRC)
Gladstone – Mt Larcom Road	State Controlled (TMR)
Landing Road	Local Road (GRC)

1.3 Boxed Beef Export Facility

1.3.1 General Description

Boxed beef refers to beef products from abattoirs and other meat processing facilities that has been “boxed” for transport within refrigerated trailers (local markets) or refrigerated containers (export markets). Currently within Queensland, all boxed beef for export is handled through the Port of Brisbane with 650,000 tonnes exported in 2014, with transport predominately via road haulage (B-Double vehicles). The origin of the boxed beef in north Queensland includes existing abattoir facilities in Townsville, Mackay, Rockhampton and Biloela. A number of new abattoir facilities are currently under investigation and include facilities at Hughenden (scenario has already been assessed by CSIRO with TRANSIT), Emerald and Roma. A new facility is also undergoing a feasibility study within the Aldoga Precinct of the GSDA.

GRC has identified a potential savings in overall road transport costs associated with the provision of a boxed beef export facility within the Port Central Precinct of the Port of Gladstone. Within Gladstone Ports Corporation's 50 Year Strategic Plan, Port Central is identified for the establishment of container

based facilities. Therefore the establishment of a boxed beef facility fits within the GPC's proposed uses.

Port Central is currently connected to the wider road network with approved B-Double routes, namely the Port Access Road Stage 1 (Glen Lyon Road to Port Central), Dawson Highway, Gladstone Mt Larcom Road, and the Bruce Highway. A new boxed beef export facility within Port Central can be serviced by the existing road network, and would support the implementation of future stages of the Port Access Road.

1.3.2 Scenario to be Assessed

The Port Access Road has been identified in strategic planning as a major freight corridor within the city limits providing a long term, dedicated freight corridor from the wider road network into Port Central, allowing for maximum growth potential within Port Central with minimal disruption to the urban transport function of the Dawson Highway and Gladstone Mt Larcom Road. Planning and preliminary design was undertaken by TMR in 2014 for the extension of the Port Access Road from Gladstone Mt Larcom Road (Glen Lyon Road) west through the city to connect with Blain Drive (Stage 2) and through to Red Rover Road (Stage 3).

GRC's is requesting that TRANSIT be used to model a scenario for the provision of a boxed beef export facility located at Port Central and servicing the central and north Queensland boxed beef market. The model can then provide advice with respect to:

- The number of vehicle movements and tonnages into the proposed facility
- The road transport cost savings that may arise from the redirection away from Port of Brisbane

This information may then be utilised by GRC and wider government/GPC to assist in the future assessment of the Port Access Road extensions (Stages 2 and 3).

1.4 Assessment Guidelines

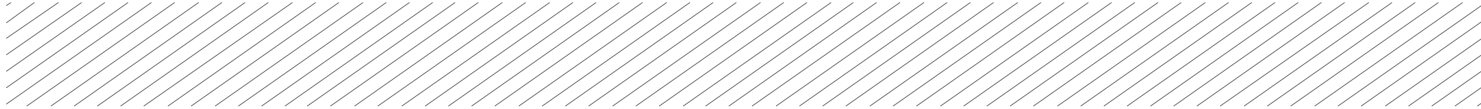
There are several documents that this assessment will be based on and referenced from including:

- *Route Assessment Guidelines for Multi-Combination Vehicles in Queensland*. October 2013. Department of Transport and Main Roads Queensland.
- *Performance Based Standards Scheme Queensland Network Classification Guideline Level 2B, 3B and 4B Roads*. January 2014. Department of Transport and Main Roads Queensland.
- *Performance Based Standards Scheme Network Classification Guidelines*. July 2007. National Transport Commission.
- *Guidelines for Assessing the Suitability of Heavy Vehicles for Local Roads*. December 2002. National Transport Commission.

1.5 Assumptions

The following assumptions were made as part of this assessment:

- Existing B-Double beef truck movements, if any, are replaced by Type 1 Road Trains
- Full road safety audits have not been undertaken as part of this assessment
- Public Utility Plant (PUP) and other service impacts have not been assessed.
- The design vehicle is to be a Type 1 Road Train
- Community consultation is not assumed to be part of this scope of works
- Design of road and intersection upgrades are not part of this scope of works

- 
- Detailed Cost Estimates are not assumed to be part of these scope of works. High level cost estimates have been referenced from similar projects previously undertaken by Aurecon.
 - An Environmental Impact Assessment is not within this scope of works
 - Detailed structural assessments are not within this scope of works
 - No alternative routes have been considered as part of this assessment
 - Detailed traffic counts have not been undertaken as part of this assessment



2 Road Train Type 1 Route Assessment

2.1 General approach and Methodology

The methodology used for the Biloela to Port of Gladstone route assessment follows the checklist that is presented within TMR's Route Assessment Guidelines 2013. The check list contains a range of criteria that should be considered to determine if a particular route is suitable for Road Train Type 1 Access. The criteria assessed is presented in the following sections.

2.2 Environmental Considerations

2.2.1 Noise

A proposed route should consider the potential noise impacts on the surrounding areas, particularly as road trains have the potential to generate more noise than other vehicles especially when braking and accelerating (TMR 2013).

2.2.2 Dust, Splash and Spray

Dust, splash or spray of rainwater from Type 1 Road Trains operating at speed on other vehicles, pedestrians, cyclists or nearby property should be considered and mitigated.

2.2.3 Vibration

Adverse impacts upon people and property due to vibration caused by a heavy vehicle should be considered if a proposed road train route passes close to abutting development.

2.2.4 Odours and Fumes

Increased odours and fumes when carrying livestock and increased exhaust fumes from heavy vehicles are to be considered if they are likely to be significant if a road train route is introduced.

2.2.5 Environmental Factors

Environmental impacts of the proposed operation on vegetation, wildlife, air quality and native title issues are to be considered.

2.2.6 Dangerous Goods

The consequences of a spill or dislodgement of large quantities of hazardous materials on persons and the environment are to be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.



2.3 Planning Considerations

2.3.1 Land Use

The proximity of Road Train routes to sensitive receptors such as residential, commercial, industrial areas, schools, hospitals, aged care, shopping centres, religious facilities and recreational areas are to be considered.

2.3.2 Planning Evaluation

Assessment of a proposed route should be checked against any future planning proposals to evaluate the potential effect that road trains may have.

2.3.3 Community Consultation

Local community concerns should be taken into account and balanced against the economic, road safety, traffic management and other technical issues.

2.3.4 Economic Factors

In making an assessment of a proposed route, the Regional, State and National economic benefits for the proposed operation must be taken into consideration.

2.3.5 Intermodal Transport Evaluation

Alternative modes of transport need to be assessed to ensure that using road trains is the most effective form of transportation available taking into consideration economics, road safety, and community benefit.

2.4 Technical Considerations

2.4.1 Pavement Widths

Pavement width is a key consideration when assessing potential road train routes. Pavement widths will differ dependent on an urban or rural area. For the purposes of this study, only rural area requirements will be listed.

Sealed Roads

For sealed roads within a rural area, the minimum seal width requirements are presented in the following table.

Table 2: Minimum Carriageway and Seal Widths in Rural Areas for MCV Routes (TMR 2013)

AADT	Existing Alignments						New Alignments (for comparison)	
	Absolute Minimum		Desirable Minimum					
			Limited tourist traffic		Prolonged periods with > 5% caravans			
	Seal width (m)	C'way width (m)	Seal width (m)	C'way width (m)	Seal width (m)	C'way width (m)	Seal width (m)	C'way width (m)
<150	- ⁽²⁾	8.0	6.0	8.0	8.0	8.0	6.0 ⁽³⁾ 9.0	8.0 9.0
150 to 500	6.0	8.0	7.0 ⁽⁴⁾	8.0	8.0	8.0	9.0	9.0
500 to 1000	6.5	8.0	8.0	8.0	8.0	8.5	9.0	9.0
>1000	-	-	-	-	9.0	9.0	9.0	10.0

Notes:

1. The available seal and carriageway width on horizontal curves (i.e. what curve widening has been provided) will determine the suitability for a particular type or types of MCV (see Table 3-3: Curve Widening per Lane).
2. A sealed pavement is not mandatory for this traffic volume. In practice, many existing roads will have a 3.7m wide (or greater) single lane seal. Some roads may have a 6.0m seal which may function as a single lane (see Note 3) or two-lane if marked with a centre line.
3. The 6.0m seal is not marked and operates as a single 4m lane with partially sealed shoulders. An 8.0m seal provides acceptable two-lane operation.
4. Preferably 7.4 to reduce maintenance.
5. Carriageway widths < 9.0m on two-lane roads must be accompanied by embankment and table drain slopes 1 on 4 or flatter together with clear areas to prevent “shying” towards the centre of the road. However, some short local exceptions (<200m) are possible.
6. Carriageway widths < 10.0m on roads with a single-lane seal must be accompanied by embankment and table drain slopes 1 on 6 or flatter so smaller vehicles can move over to clear an oncoming MCV that stays on the seal. However, some short local sections are possible where visibility allows drivers of smaller vehicles to move over and stop prior to the restricted width section if there is an oncoming MCV.

Unsealed Roads

On unsealed roads a minimum pavement width of 8.0 metres should desirably be available for B-Doubles and a minimum pavement width of 8.4 metres should desirably be available for Road Trains.

2.4.2 Road Geometry

Crossfall

TMR recommends sealed freight routes should not exceed 3% crossfall.

For unsealed roads, crossfall of 4-6% is required to ensure adequate drainage and minimal maintenance.

Horizontal curves

Figure 1 details the curve widening per lane in metres required for heavy vehicles

Radius (m)	B-Double	Type 1 Road Train	Type 2 Road Train
30	Use Turning Templates		
40			
50			
60			
70			
80	1.31	1.62	
90	1.03	1.44	
100	0.90	1.26	1.80
120	0.80	1.13	1.61
140	0.71	1.00	1.43
160	0.62	0.87	1.25
180	0.53	0.74	1.07
200	0.45	0.62	0.89
250	0.37	0.51	0.74
300	0.30	0.41	0.59
350	0.26	0.35	0.51
400	0.22	0.30	0.44
450	No Curve Widening		0.39
500			0.35
600			0.30
700			0.25
800			0.22

Figure 1: Curve Widening per Lane in metres (TMR 2013)

Superelevation

Superelevation should be as per Figure 2. The route should not be recommended for approval if any of the following is true for one or more curves on the sealed route:

- The maximum speed of the curve, as determined from Figure 2, is more than 15 km/h below the posted or legal speed limit for the section of road, and there are no advisory speed signs installed on the approaches to the curve; and
- The maximum speed of the curve, as determined from Figure 2, falls below the speed shown on any advisory speed signs installed on the approaches to the curve.

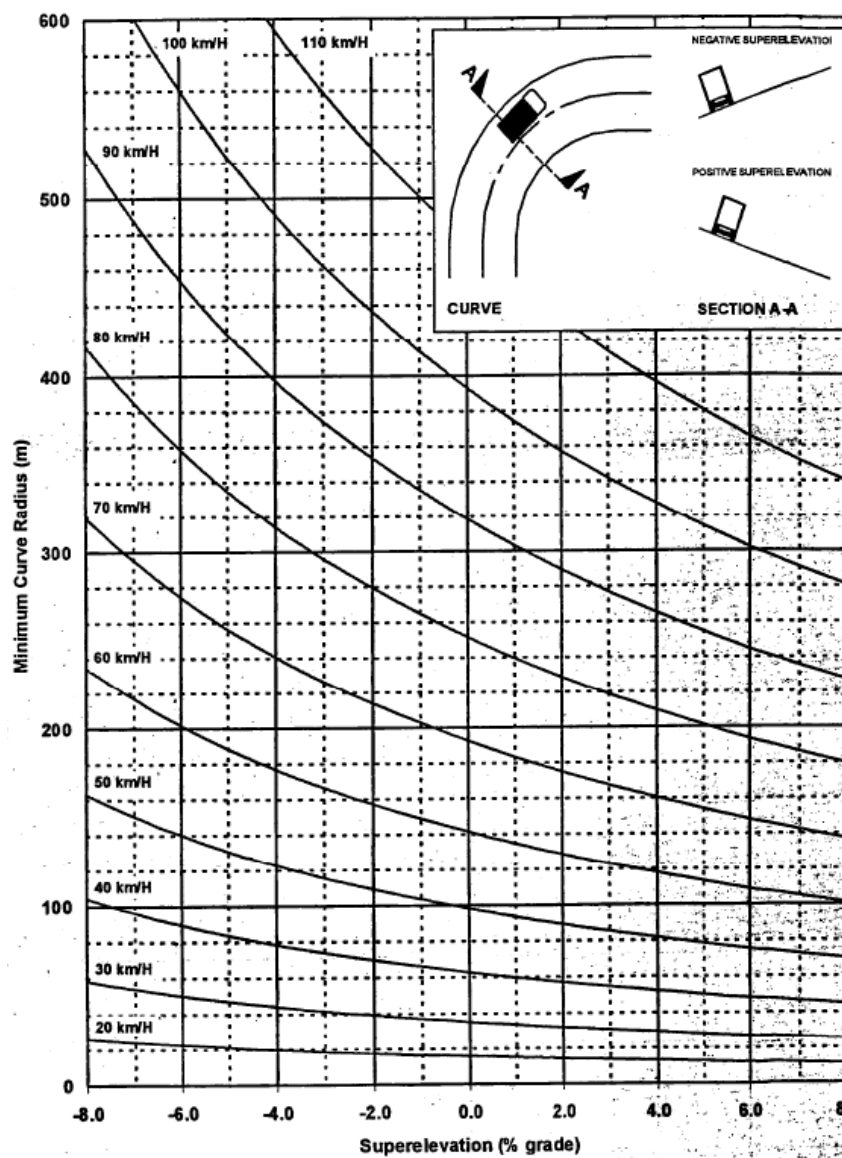


Figure 2: Curves and Superelevation (TMR 2013)

2.4.3 Intersections

There should be sufficient length between adjacent intersections to allow road trains to clear the first intersection before stopping at the second intersection.

Unsignalised Intersections

Larger gaps in traffic are required by heavy vehicles to carry out manoeuvres when turning into and out of unsignalised intersections. As a result, adequate Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD) are two aspects that need to be considered. The requirements of which can be found within Austroads Guide to Road Design Part 4A and are illustrated in Figure 3 and Figure 4.

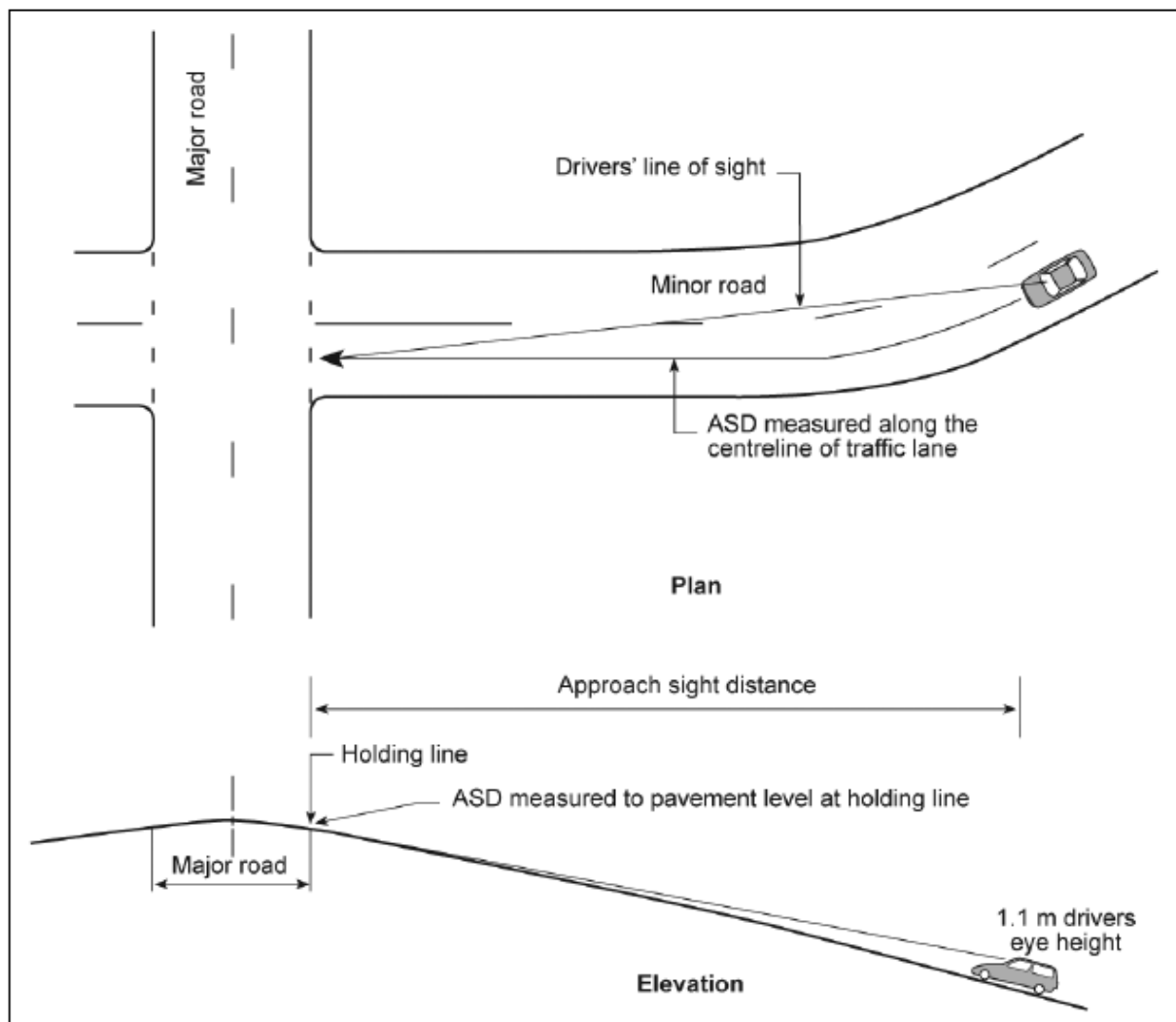


Figure 3: Application of ASD (Austroads 2010)

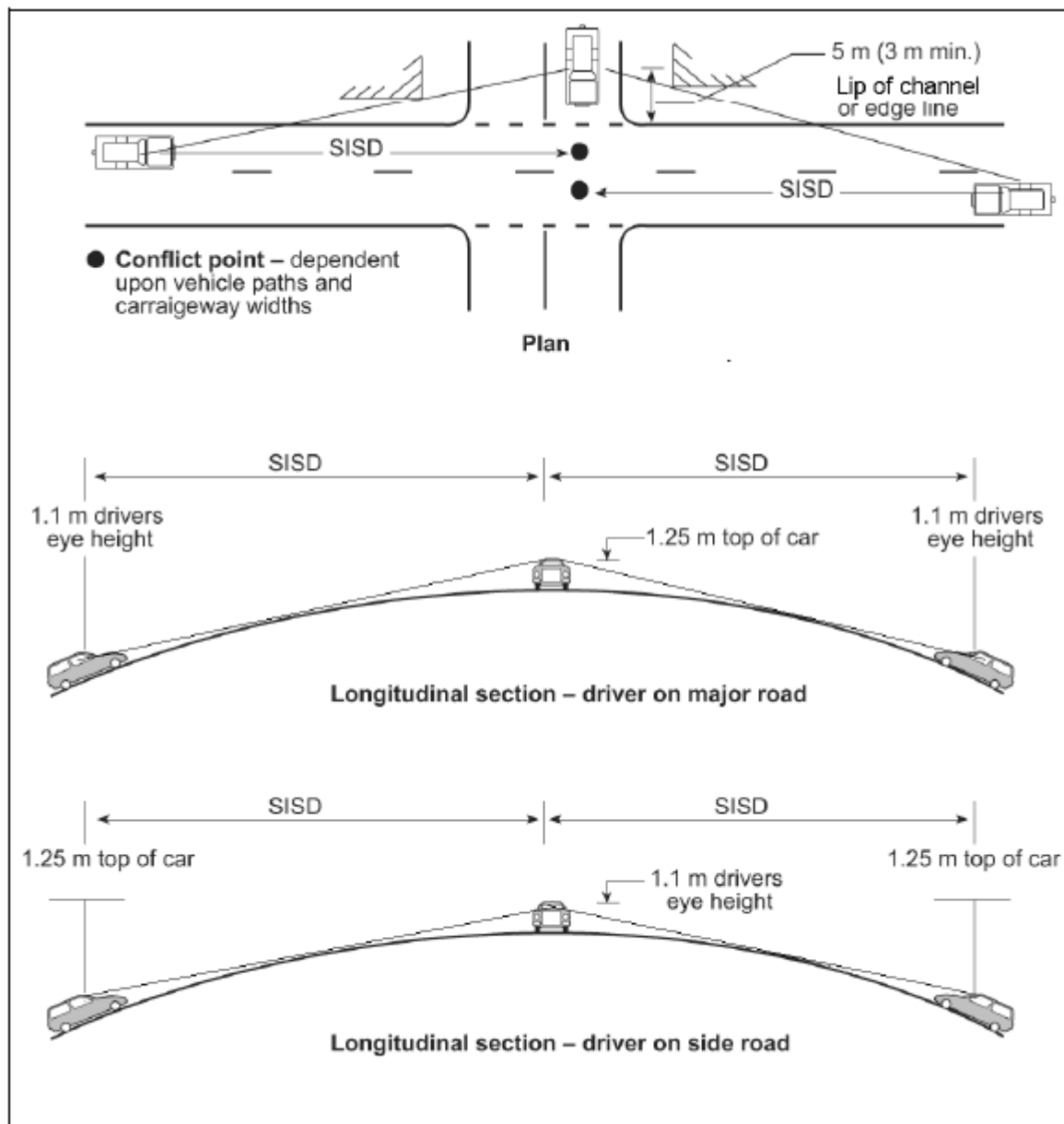


Figure 4: Safe intersection sight distance (Austroads 2010)

Signalised Intersections

The route should not be recommended for approval if the traffic signals are not visible to the operator of the approaching road train from a stopping sight distance as per Austroads Guide to Road Design Part 4A and TMR's Road Planning and Design Manual (RPDM).

Table 3: Stopping Sight Distances for a 2.5 second reaction time (TMR 2013)

Type 1 Road Train Operating Speed	Grade								
	Downhill				Level	Uphill			
	-8%	-6%	-4%	-2%		2%	4%	6%	8%
40	74	72	70	68	66	65	64	62	61
50	102	98	95	92	89	87	85	84	82
60	134	128	123	119	116	112	110	107	105
70	170	162	155	149	144	140	136	133	130
80	209	198	190	182	176	170	165	161	157
90	252	239	228	218	210	203	197	191	186
100	308	290	275	263	252	242	234	227	220
110	387	360	339	321	305	292	281	271	262

2.4.4 Turning

Turning and swept path should be checked to ensure road trains can safely negotiate all corners, intersections, roundabouts and other traffic management devices along the proposed route, with minimal or no interference to traffic within the existing available seal width.

2.4.5 Terminal/Destination Connections

The proposed route should have suitable terminal and destination connections.

2.4.6 Overtaking Requirements

Proposed routes should provide sufficient overtaking opportunities according to the following criteria.

Table 4: Acceptable criteria for overtaking opportunities (TMR 2013)

AADT	Maximum average distance per overtaking opportunity	Maximum distance between overtaking opportunities	Notes
500 or below	N/A	N/A	Provision of additional opportunities are usually not justified.
501–1000	15 km	30 km	
1001–1800	8 km	15 km	
1801 or above	5 km	10 km	At AADT > 2700, additional opportunities that exceed the criteria may be necessary.

Sight distance for overtaking is made up of two parts:

- Establishment distance - The length of clear visibility ahead in which a driver can establish that a safe overtaking opportunity exists and commence the overtaking manoeuvre
- Continuation distance - The length of road ahead in which clear visibility remains available for a driver to complete the overtaking manoeuvre, or abandon the manoeuvre if necessary

Table 5 shows the minimum requirements for overtaking a Type 1 Road train.

Table 5: Minimum establishment and continuation sight distances for overtaking

Road section Design Speed (km/h)	Overtaken vehicle speed (km/h)	Establishment Sight Distance (m)	Continuation Sight Distance (m)
	Road Trains	Type 1 Road Train	Type 1 Road Train
70	60	640	360
80	69	790	450
90	77	950	530
100	84	1,130	630
110	84	1,200	660

Overtaking Lanes

Where overtaking opportunities along a length of road are insufficient, the introduction of overtaking lanes should be considered. Particular attention should be given to roads with significant proportions of grade exceeding 5%.

On sections of road where a 100 km/h speed limit applies the minimum length of the overtaking lane should be 800 m including tapers.

2.4.7 Steep Ascending Grades

The speed of road trains ascending long and steep grades can be reduced to the extent that the difference in speed between the road train and other vehicles can become hazardous for vehicles approaching from behind. In some cases, the drivers of faster following vehicles may become frustrated and attempt an overtaking manoeuvre when unsafe to do so. For this reason, steep ascending grades should have overtaking lanes where possible.

A forced speed reduction to 40 km/h is considered the threshold point at which drivers will seek to overtake a slower vehicle, regardless of whether or not adequate sight distance is available (TMR 2013).

The maximum desirable vertical grade for any section of a proposed route is 5%.

2.4.8 Acceleration Lanes

Acceleration lanes should be provided for a fully loaded road train to accelerate to within 70% of the operating traffic speed at the merge onto the main road.

2.4.9 Railway Crossings

Routes should only be accepted if the requirements relating to visibility, stacking distance, stopping distance, and sight distance are met. Routes should be rejected where road trains are required to queue across railway lines due to the close proximity of road intersections.

2.4.10 Structures

Load Capacity

Routes with bridges having legal posted load limit signs in place should only be recommended for approval where the maximum gross mass of the vehicle is 10% less than the posted load limit.

Bridge Width Requirements

The following figures detail the minimum bridge carriageway requirements for national highways and roads other than national highways.

Bridge		Two Way				One Way							
		Two Lane				Single Lane				Two Lane			
Length	AADT	Shldr	Lane	Shldr	Total Width	Shldr	Lane	Shldr	Total Width	Shldr	Lane	Shldr	Total Width
<20	<3000 ⁽²⁾	1.5	7.0	1.5	10.0	2.0	3.5	1.0	6.5	-	-	-	-
<20	>3000 ⁽²⁾	2.0	7.0	2.0	11.0	2.0	3.5	1.0	6.5	2.0	7.0	1.0	10.0
>20	<1000/ lane	0.6 ⁽³⁾	7.0	0.6 ⁽³⁾	8.2	2.0	3.5	1.0	6.5	-	-	-	-
>20	>1000/ lane	1.2 ⁽³⁾	7.0	1.2 ⁽³⁾	9.4	2.0	3.5	1.0	6.5	2.0	7.0	1.0	10.0

1. Add appropriate lane widths to the two lane configurations to determine multi-lane bridge widths.
2. AADT within 10 years, other AADTs are within 20 years.
3. Minimum allowable shoulder widths have been used.
4. If a bridge is part of a cycle route and/or is in a built-up area, extra shoulder width will be required to allow adequate cyclist access, and pedestrian facilities will be required.

Figure 5: Bridge carriageway widths for national highways (TMR 2013)

Bridge		Two Way				One Way							
		Two Lane				Single Lane				Two Lane			
Length	AADT	Shldr	Lane	Shldr	Total Width	Shldr	Lane	Shldr	Total Width	Shldr	Lane	Shldr	Total Width
Any	<100	1.0	6.0	1.0	8.0	0.6	3.0	0.6	4.2	-	-	-	-
Any	100-500	1.0	6.0	1.0	8.0	2.0	3.0	1.0	6.0	-	-	-	-
Any	500-1000	1.0	6.5	1.0	8.5	2.0	3.25	1.0	6.25	-	-	-	-
<20	1000-2000	1.5	6.5	1.5	9.5	2.0	3.25	1.0	6.25	-	-	-	-
>20	1000-2000	1.0	6.5	1.0	8.5	2.0	3.25	1.0	6.25	-	-	-	-
<20	>2000	2.0	7.0	2.0	11.0	2.0	3.5	1.0	6.5	2.0	7.0	1.0	10.0
>20	>2000	1.0	7.0	1.0	9.0	2.0	3.5	1.0	6.5	1.0	7.0	1.0	9.0

1. Add appropriate lane widths to the two lane configurations to determine multi-lane bridge widths.
2. AADTs are within 20 years.
3. If a bridge is part of a cycle route and/or is in a built-up area, extra shoulder width will be required to allow adequate cyclist access, and pedestrian facilities will be required.

Figure 6: Bridge carriageway widths for roads other than national highways (TMR 2013)

2.4.11 Vertical Clearances

The minimum overhead clearance at rigid overhead obstructions such as bridges, overpasses and signs shall be 400 mm above the height of the vehicle being investigated.

The minimum overhead clearance at non-rigid overhead obstructions such as wires and trees shall be 500 mm above the height of the vehicle being investigated.

2.4.12 Off-Road Parking

In rural and remote areas the route should have adequate off-road parking facilities suitable to allow the safe entry/exit and parking of the requested road trains at sufficient spacing along the route.

In any one direction of travel, the desirable maximum spacing for off-road parking facilities is:

- Rural Areas - 80 km
- Remote Areas - 120 km

2.5 Traffic Interaction Considerations

2.5.1 Crash Reports

The crash history of any proposed route is to be assessed to determine if accident rates are comparable to other roads of a comparable class. Other road users to be considered include pedestrians, cyclists, tourists, school buses, cattle and other stock and farm machinery.

2.5.2 Traffic Composition

The vehicle composition of the route should be assessed. On a route where there is a high proportion of commercial vehicles, or where local drivers are already familiar with road trains operating in the area, there is a greater likelihood of route acceptance.

However, on a route where there is high tourist demand, vehicles towing caravans, or drivers not familiar with the area and inexperienced in encountering road trains, the possible safety risk to other road users' needs to be considered.

2.5.3 Traffic Volumes

The variation in traffic volumes on the proposed route throughout the year and the day, as well as the rate of growth should be considered. It may be necessary to restrict road train operation during peak hours in urban areas, or during certain periods of the year due to seasonal fluctuations in traffic flow. On the other hand, road train operations may be allowed during certain periods of the year; for example to cater for grain carting season.

Overtaking opportunities for other road users is a major consideration for roads with high traffic volumes. The frequency at which opportunities occur reduces with higher traffic volumes, thereby increasing the risk taken by overtaking vehicles. In these circumstances, consideration may be given to installing overtaking lanes.

2.6 Pavement Considerations

2.6.1 Pavement

Generally road trains are permitted the same axle load limits as general access vehicles like semi-trailers and therefore the road damage due to vertical loading would be expected to be the same per axle.

2.6.2 Roughness and High Stress Areas

Dynamic wheel forces applied to pavements, culverts and bridges are influenced by the longitudinal profile or roughness of the road approaches and pavements over culverts, vehicle suspension type, travel speed, vehicle trailer combinations and heavy vehicle mass. Typically, an impact allowance of approximately 30% is adopted for bridge design.

2.6.3 Shoulder Treatment

The Australian Road Research Board (1999) has advised that road shoulder conditions will need to be considered if vehicles are likely to use the shoulder. Provision of sealed shoulders, having minimal drop off from the road surface, would minimise the impact of a road train having to cross the shoulder.

2.6.4 Intersection Treatment

Pavement shear forces are produced when a large vehicle turns a corner at an urban intersection and the increased off tracking of road trains will compound this problem. For situations where there is stone stripping at the intersection, TMR advises the following surfacing alternatives, ordered from least to most effective:

- i) Single coat seal with polymer modification
- ii) Two-coat seal
- iii) Two-coat seal with polymer modification
- iv) Dense graded asphalt
- v) Dense graded asphalt with polymer modification

2.7 General Considerations

The determination of route suitability for road train operations will usually be a judgment based upon a combination of factors. Absolute limits cannot be established to suit every situation. The conditions existing along a route under assessment may vary considerably, from open rural road, sealed or unsealed, to urban situations, and a balance has to be reached between these.

The existence of a short section of poor standard road, either because of vertical or horizontal geometry, in a route of significant length and potential should not necessary preclude the whole route from being acceptable. However, the presence of an urban area, or structure that is unacceptable for the road train and where there is no alternative route, may well preclude the whole route.

2.7.1 Field Trials

If initial assessments are inconclusive, field trials may be required to determine dynamic behaviour and overall performance not picked up by the desktop assessment.

2.7.2 Restricted Hours of Operation

Curfews or restricted hours operations may be a practical solution to approving routes that may otherwise be unacceptable.

2.8 Summary

The methodology as presented within Chapter 2 of this report was applied to each individual road element of the proposed Biloela to Port of Gladstone route as was listed within Table 1. The following sections detail the results of the assessment per road element.

Table 6: Road Elements to be assessed

Road Element	Hierarchy	Comments
Dawson Highway (Gladstone to Biloela)	State Controlled (TMR)	Sealed 73.5 km segment
Calliope Station Road	Local Road (GRC)	Unsealed 2.5 km segment
Mt Alma Road	Local Road (GRC)	Unsealed 17 km segment
Aldoga Drive and Proposed Extension	Local Road (GRC)	Existing sealed 1.9 km segment New sealed 9 km extension
Gladstone – Mt Larcom Road	State Controlled (TMR)	Existing sealed 7.6 km segment
Landing Road	Local Road (GRC)	Existing sealed 4 km segment

3 Dawson Highway – Gladstone to Biloela

3.1 General

The Dawson Highway is an approved Road Train Type 1 route west of the Dunn Street intersection, located within the urban area of Biloela, and a B-Double approved route east from there into Gladstone. Dunn Street is a local road approved for Road Train Type 1 access to service heavy vehicle wash down facility, sale yards and abattoir.

The Dawson Highway (Gladstone to Biloela) is a state controlled, predominantly two lane undivided carriageway that runs from Gladstone to Biloela for approximately 120 kilometres with a general posted speed of 100 km/h outside of urban areas. The Gazetted direction runs from the Dawson Highway/Gladstone Mount Larcom Road four-way signalised intersection in Gladstone (Chainage 00) and extends to the Dawson Highway/Burnett Highway three-way signalised intersection in Biloela. The Anti-Gazetted version runs vice versa from Biloela to Gladstone.

For the purpose of this assessment, the section of the Dawson Highway that is assessed runs from Chainage 46.5 km (Calliope Station Road intersection) to 120 km (Dunn Street, 100 m west of Burnett Highway intersection) with gazetted (120 km to 46.5 km against gazetted).

2014 traffic census data indicates that this section of the Dawson Highway carries an AADT in the order of 1,350 vehicles per day with a HV% of approximately 23%.

TMR undertook a major upgrade to the Dawson Highway from west of Calliope to Banana, in 2008 spending \$80M to provide sealed shoulders and pavement strengthening over significant lengths. The sections were typically upgraded to achieve a sealed carriageway width of 9.0 m. A number of older bridge structures were not upgraded in this project and are currently the subject of Business Case assessment within the TMR process for upgrading in their funding program (QTRIP).

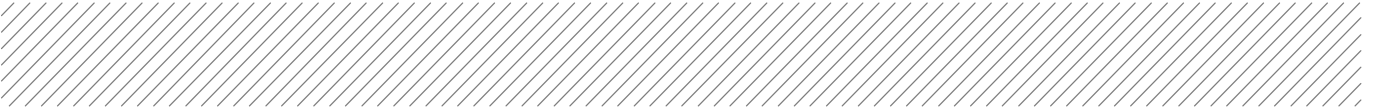
The Calliope Range section of the highway was also upgraded under a separate project to provide improved geometry and safety.

The older sections that were not included in the above typically comprise a sealed width of 7-8 m and carriageway widths of 9-10 m. The largest section of highway not upgraded is approximately 20 km in length and located west of the new Calliope Range section but still within mountainous terrain with environmental speed of 80-90 km/h for heavy vehicles.

3.2 Environmental Considerations

3.2.1 Noise

Dawson Highway from Chainage 120 km to 117 km runs through the heart of Biloela with residential/commercial properties on either side of the road that may be affected by excessive noise coming from road trains.



From 117 km to 105 km, there are farming properties that are located adjacent or offset from the Dawson Highway that may be affected by noise. Of note is Mount Murchison State School at 111.2 km that is located directly alongside the Dawson Highway.

From 105 km to 46.5 km, there are few, if any, properties that are likely to be affected.

3.2.2 Dust, Splash and Spray

Given that the Dawson Highway is a sealed road, it is not expected that dust as a result of road trains will be an issue. During rainfall periods, there may be surface rainwater spray impacts that affect pedestrians, cyclists and the vision of adjacent and opposing road vehicles from Chainage 120 km to 105 km.

3.2.3 Vibration

Residential properties from Chainage 120 km to 105 km may be affected by heavy vehicle vibration.

3.2.4 Odours and Fumes

Residential properties from Chainage 120 km to 105 km may be affected by the increased exhaust fumes from the introduction of road trains. It is fair to assume that livestock will be carried along this route, given the proposed Beef Route from Biloela to Gladstone.

3.2.5 Environmental Factors

It is not envisioned that there will be major environmental impacts as a result of road train movements along this route given that the Dawson Highway is an approved B-Double route.

3.2.6 Dangerous Goods

The proposed road train route should follow the same protocol for hazard spillage as put forth for B-Double route approval. The exact details are unknown at the time of this assessment. It is recommended that TMR is consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

3.3 Planning Considerations

3.3.1 Land Use

The proposed route from Chainage 120 km to 105 km will run through the heart of Biloela, which will be in the immediate vicinity of a variety of residential and commercial properties, schools, shopping centres, religious and recreational facilities etc.

There may be a need to introduce restricted route usage at certain times of the day, particularly around school times and peak commuter periods.

3.3.2 Planning Evaluation

The introduction of the road train route is not expected to impact on any proposed future planning proposals concerning the Dawson Highway between Chainage 120 km to 46.5 km.

3.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should be explored and consulted with at later stages of the approval process.

3.3.4 Economic Factors

For significant economic benefits to be realised associated with the movement of live cattle within the Gladstone region, destinations within the Gladstone region would need to be established that would



attract movements from Western Queensland into Gladstone via the Dawson Highway. The proposed Road Train route between Biloela and Gladstone may then achieve significant savings across the road network.

3.3.5 Intermodal Transport Evaluation

Rail was traditionally used for the transport of cattle into abattoirs for processing but limited for movements of cattle between properties and into feedlots. A rail line exists from the Moura Short Line into Biloela, terminating just to the south of the Dawson Highway. The line passes adjacent to the Tey's Brothers abattoir located off Tognalini Baldwin Road, and sale yards adjacent Payne's Road / Quarrie Road and is accessible via approved Road Train Type 1 roads.

The utilisation of rail for the transport of cattle from Biloela into the Port of Gladstone and other Gladstone region cattle facilities is feasible, as both Port Central and Fisherman's Landing Precincts have existing rail access and the Aldoga Precinct of the GSDA can be accessed via the East End Rail.

Whilst feasible, there has been an industry trend away from the use of rail post deregulation of the rail sector and competition with higher value coal transport demand on the rail network. A detailed assessment as to the economics of rail transport is outside the scope of this submission.

3.4 Technical Considerations

Note: TMR Road Asset information has not been sourced and used in the assessment to date. If the proposal warrants further investigation and assessment, this information should be sourced.

3.4.1 Pavement Widths

For the purpose of this assessment, the Dawson Highway between Calliope Station Road and Biloela is considered to be within a rural area. From 2014 TMR census data, the AADT along the Dawson Highway is in the order of 1,350 vehicles. Consulting Table 2, the desirable minimum seal width/carriageway width required for a road train route is 9.0 m.

Significant sections that have not been the subject of recent (last 10 years) upgrade programs still have unsealed or narrow sealed shoulders which do not provide the desired 9.0 m sealed carriageway width, having typical seal widths of 7.0 to 8.0 m. Based on the inspection, no significant off seal tracking of vehicles, ie vehicles tracking onto the unsealed shoulder, was evident. The less than desirable minimum sealed carriageway would appear to be operating satisfactorily for the approved B-Doubles, which "track" better than the Road Train Type 1 vehicles being considered.

The approach and departure of bridges has also been identified as being below the minimum desirable width. For example, Chainage 93.7 km to 91.0 km which contains Collards Creek No 1 and Collards Creek No 2 bridge structures appears to be in the region of 7.5 to 8 m of available seal width, with no sealed shoulders available. Similar seal widths can be found within vicinity of Collards Creek No 3 and Collards Creek No 4 bridges at Chainage 90.5 km and 87.2 km respectively.

It is recommended that an in-depth assessment is undertaken using road asset data of the Dawson Highway at further stages of the approval process.

3.4.2 Road Geometry

Road geometry checks including but not limited to crossfall, horizontal curves and superelevation, are difficult to assess without proper survey and input data available at the time of this assessment. It is imperative that further road geometry checks are undertaken at further stages of the approval process to assess the geometric upgrade requirements that may need to be undertaken to allow for road train use.

3.4.3 Intersections

Within the study area along Dawson Highway (Chainage 120 km to 46.5 km) there are no known adjacent intersections that may provide inadequate stack distance for a Type 1 Road Train.

Signalised Intersection

Signalised intersection on the Dawson Highway occur within the town of Biloela, at both the Burnett Highway intersection and the Kariboe Street intersection.

No approach or departure stacking issues were identified with these intersections.

Roundabout

A roundabout has recently been constructed on the Dawson Highway/Valley View Drive intersection on the eastern approach into Biloela, approximate Chainage 117.5 km. It is understood that this roundabout is suitable for B-Double use with a mountable annulus on the central island and adequate lane width.

It is recommended that a swept path analysis is undertaken to check the adequacy of the roundabout and outer kerb diameters at further approval stages.

Unsignalised Intersection

There are several unsignalised intersections along the Dawson Highway route, these are mainly local streets within Biloela and local roads which would not be approved for road train use.

No detailed assessment has been made with respect to Approach Site Distance and Safe Intersection Site Distance compliance with Appendix B and C of the Route Assessment Guidelines. It is noted that the difference in sight distance requirements between a B-Double and Road Train Type 1 for an operating speed of 100 km/h is typically less than 20 m for a reaction time of 2.0 seconds. On the assumption that the intersections currently meet requirements for a B-Double, it is anticipated that no major modifications to the location of the intersections and or geometry of the Dawson Highway will be required. A detailed assessment will need to be undertaken in the latter stages of route assessment.

The proposed route connects to the Dawson Highway via Calliope Station Road, an unsignalised intersection located at Chainage 46.5 km. The Dawson/Calliope Station intersection is an existing Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment as per Austroads Part 4A.

The designation of the route will result in Road Train movements:

- turning left from the Dawson Highway into Calliope Station Road, which may impact on:
 - following traffic, requiring the provision of an auxiliary left turn lane
 - vehicles stored in the minor leg waiting to enter the Dawson Highway, requiring the widening of the minor leg to allow the road train to access Calliope River Road without conflicting with the stored vehicle
- turning right out from Calliope Station Road onto the Dawson Highway, which may impact on:
 - westbound traffic along the Dawson Highway, as the road train will typically be slower to accelerate and reach operating speed

Upgrades to this intersection to provide for Road Train Type 1 use will typically comprise:

- Provision of left turn auxiliary lane
- Widening and sealing of the minor leg (Calliope Station Road) to allow for turning traffic clearance to stored traffic
- Provision of an auxiliary acceleration lane for heavy vehicles entering the Dawson Highway, this would typically be provided as a dual auxiliary lane/overtaking lane

- Provision of asphalt surfacing to the turning movement areas within the intersection

It is not expected that full intersection lighting will be required and that the provision of flag lighting should be sufficient for the anticipated traffic volumes.

3.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the key intersections along the Dawson Highway. Initial site observations and subsequent desktop review of the Dawson Highway/Calliope Station Road intersection has indicated that intersection upgrades may need to be undertaken at this intersection to account for turning Type 1 Road Trains.

It is recommended that further analysis is undertaken at future approval stages.

3.4.5 Terminal/Destination Connections

It is assumed that there will be no terminal/destination facilities along the Dawson Highway section of the proposed route.

3.4.6 Overtaking requirements

Table 4 indicates that for an AADT of approximately 1,350 vehicles, the maximum distance between overtaking opportunities and the maximum average distance per overtaking opportunity is to be 15km and 8 km respectively. Whilst a detailed overtaking assessment along the Dawson Highway from Chainage 120 km to 46.5 km has not been undertaken, TMR has already undertaken such an assessment along the Dawson Highway.

It is understood that the results of the TMR study identified overtaking opportunity deficiencies along the Dawson Highway between Gladstone and Biloela. It is recommended that consultation with TMR is undertaken at future approval stages regarding the outcomes of the overtaking assessment.

3.4.7 Steep ascending grades

As mentioned within Section 3.4.2, recent works along the Dawson Highway were completed within mountainous terrain. It is recommended that consultation with TMR is undertaken in order to establish if the maximum desirable vertical grade for any section of the proposed route is no greater than 5%.

3.4.8 Acceleration Lanes

The requirement for acceleration lanes within the study area along the Dawson Highway should not be impacted by the designation as a Road Train Route.

3.4.9 Railway Crossings

There is an at-grade railway crossing along the Dawson Highway located at Chainage 113 km on the approach to Biloela. There is adequate sight distance in the gazettal and against gazettal with no queueing or stacking distance problems envisioned.

The Callide Valley Branch line that crosses the Dawson Highway at Chainage 119.85 km. There is good sight distance in the gazettal and against gazettal directions with no queueing or stacking distance problem restrictions.

3.4.10 Structures

The Queensland Government's 'Queensland Globe' resource has indicated a total of 14 bridge structures that will be found within the Dawson Highway study area, the details of which are presented in the following table alongside the required multi-lane widths for a non-National Highway asset as per Figure 6. The order of bridges runs against gazettal from Biloela to the Calliope Station Road intersection.

Table 7: Bridge structure summary along the Dawson Highway study area and Road Train route compliance

Bridge Name	Chainage	Approx. Bridge Length	Approx. Bridge Width	Required Total Bridge Width	Comment
Callide Creek	115.5 km	80 m	8.2 m	8.5 m	May not be compliant
Oaky Creek	104.4 km	50 m	8.0 m	8.5 m	May not be compliant
Collards Creek No 1	92.7 km	50 m	8.0 m	8.5 m	May not be compliant
Collards Creek No 2	92.25 km	70 m	8.0 m	8.5 m	May not be compliant
Collards Creek No 3	90.46 km	60 m	7.6 m	8.5 m	May not be compliant
Collards Creek No 4	87.25 km	70 m	7.6 m	8.5 m	May not be compliant
Collards Creek No 5	85.70 km	70 m	8.2 m	8.5 m	May not be compliant
Bell Creek	78.84 km	50 m	8.2 m	8.5 m	May not be compliant
Running Creek	74.82 km	60 m	9.4 m	8.5 m	New structure, Compliant.
Doubtful Creek	64.10 km	30 m	6.6 m	8.5 m	Timber sub-structure. Not compliant
Moura Short Railway	63.11 km	10 m	8.2 m	9.5 m	May not be compliant
Maxwelton Creek	58.78 km	30 m	7.2 m	8.5 m	Timber sub-structure. Not compliant
Oakey Creek	50.55 km	80 m	8.3 m	8.5 m	May not be compliant
Chas Mcguire	48.70 km	60 m	8.5 m	8.5 m	Compliant

It should be noted that at the time of this assessment, approximate bridge widths have only been assessed from a desktop perspective. No consultation has been undertaken with TMR regarding exact bridge widths.

The outcomes as presented in Table 7 indicates that 12 of the 14 structures along the study area may not be compliant for a road train designated route due to the bridge widths.

It is recommended that consultation with TMR is undertaken to determine exact bridge widths for the 14 bridge structures listed in Table 7.

TMR has identified five bridge structures to be upgraded to meet current and forecast demand on the Dawson Highway and is developing a Business Case for the upgrade of these structures to meet existing route requirements. The designation of this section of the Dawson Highway for Road Train use can be taken into consideration in developing the Business Case and allowance made in the design for road train use.

3.4.11 Vertical Clearances

Vertical clearance issues would typically be associated with over road structures located on sags on the Dawson Highway, where the increased length of the road train would effectively increase the height of the vehicle as it passes under the structure. The major overhead structure is the Callide Mine Haul Road overpass, which is not located in a sag situation. No other overhead structures were identified in the initial assessment.

3.4.12 Off-Road Parking

There is a designated heavy vehicle rest area in Biloela and a heavy vehicle stopping place along the Dawson Highway at approximately Chainage 103.1 km against gazettal. The recent Calliope Range Deviation works have provided a heavy vehicle stopping areas at Chainage 75.1 km in the gazettal direction and 77.2 km in the anti-gazettal direction.

3.5 Traffic Interaction Considerations

3.5.1 Crash Reports

Road crash data as provided by Queensland Globe was assessed for a five year period only from 2010 to 2014 along the Dawson Highway for the study area between Chainage 46.5 km and 120 km.

A total of 15 incidents were recorded in the five year period, summarised within the following table.

Table 8: Crash history from 2010 to 2014 for the Dawson Highway study area

Chainage	Severity	Crash type	DCA Code	DCA Crash Description
118.7 km	Hospitalisation	Multi-vehicle	104	Intersection Thru – Right
	Medical Treatment	Multi-vehicle	104	Intersection Thru – Right
117.5 km	Hospitalisation	Single Vehicle	703	Off path – Left of carriageway
110.1 km	Hospitalisation	Single Vehicle	702	Off path straight –Right of carriageway
107.55 km	Hospitalisation	Single Vehicle	704	Off path straight –Right of carriageway hit object
107.5 km	Hospitalisation	Multi-vehicle	303	Right rear end
106.7 km	Medical Treatment	Single Vehicle	704	Off path straight –Right of carriageway hit object
106.25 km	Fatal	Multi-Vehicle	201	Head on collision
106.15 km	Minor Injury	Other	609	Hit Animal

Chainage	Severity	Crash type	DCA Code	DCA Crash Description
105.6 km	Hospitalisation	Single Vehicle	702	Off path straight –Right of carriageway
99.01 km	Hospitalisation	Other	600	On path - Other
93.85 km	Medical Treatment	Single Vehicle	803	Off path curve – Off carriageway right bend hit object
84.8 km	Hospitalisation	Single Vehicle	803	Off path curve – Off carriageway right bend hit object
78.58 km	Property Damage	Single Vehicle	804	Off path curve – Off carriageway left bend hit object
60.4 km	Medical Treatment	Single Vehicle	801	Off path curve – Off carriageway right bend.

Of the total crashes, 4 crashes involved multi-vehicle crashes occurring entirely at intersections, 9 crashes involved single vehicles predominately coming off the carriageway and 2 crashes were described as 'other' crash types.

Without detailed crash reports, it is difficult to pinpoint if any of these crashes involved heavy vehicles, however the high number of off-path single vehicle crashes may suggest geometric or fatigue related issues with vehicles travelling in a high speed environment.

Type 1 Road Trains do require more road space than B-Doubles at higher speeds because of increased transverse movement in the rear trailers (TMR 2013). These increased transverse movements may contribute to more road accident effects. It is recommended that detailed crash reports are obtained from police records for the 15 incidents in order to determine the composition of heavy vehicles vs light vehicle statistics.

3.5.2 Traffic Composition

It is assumed that the majority of road users along the Dawson Highway will be commercial/industrial and local road users and only occasional tourists/drivers unfamiliar with the area.

Therefore the provision of Road Train operation signage may not be required, but it is recommended that such signage is implemented from a road safety perspective.

3.5.3 Traffic Volumes

The Dawson Highway AADT is approximately 1,350 vehicles and a HV% of 22.5%. The AADT increases to around 1,800 to 2,000 vehicles as the Dawson Highway approaches Biloela, primarily due to the Callide Power Station.

Consideration should be given to restricting Road Train access during school and shift peak times of the Callide power station.

3.6 Pavement Considerations

3.6.1 Pavement

Road Trains are permitted the same axle load limits as B-Doubles and Semi-trailers. Therefore pavement resurfacing/upgrades are not suggested as part of this assessment, however extra care should be considered during maintenance and rehabilitation works.



3.6.2 Roughness and High Stress Areas

The roughness of pavements should be considered across the 14 bridges structures within the Dawson Highway study area.

3.6.3 Shoulder Treatments

As per Section 3.4.1, there are sections along the Dawson Highway where sealed shoulders would need to be provided in order to minimise maintenance and impacts on the side of the road due to road train wheel paths.

3.6.4 Intersection Treatments

The Calliope Station Road and Dawson Highway intersection transitions from a sealed road along the Dawson Highway, to an unsealed gravel road along Calliope Station Road. The transition from sealed to unsealed and vice versa is likely to damage the pavement at the intersection at a quicker rate due to the introduction of road trains turning.

It is recommended that adequate road surfacing be applied once the existing seal shows signs of wear or in conjunction with any upgrade to the intersection.

3.7 General Considerations

3.7.1 Field Trials

Field trials may provide an overall greater picture for the route along the Dawson Highway, particularly for any sight distance issues that may be present at the Calliope Station/Dawson Highway intersection.

3.7.2 Restricted Hours of Operation

It is recommended that road train restrictions are applied, particular during the AM and PM school peak periods, due to the proximity of the intended route to several schools within and adjacent to Biloela.

No assessment with respect to school bus routes along the Dawson has been undertaken. This would be need to be assessed to determine if restrictions are required.

4 Calliope Station Road

4.1 General

Calliope Station Road is a GRC controlled, unsealed undivided two lane carriageway that runs from the Dawson Highway for approximately 2.5 km to intersect with Mt Alma Road on the northern side of the Calliope River. The Chainage has been assumed to run from the Dawson Highway to Mt Alma Road.

Calliope Station Road services the surrounding rural community as well as providing a connection from the Dawson Highway to the Bruce Highway, via Mt Alma Road. This is attractive to movements north to west as the alternative route through Calliope is approximately 30 km longer. GRC has advised that the route is approved for limited b-double operations under permit by a number of rural properties in the area.

No traffic volume data was available at the time of the assessment, however the connecting section of Mt Alma Road has an AADT of 300 vpd in 2010.

It is noted that the traffic volumes in the period since 2010 may be distorted by the utilisation of the road for construction access to the LNG pipelines as well as construction traffic associated with flood damage repair works.

It is also noted that the designation of the Calliope Station Road/Mt Alma Road for Road Train Type 1 will also allow the 'as of right' use by B-Doubles. Given that the route is significantly shorter for west to north movements, it will attract a significant number of additional movements and as such the assessment as to the suitability for road trains needs to make an allowance for expected traffic volumes, not a notional growth of existing volumes.

The crossing of the Calliope River is via a single lane, low height concrete floodway with very low immunity. Albeit the Average Annual Time of Closure (AATOC) may be relatively low, ie in the order of days not weeks. Road closures as a result of the crossing becoming impassable would require the closure of the proposed Road Train route or the diversions of movements further east along the Dawson Highway through Calliope and onto the Bruce Highway.

4.2 Environmental Considerations

4.2.1 Noise

Desktop assessment has indicated that Calliope Station properties are within 400 m of Calliope Station Road that may be affected by road train noise.

4.2.2 Dust, Splash and Spray

The aforementioned properties may be affected by dust resulting from road trains as Calliope Station Road is an unsealed gravel road. Splash and spray from rainwater will not be an issue.



4.2.3 Vibration

The desktop assessment of the location of these properties indicates that they are set back enough from Calliope Station Road so that heavy vehicle vibration will not be an issue.

4.2.4 Odours and Fumes

The properties with access off Calliope Station Road may be affected by the increased exhaust fumes from the introduction of road trains. It is fair to assume that livestock will be carried along this route, given the proposed Beef Route from Biloela to Gladstone.

4.2.5 Environmental Factors

It is not envisioned that there will be major environmental impacts as a result of the proposed road train route, however assessment is recommended at later stages of the approval process if road upgrades (i.e. increasing formation, sealing road etc.) is to be undertaken.

4.2.6 Dangerous Goods

The proposed road train route should follow the same protocol for hazard spillage as put forth for B-Double route approval along the Dawson Highway as well as any GRC protocols for GRC controlled roads. The exact details are unknown at the time of this assessment. It is recommended that relevant stakeholders are consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

4.3 Planning Considerations

4.3.1 Land Use

Access to the nearby properties from Calliope Station Road should be considered should the introduction of the road train route be further progressed. The road does not impact on the Callide Infrastructure Corridor State Development Area, refer to Figure 7.

4.3.2 Planning Evaluation

Reference is made to Section 1 of the report with respect to the wider benefits associated with the provision of a heavy vehicle route from the west into the Bruce Highway and Aldoga Precinct of the GSDA.



Figure 7: Location of Calliope Station Road with respect to the Callide Infrastructure Corridor (TMR 2009)

4.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should be explored and consulted with at later stages of the approval process.

4.3.4 Economic Factors

Refer to Section 3.3.4.

4.3.5 Intermodal Transport Evaluation

Refer to Section 3.3.5.

4.4 Technical Considerations

4.4.1 Pavement Widths

TMR guidelines require a minimum desirable width of 8.4 m for road trains on unsealed roads and 8.0 m for existing sealed alignments and 9.0 m for new sealed alignments.

Recent NDRRA works on Calliope Station Road indicates that the road width varies between 5 m – 6 m along the 2.5 km length of road. As a result, Calliope Station Road will need to be upgraded to at least 8.4 m (unsealed) for road train access. Given the investment required to upgrade the carriageway width and the potential for the route to attract significant traffic volumes, any upgrade should achieve a minimum formation width that allows for a final sealed carriageway meeting minimum standards, typically 9.0 m

4.4.2 Road Geometry

The existing crossfall on Calliope Station Road is variable however typical cross sections from the NDRRA project has indicated that crossfall for unsealed roads has been built to 5.5%, which meets the 4-6% crossfall requirements for an unsealed road.

Horizontal curves and superelevation, are difficult to assess without proper survey and input data available at the time of this assessment. It is imperative that further road geometry checks are undertaken at further stages of the approval process to assess the geometric upgrade requirements that may need to be undertaken to allow for road train use.

4.4.3 Intersections

The key intersections for Calliope Station Road are the unsignalised intersections of Calliope Station Road/Dawson Highway and Calliope Station Road/Mt Alma Road intersection.

The Calliope Station/Mt Alma Road intersection is a three-way unsignalised intersection. An initial site visit on the 14 October 2015 has indicated that vehicle priority control at the intersection gives priority to Mt Alma Road whilst Calliope Station Road is the minor leg.

The sight distance to the intersection from Calliope Station Road is reduced as a result of a floodway (Chainage 2.4 km) located approximately 140 m away and steep grade on the approach to the intersection. The site visit has raised concerns regarding the intersection priority as under current arrangements, road trains would need to give way to Mt Alma Road traffic whilst stopped on a steep grade on the departure side of the floodway.

It is highly recommended that intersection priority is given to vehicles from the Calliope Station Road approach continuing north along Mt Alma Road.

The recommendations for Calliope Station Road/Dawson Highway intersection is as per Section 3.4.3.

4.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the key intersections along Calliope Station Road. Initial site observations and subsequent desktop review of the Dawson Highway/Calliope Station Road intersection has indicated that intersection upgrades may need to be undertaken at this intersection to account for turning type 1 road trains.

Initial observations of the Calliope Station/Mt Alma Road intersection have not raised any turning swept path concerns.

It is recommended that further analysis is undertaken at future approval stages.

4.4.5 Terminal/Destination Connections

It is assumed that there will be no terminal/destination facilities along Calliope Station Road.

4.4.6 Overtaking requirements

Overtaking requirements are not required due to the low level of traffic volumes along the road.

4.4.7 Steep ascending grades

Overtaking requirements on steep ascending grades are not required due to the low level of traffic volumes along the road.

4.4.8 Acceleration Lanes

Acceleration lane requirements are not required due to the low level of traffic volumes along the road.

4.4.9 Railway Crossings

There are no railway crossings along Calliope Station Road.

4.4.10 Structures

Along Calliope Station Road, there are two major features of note.

- At Chainage 0.4 km, a cattle grid reduces the road formation from approximately 5.0 m down to a single vehicle width. This will need to be modified for road train access.
- At Chainage 2.4 km, a single lane floodway structure of approximately 20 m length crosses the Calliope River. It is recommended that structural assessments are undertaken of this floodway asset in later approval stages to determine the structural integrity and vertical alignment issues. A detailed flood immunity / AATOC assessment for the structure also needs to be undertaken to determine the impacts of road closures and potential diversion of traffic.

TMR recommends that a single lane structure should be a minimum 6.0 m wide for road train provision. As such the existing floodway structure will require width upgrades.

4.4.11 Vertical Clearances

There are no known vertical clearance issues along Calliope Station Road.

4.4.12 Off-road Parking

Off-road parking for heavy vehicles is unlikely to be not required along Calliope Station Road.

4.5 Traffic Interaction Considerations

4.5.1 Accident Reports

At the time of this assessment, no crash data was available for Calliope Station Road. TMR crash data for a period of 2010 – 2014 has indicated that there has been no crashes recorded at the Calliope Station/Dawson Highway intersection.

With the introduction of the proposed road train route, Type 1 Road Trains do require more road space than B-Doubles at higher speeds because of increased transverse movement in the rear trailers (TMR 2013). These increased transverse movements may contribute to more road accident effects.

4.5.2 Traffic Composition

Given the existing nature of Calliope Station Road, the majority of road users are assumed to be local and very few, if any, tourists. This will change with the upgrading of the link between the Bruce Highway and Dawson Highway which will typically attract traffic associated with interregional movements, ie west of Biloela into the GSDA and northern port areas.

4.5.3 Traffic Volumes

Refer to Section 4.1.

4.6 Pavement Considerations

The road is currently a formed, gravel surfaced road. The upgrading of the road as a Road Train route could be staged to initially achieve an all-weather gravel surface with a maintenance program to maintain acceptable standards. If and when the route attracts significant movements and maintenance becomes problematical for a gravel surface, the road could be upgraded with additional high quality pavement and bitumen surfacing.



4.6.1 Intersection Treatment

Refer to Section 3.6.4 for details with respect to the Calliope Station Road and Dawson Highway intersection.

4.7 General Considerations

4.7.1 Field Trials

Field trials may provide an overall greater picture for the route along Calliope Station Road, particularly for the floodway structure at Chainage 2.4km as well as the sight distance issues that may be experienced for the approach to the Calliope Station/Mt Alma Road intersection.



5 Mt Alma Road

5.1 General

Mt Alma Road is a GRC controlled, unsealed undivided road that runs from Duck Holes Road to the Bruce Highway. The subject section of Mt Alma Road from Calliope Station Road to the Bruce Highway, a distance of approximately 17 km. The Chainage for this road has been assumed to run from the Calliope Station Road intersection towards the Bruce Highway.

Mt Alma Road services the surrounding rural community as well as providing a connection from the Dawson Highway to the Bruce Highway, via Calliope Station Road. This is attractive to movements north to west as the alternative route through Calliope is approximately 30kms longer. GRC has advised that the route is approved for limited b-double operations under permit by a number of rural properties in the area.

AADT data from 2010 indicates daily vehicle volumes in the order of 300 vehicles per day. It is noted that the traffic volumes in the period since 2010 may be distorted by the utilisation of the road for construction access to the LNG pipelines as well as construction traffic associated with flood damage repair works.

It is also noted that the designation of the Calliope Station Road/ Mt Alma Road for Road Train Type 1 will also allow the as of right use by B-Doubles. Given that the route is significantly shorter for west to north movements, it will attract a significant number of additional movements and as such the assessment as to the suitability for road trains needs to make an allowance for expected traffic volumes, not a notional growth on existing volumes.

5.2 Environmental Considerations

5.2.1 Noise

There are very little, if any, sensitive receptors such as residential or commercial properties along this section of Mt Alma Road. This section of road provides access to the various gas pipelines that run to the Port of Gladstone.

5.2.2 Dust, splash and spray

No dust or water spray issues are anticipated along this section of Mt Alma Road.

5.2.3 Vibration

No vibration issues are anticipated along this section of Mt Alma Road.

5.2.4 Odours and Fumes

No issues are anticipated along this section of Mt Alma Road.



5.2.5 Environmental Factors

Environmental impacts are unlikely as a result of the proposed road train route, however assessment is recommended at later stages of the approval process if road upgrades (ie increasing formation, sealing road etc) is to be undertaken.

5.2.6 Dangerous Goods

The proposed road train route should follow the same protocol for hazard spillage as put forth for B-Double route approval along the Dawson Highway as well as any GRC protocols for GRC controlled roads. The exact details are unknown at the time of this assessment. It is recommended that relevant stakeholders are consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

5.3 Planning Considerations

5.3.1 Land Use

The section of Mt Alma Road along the proposed road train route provides access to several locations for gas pipelines running towards Curtis Island. Proposed road upgrades along Mt Alma Road will need to consult with the relevant asset and stakeholders of the underground pipelines.

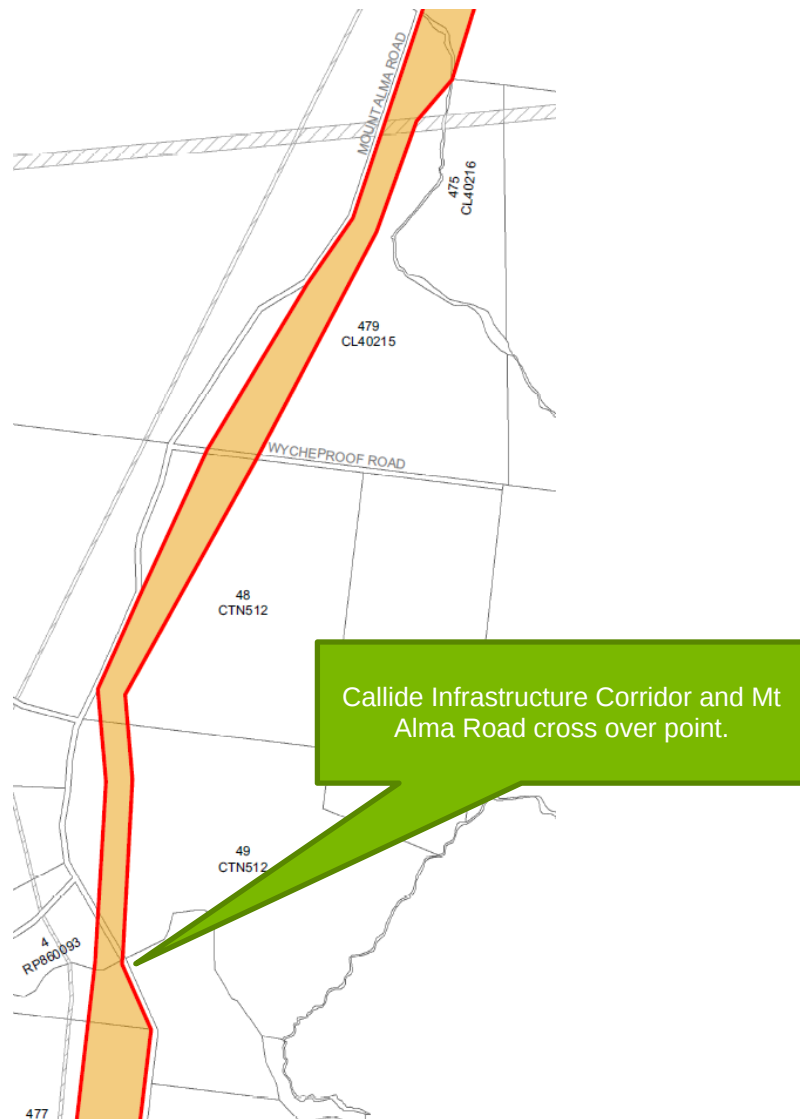


Figure 8: Callide Infrastructure Corridor and Mt Alma Road (TMR 2009)

5.3.2 Planning Evaluation

Reference is made to Section 1 of the Report with respect to the wider benefits associated with the provision of a heavy vehicle route from the west into the Bruce Highway and Aldoga Precinct of the GSDA.

5.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should be explored and consulted with at later stages of the approval process.

5.3.4 Economic Factors

Refer to Section 3.3.4.

5.3.5 Intermodal Transport Evaluation

Refer to Section 3.3.5.

5.4 Technical Considerations

5.4.1 Pavement Widths

TMR guidelines require a minimum desirable width of 8.4 m for road trains on unsealed roads and 8.0 m for existing sealed alignments and 9.0 m for new sealed alignments.

Recent NDRRA works on Mt Alma Road indicates that the road width varies between 5 m – 6 m along the 2.5 km length of road. As a result, it will need to be upgraded to at least 8.4 m (unsealed) for road train access. Given the investment required to upgrade the carriageway width and the potential for the route to attract significant traffic volumes, any upgrade should achieve a minimum carriageway width that allows for a final sealed carriageway meeting minimum standards, typically 9.0 m.

5.4.2 Road Geometry

The existing crossfall on Mt Alma Road is variable however typical cross sections from the NDRRA project has indicated that crossfall for unsealed roads has been built to 5.5%, which meets the 4-6% crossfall requirements for an unsealed road.

Horizontal curves and superelevation, are difficult to assess without proper survey and input data available at the time of this assessment. It is imperative that further road geometry checks are undertaken at further stages of the approval process to assess the geometric upgrade requirements that may need to be undertaken to allow for road train use.

5.4.3 Intersections

The key intersections for Mt Alma Road is the unsignalised Calliope Station Road/Mt Alma Road intersection and a new four way intersection at Mt Alma/Bruce Highway/Aldoga Drive extension.

The recommendations for the Calliope Station/Mt Alma Road are as per Section 4.4.3.

The existing intersection of Mt Alma Road with the Bruce Highway comprises an at-grade T-intersection with an Auxiliary Right Turn (AUR) and Basic Left Turn (BAL). The intersection is located on a straight section of the Bruce Highway with excellent visibility on the approaches to the intersection. The minor leg of the intersection is sealed for a length of approximately 40m, adequate for the storage of a single heavy vehicle.

A turning path assessment will need to be undertaken for the proposed Road Train Type 1 vehicle to determine if any improvements are required.

If the Bruce Highway is not available to be utilised for road train movements over any part, connectivity through to the Aldoga Drive section of the route will require either:

- The construction of the Aldoga Drive extension west to the Bruce Highway to align with the existing Mt Alma intersection, or
- The realignment of the last 2 km of Mt Alma Road to the north to align with currently planned Aldoga Drive alignment

Given that the planning undertaken in development of the Aldoga Drive alignment did not consider the potential route and linkage through to the Dawson Highway, the preferred strategy would be to develop the Aldoga Drive extension to suite the existing Mt Alma Road alignment. On this basis the existing intersection of Mt Alma Road may be able to be retained in the short to medium term as part of an at grade staggered T intersection with Aldoga Drive. As traffic volumes warrant, this could be upgraded to a grade separated interchange.

5.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the key intersections along Mt Alma Road. Initial site observations and subsequent desktop review of the Calliope Station/Mt Alma Road intersection have not raised any concerns.

The new four way intersection at will need to be designed to appropriate standards for road train access.

5.4.5 Terminal/Destination Connections

It is assumed that there will be no terminal/destination facilities along Mt Alma Road.

5.4.6 Overtaking requirements

Overtaking requirements are not required due to the low level of traffic volumes along the road.

5.4.7 Steep ascending grades

Overtaking requirements on steep ascending grades are not required due to the low level of traffic volumes and lack of steep grades along the road.

5.4.8 Acceleration Lanes

Acceleration lane requirements are not required due to the low level of traffic volumes along the road.

5.4.9 Railway Crossings

There are no railway crossings along Mt Alma Road.

5.4.10 Structures

There are several floodway and cattle grid structures that exist along Mt Alma up to the Bruce Highway. Table 9 summarises the approximate locations.

Table 9: Floodway and cattle grid structures along Mt Alma Road

Structure	Approximate Chainage	Comment
Floodway/Causeway	2 km	Single lane floodway
	8.4 km	Causeway
	10 km	Single lane floodway
	11.5 km	Single lane floodway
	12.6 km	Single lane floodway
Cattle Grid	2.7 km	Single Vehicle Width
	12.2 km	Single Vehicle Width
	13.5 km	Single Vehicle Width

The three cattle grids will need to be modified for road train access.

It is recommended that structural assessments are undertaken at the five floodway's in later approval stages to determine the structural integrity. Given that the structures are typically single lane with low flood immunity, a detailed assessment of the route (Dawson Highway to Bruce Highway) needs to be undertaken to achieve a co-ordinated approach to achieving acceptable immunity and AATOC, ie it is of no value to upgrade individual elements to a standard higher than the rest of the route, with the crossing of the Calliope River being the dominant control.

5.4.11 Vertical Clearances

There are no known vertical clearance issues along Mt Alma Road.

5.4.12 Off-Road Parking

Given that the route may not be implemented in its entirety in a single stage and that road trains continuing to destinations accessed via the Bruce Highway will need to break down, a heavy vehicle staging area may be required. Ideally this would be provided adjacent to and west of the Bruce Highway north or south of Mt Alma Road. This would require acquisition of private land for this purpose. The Bruce Highway reserve is wider on the eastern side and may be adequate for a break down area, however this requires additional movements onto and across the Bruce Highway over a facility provided on the western side.

5.5 Traffic Interaction Considerations

5.5.1 Accident Reports

At the time of this assessment, no crash data was available for Mt Alma Road. TMR crash data for a period of 2010 – 2014 has indicated that there has been no crashes recorded along the Bruce Highway within immediate vicinity of the existing intersection.

5.5.2 Traffic Composition

Given the existing nature of Mt Alma Road, the majority of road users are assumed to be local and very few, if any, tourists. This will change with the upgrading of the link between the Bruce Highway and Dawson Highway which will typically attract traffic associated with interregional movements, ie west of Biloela into the GSDA and northern port areas.

5.5.3 Traffic Volumes

2010 AADT data indicates vehicular volumes in the order of 317 vehicles per day. Traffic over the last five years would have varied significantly with construction of the LNG pipelines and flood damage restoration works. Traffic growth may also be significant once the route is established, as it provides an attractive alternative to movements through Calliope, ie 30 km reduction in trip length.

5.6 Pavement Considerations

The road is currently a formed, gravel surfaced road. The upgrading of the road as a Road Train route could be staged to initially achieve an all-weather gravel surface with a maintenance program to maintain acceptable standards. If and when the route attracts significant movements and maintenance becomes problematical for a gravel surface, the road could be upgraded with additional high quality pavement and bitumen surfacing.

5.6.1 Intersection Treatment

Future pavement design for the new Mt Alma/Bruce Highway intersection should be up to a standard suitable for type 1 road train usage.

5.7 General Considerations

5.7.1 Field Trials

Field trials may provide an overall greater picture for the route along Mt Alma Road, particularly for the various floodway structures along the route.



6 Aldoga Drive

6.1 General

Planning undertaken for servicing of the GSDA identified the Aldoga Drive as an interconnection from the Bruce Highway to Gladstone Mt Larcom Road, passing through the Aldoga Precinct of the GSDA generally aligned within the Western Corridor Sub-Precinct. The interconnection was to service fronting industry development as well as provide an alternative to Calliope River Road for heavy freight and worker movements from the south. Planning allowed for the road to be constructed as a heavy freight corridor which would meet the needs for road train access.

The alignment adopted in the planning placed the intersection with the Bruce Highway approximately 1.5kms north of the Mt Alma Road intersection and north of the LNG pipeline crossings of the Bruce Highway. Constraints on the alignment of Aldoga Drive also included a requirement for a grade separated crossing of the proposed Moura Link Rail, which is aligned on the eastern side of the Bruce Highway.

The eastern end of Aldoga Drive, connecting to Gladstone Mt Larcom Road, has been constructed to service RTA Yarwun Refinery Residue Disposal Area and a site currently occupied by Bechtel's LNG Plant Logistics Facility. This site has been the subject of planning and design for development as a light – medium industry precinct within the GSDA.

The existing section of Aldoga Drive, accessed from Gladstone Mount Larcom Road, is approximately 1.9km long and has been constructed as a low cost sealed road with formation width of approximately 10m.

Aldoga Drive will require new road construction of approximately 8 km to extend west and connect through to the Bruce Highway.

6.2 Environmental Considerations

6.2.1 Noise

The introduction of a road train route is not expected to cause adverse noise affects due to the nature of the GSDA being primarily industrial land use.

6.2.2 Dust, splash and spray

It is assumed that Aldoga Drive Extension will be sealed and as such splash and spray from rainwater may affect other road users.

6.2.3 Vibration

Dependent on the industrial property layouts to be built within the GSDA, road train vibration may affect properties fronting the Aldoga Drive Extension.



6.2.4 Odours and Fumes

Dependent on the industrial property layouts within the GSDA, road train exhausts and associated livestock odour may affect people working and visiting within the GSDA.

6.2.5 Environmental Factors

It is not envisioned that there will be major environmental impacts as a result of the proposed road train route.

6.2.6 Dangerous Goods

The proposed road train route should follow the same protocol for hazard spillage as put forth for B-Double route approval along state controlled roads as well as any GRC protocols for GRC controlled roads. The exact details are unknown at the time of this assessment. It is recommended that relevant stakeholders are consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

6.3 Planning Considerations

6.3.1 Land Use

Aldoga Drive has already been identified in land use planning for the GSDA and therefore implementation will support future development.

A broad snapshot of the GSDA can be seen in Figure 9.

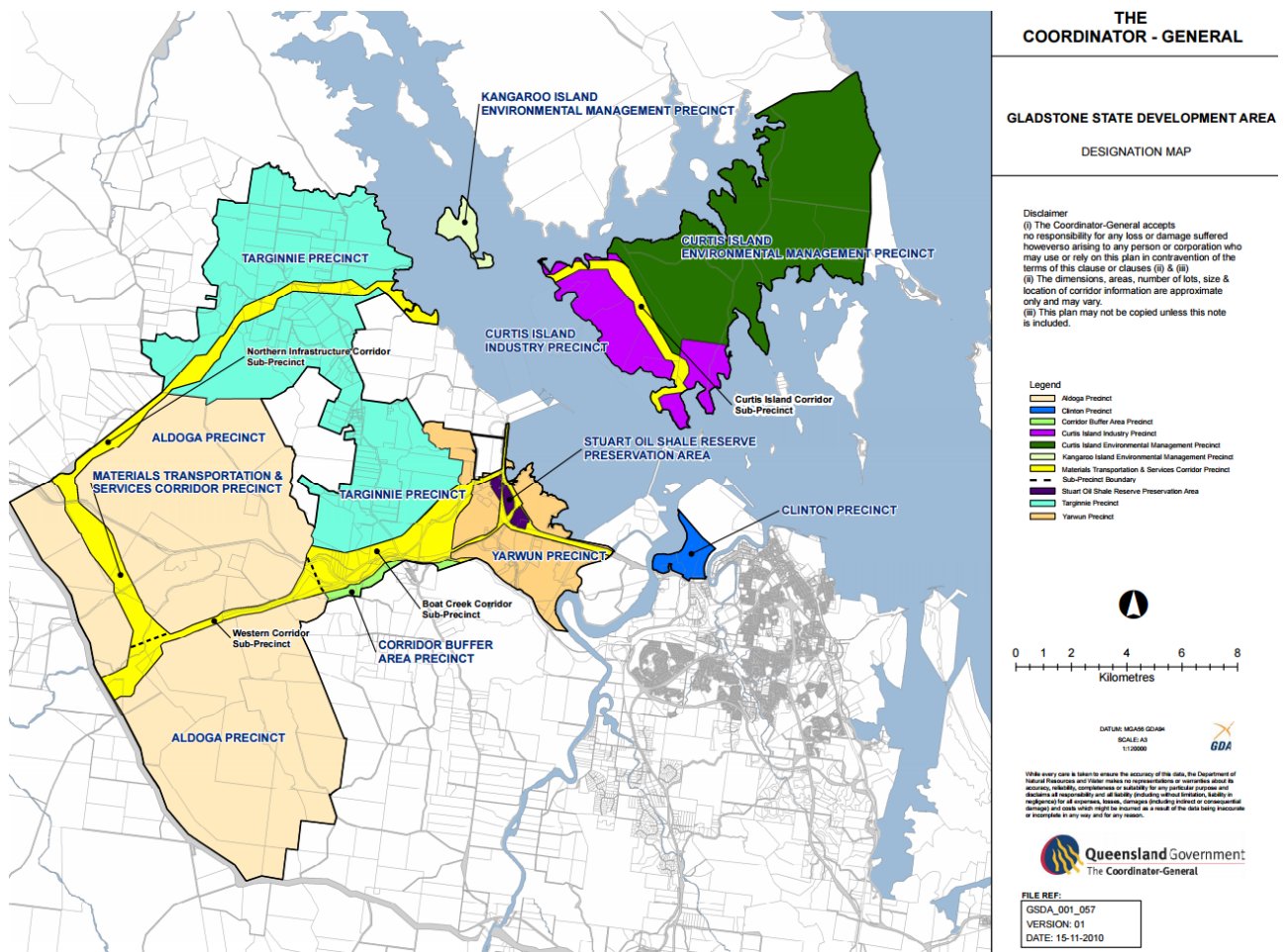


Figure 9: GSDA Map (Queensland Government 2010)

6.3.2 Planning Evaluation

The proposed freight route will need to abide the Development scheme developed for the GSDA. As per Figure 9, the Aldoga Drive extension will likely be within the 'Materials Transportation & Services Corridor Precinct'.

6.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should be undertaken at later stages of the approval process.

6.3.4 Economic Factors

Refer to Section 3.3.4.

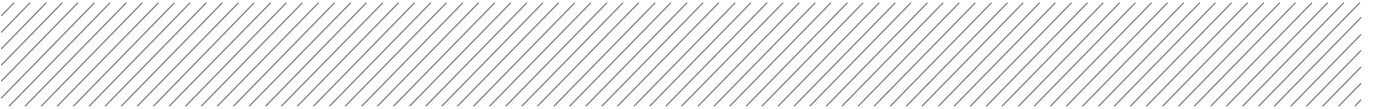
6.3.5 Intermodal Transport Evaluation

Refer to Section 3.3.5.

6.4 Technical Considerations

6.4.1 Pavement Widths

Exact details such as AADT for the Aldoga Drive Extension is not known as the GSDA is yet to be fully developed. It would be fair to assume that given the proposed land planning of the immediate area of



Aldoga Drive, as well as the geographic location in regards to Gladstone and the ports area, the AADT along the proposed Aldoga Drive extension would be in excess of 1,000 vehicles per day. Therefore the minimum seal width and carriageway width to accommodate road train access would be 9.0 m and 10.0 m respectively along Aldoga Drive.

6.4.2 Road Geometry

Road geometry including superelevation, crossfall, horizontal and vertical curves would need to be designed for road train access for the Aldoga Drive Extension. Without survey data, it is difficult to ascertain whether the existing Aldoga Drive road element is road train compliant.

It is recommended that an in-depth assessment is undertaken using Road Asset data of the existing Aldoga Drive during future stages of the approval process.

6.4.3 Intersections

The key intersection along Aldoga Drive will be the proposed four way Mt Alma/Bruce Highway/Aldoga Drive extension intersection and the existing priority controlled, three leg intersection between Aldoga Road and Gladstone Mount Larcom Road.

Recommendations for the Mt Alma/Bruce Highway/Aldoga Drive extension intersection are as per Section 5.4.3.

The Aldoga Drive/Gladstone Mount Larcom Road intersection is an existing Basic Right Turn (BAR) with Channelised Left Turn (CHL) treatment with an acceleration lane as per Austroads Part 4A. Without survey data, it is difficult to assess whether SISD requirements on Gladstone Mount Larcom Road are met for a Type 1 Road Train and ASD requirements are met on the existing Aldoga Drive.

Initial site observations indicates that ASD on the approach to the intersection from Aldoga Drive may be limited.

It is highly recommended that the Aldoga Drive/Gladstone Mount Larcom Road intersection is assessed with survey data at later approval stages.

6.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the key intersections along Aldoga Drive. Initial site observations and subsequent desktop review of the Aldoga Drive/Gladstone Mount Larcom Road intersection has indicated that intersection upgrades may need to be undertaken at this intersection to account for turning type 1 road trains.

It is recommended that further analysis is undertaken at future approval stages.

6.4.5 Terminal/Destination Connections

The establishment of future industries with access to Aldoga drive may warrant road train access, i.e. it may be feasible for proposed meat processing facility to access Aldoga Dr in lieu of Gladstone Mt Larcom Road. It will be the responsibility of the project proponents to determine access requirements.

6.4.6 Overtaking requirements

Overtaking requirements should be assessed in the detail design of the Aldoga Road extension.

6.4.7 Steep ascending grades

Conceptual design for the Aldoga Drive within GSDA planning did not identify any steep sections. Again, this should be addressed in future stages of the road design.

6.4.8 Acceleration Lanes

Acceleration lane requirements to be assessed in future stages of road design.

6.4.9 Railway Crossings

There are no existing railway crossings along Aldoga Drive, however the proposed Moura Link Rail will require a crossing with Aldoga Drive. Current planning has allowed for this to be grade separated. Future stages of road design, especially if a realignment is progressed to form a four way intersection with Mt Alma Road, needs to review crossing location and grade separation issues. The planning for Moura Link Rail has progressed to a detailed design phase however due to changes in the economics of the coal developments generating the demand for the rail, implementation of the rail needs to be reviewed.

6.4.10 Structures

There are no known structures along Aldoga Drive and it is unknown where there will be structures as part of the Aldoga Drive Extension. Assessments should be undertaken at later stages once GSDA is fully developed.

6.4.11 Vertical Clearances

There are no known vertical clearance issues along Aldoga Drive. Assessments should be undertaken at later stages of road design.

6.4.12 Off-road Parking

Off-road parking for heavy vehicles is assumed to be not required along the Aldoga Drive Extension. Assessments should be undertaken at later stages once GSDA is fully developed.

6.5 Traffic Interaction Considerations

6.5.1 Crash Reports

At the time of this assessment, no crash data was available for Aldoga Drive. TMR crash data for a period of 2010 – 2014 has indicated that there has been no crashes recorded at the Aldoga Drive/Gladstone Mount Larcom Road intersection.

6.5.2 Traffic Composition

Given the nature of Aldoga Drive, both current and future, the majority of road users are assumed to be workers and freight accessing industries.

6.5.3 Traffic Volumes

No traffic volume data was available at the time of the assessment for Aldoga Drive.

Details such as AADT for the Aldoga Drive Extension are not known as the GSDA is yet to be fully developed. It would be fair to assume that given the proposed land planning of the immediate area of Aldoga Drive, as well as the geographic location in regards to Gladstone and the ports area, the AADT along the proposed Aldoga Drive extension would be in excess of 1,000 vehicles per day once the GSDA is fully developed.

6.6 Pavement Considerations

6.6.1 Pavement

TMR has advised that Road Trains generally are permitted the same axle load limits as B-Doubles and Semi-trailers. Therefore pavement resurfacing /upgrades are not suggested as part of this assessment, however extra care should be considered during maintenance and rehabilitation works.



6.6.2 Intersection Treatment

It is assumed that B-Doubles currently use the Aldoga Drive/Gladstone Mount Larcom Road intersection to access the Yarwun refinery. As such the existing pavement at this intersection is assumed to be up to a standard that would be able to accommodate heavy vehicle movements.

It is recommended that an effective road surfacing treatment be applied once the existing seal shows sign of excess damage

6.7 General Considerations

6.7.1 Field Trials

Field trials may provide an overall greater picture for the route along Aldoga Drive, particularly for the turning requirements and sight distance issues that exist at the Aldoga Drive/Gladstone Mount Larcom Road intersection.

6.7.2 Restricted Hours of Operation

There may be opportunities to apply restricted road train hours of operation, particularly around the shift patterns of the industries operating at the time, as well as any other developments that may be a part of the GSDA.



7 Gladstone Mount Larcom Road

7.1 General

Gladstone Mount Larcom Road is a state controlled, predominantly two lane undivided carriageway that runs from Gladstone to Mount Larcom for approximately 32 kilometres with a posted speed of 100 km/h. The with gazettal direction runs from the Dawson Highway/Gladstone Mount Larcom Road four-way signalised intersection in Gladstone and ends at the Bruce Highway/Gladstone Mount Larcom Road three-way unsignalised intersection in Mount Larcom.

For the purposes of this assessment, the section of Gladstone Mount Larcom Road that is assessed runs from Chainage 12.3 km (Landing Road intersection) to 19.9 km (Aldoga Drive intersection) with gazettal (19.9 km to 12.3 km against gazettal).

2014 traffic census data indicates that the section of Gladstone Mount Larcom Road within the study area carries an AADT in the order of 4,000 vehicles per day with a HV% of approximately 23%. Gladstone Mount Larcom Road is an existing approved B-Double route.

Long term corridor planning has been undertaken by TMR for this road corridor. TMR is currently undertaking design for the upgrade of the Landing Road intersection.

7.2 Environmental Considerations

7.2.1 Noise

From initial desktop assessments, there do not appear to be many sensitive receptors close to the subject section of Gladstone Mount Larcom Road that would be affected by noise.

7.2.2 Dust, splash and spray

No issues have been identified.

7.2.3 Vibration

Vibration is not expected to be an issue along this section of the Gladstone Mount Larcom Road.

7.2.4 Odours and Fumes

Odours and exhaust fumes are not expected to be an issue along this section of the Gladstone Mount Larcom Road.

7.2.5 Environmental Factors

It is not envisioned that there will be major environmental impacts as a result of the Road Train route given that the Dawson Highway is a pre-approved B-Double route.

7.2.6 Dangerous Goods

The proposed road train route should follow the same protocol for hazard spillage for B-Double route approval. The exact details are unknown at the time of this assessment. It is recommended that TMR is consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

7.3 Planning Considerations

7.3.1 Land Use

As Gladstone Mount Larcom Road is located within the GSDA, the proposed land uses will apply as per Section 6.3.1 of this report.

7.3.2 Planning Evaluation

The proposed freight route will need to follow the Development scheme developed for the GSDA. As shown in Figure 9, Gladstone Mount Larcom Road is located within the '*Materials Transportation & Services Corridor Precinct*'.

7.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should be explored and consulted with at later stages of the approval process.

7.3.4 Economic Factors

Refer to Section 3.3.4.

7.3.5 Intermodal Transport Evaluation

Refer to Section 3.3.5.

7.4 Technical Considerations

7.4.1 Pavement Widths

For the purposes of this assessment, the section of Gladstone Mount Larcom Road within the study area is considered to be within a rural area. From 2014 TMR census data, the AADT along the Gladstone Mount Larcom Road is in the order of 4000 vehicles. Consulting Table 2, the desirable minimum seal width/carriageway width required for a road train route is considered to be at least 9.0 m wide.

It is difficult to ascertain exact areas along Gladstone Mount Larcom Road that may need upgrades without proper survey data, however an initial drive of the route and subsequent desktop analysis on Google Earth/Street view has indicated sections, particularly from Chainage 15 km to 18 km that may be less than 9.0 m wide.

It is recommended that an in-depth assessment is undertaken using Road Asset data of the Gladstone Mount Larcom Road at further stages of the approval process.

7.4.2 Road Geometry

Road geometry checks including but not limited to crossfall, horizontal curves and superelevation, are difficult to assess without proper road asset data available at the time of this assessment. It is imperative that further road geometry checks are undertaken at further stages of the approval process to assess the geometric upgrade requirements that may need to be undertaken to allow for road train use.

7.4.3 Intersections

Within the study area along Gladstone Mount Larcom Road, there are no known adjacent intersections that may provide inadequate stacking distance for a Type 1 Road Train.

The key intersections along this section of the proposed road train route includes:

- Aldoga Drive/Gladstone Mount Larcom Road intersection, with recommendations as per Section 6.4.3 of this report. In previous planning undertaken for the GSDA and TMR, allowance has been made for future upgrades to this intersection. This will need to be reviewed for impact of the proposed introduction of road trains.
- Earth Commodities Quarry Access – this access has been identified in previous studies by TMR as high risk intersection, due to the limited visibility to the intersection on both approaches, the steep approach from Mt Larcom, slow exit speeds onto the Gladstone Mt Larcom Road for entering traffic (laden heavy vehicles) and limited acceleration distance from exit to the narrow road over rail bridge crossing. The impact of Road Trains and the additional stopping distance requirements will need to be fully assessed.
- Flynn Road – minor local road currently servicing residential properties as well as the Aldoga North Precinct of the GSDA. A review needs to be undertaken in future stages of route assessment to determine the current planning for long term access into the North Aldoga Precinct to service future development, ie Eurora Steel Project, Aldoga Yard.
- Calliope River Road / Targinnie Road 4 way at grade intersection – Calliope River Road is a significant freight route from the Bruce Highway into industry and port precincts to the north of the city. Targinnie Road services as a local road function currently into the Targinnie precinct of the GSDA. The impact of road trains with respect to ASD and SISD needs to be undertaken in future stages of route assessment.
- Landing Road/Gladstone Mount Larcom Road intersection. Aurecon understands that there are plans to upgrade the Landing Road/Gladstone Mount Larcom Road intersection to signalised control. It is recommended that road train considerations are considered as part of the upgrade design.

7.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the key intersections along the Gladstone Mount Larcom Road. Initial site observations and subsequent desktop review of the Landing Road/Gladstone Mount Larcom Road intersection has indicated that road trains should be able to negotiate the turning manoeuvres. As previously mentioned, it is understood that there are plans to upgrade the Landing Road/Gladstone Mount Larcom Road intersection to signalised control. It is recommended that road train considerations are considered as part of the upgrade design.

7.4.5 Terminal/Destination Connections

There are no current identified terminal/destinations along this section of road. If existing or future industries wish to take advantage of the designation for road train type 1, it will be responsibility of the proponent to undertake a detailed impact assessment.

7.4.6 Overtaking requirements

Table 4 indicates that for an AADT of approximately 4000 vehicles, the maximum distance between overtaking opportunities and the maximum average distance per overtaking opportunity is to be 10 km and 5 km respectively.

Desktop analysis of the Gladstone Mount Larcom Road study area indicates that there is an overtaking lane running in the gazetted direction that runs from Chainage 13.5 km to 15 km. There are no overtaking opportunities in the anti-gazetted direction.

7.4.7 Steep ascending grades

Overtaking requirements on steep ascending grades are not required on this section of Gladstone Mount Larcom Road.

7.4.8 Acceleration Lanes

Acceleration lanes are not required on this section of Gladstone Mount Larcom Road.

7.4.9 Railway Crossings

There are no at grade rail crossings on this section of Gladstone Mount Larcom Road. A grade separated crossing of the North Coast line exists at Chainage 18.7 km.

7.4.10 Structures

There is a single structure along the study area of Gladstone Mount Larcom Road, as detailed within the following table.

Table 10: Bridge structure summary along the Gladstone Mount Larcom study area and Road Train route compliance

Bridge Name	Chainage	Approx. Bridge Length	Approx. Bridge Width	Required Total Bridge Width	Comment
North Coast Line Overpass	18.7 km	20 m	9.0 m	9.0 m	Compliant

It should be noted that at the time of this assessment, approximate bridge widths have only been assessed from a desktop perspective. No consultation has been undertaken with TMR regarding exact bridge widths.

The outcome as presented in Table 10 indicates that the bridge crossing should be compliant for road train use.

7.4.11 Vertical Clearances

There are no known vertical clearance issues along the Gladstone Mount Larcom Road study area.

7.4.12 Off-road Parking

Heavy vehicle parking locations exist in the following locations:

- Chainage 17.8 km in the gazetted direction.
- Chainage 17 km in the anti-gazetted direction.

7.5 Traffic Interaction Considerations

7.5.1 Crash Reports

Road crash data as provided by Queensland Globe was assessed for a five year period only from 2010 to 2014 along Gladstone Mount Larcom Road for the study area between Chainage 12.3km and 19.9km.

A total of 5 accidents were recorded in the five year period, summarised within the following table. Please note, a full road safety audit has not been undertaken as part of this assessment.

Table 11: Crash history from 2010 to 2014 for the Gladstone Mount Larcom Road study area

Chainage	Severity	Crash type	DCA Code	DCA Crash Description
19.18 km	Fatal	Unknown	Unknown	Unknown
15 km	Hospitalisation	Single Vehicle	201	Opposite approach – Head On
14.35 km	Medical Treatment	Multi-Vehicle	301	Rear End (Easement Access)
13.3 km	Property Damage	Single Vehicle	803	Off path Curve – Right Bend Hit Object
12.38 km	Property Damage	Multi-Vehicle	201	Opposite approach – Head On

The fatal crash at Chainage 19.18 km had no accompanying crash information. The head on collision at 15 km was located at the overtaking lane end merge, which is likely to be the contributing factor. The crashes at 14.35 and 13.3 km both occurred at easement access points along Gladstone Mount Larcom Road and the fifth crash at Chainage 12.38 km occurred immediately north of the Landing Road/Gladstone Mount Larcom Road intersection.

Without the detailed crash reports, it is difficult to pinpoint if any of these crashes involved heavy vehicles, however the majority of these crashes occurred at locations with evident contributory factors (ie merge point, easement accesses and intersections).

With the introduction of the proposed road train route, it is not expected to be any further contributing road accident effects as a result. It is recommended that detailed crash reports are obtained from police records for the 5 incidents in order to determine the composition of heavy vehicles vs light vehicle statistics.

7.5.2 Traffic Composition

Gladstone Mount Larcom Road is an approved B double route which is likely to also carry a mixture of local and non-local road users. It is recommended that Road Train operation signage is provided.

7.5.3 Traffic Volumes

The Gladstone Mount Larcom 2014 AADT is approximately 4019 vehicles and a HV% of 23.22%. The AADT increases to approximately 7399 vehicles as Gladstone Mount Larcom Road continues after the Landing Road intersection heading towards Gladstone, primarily due to the workers for the Port of Gladstone and Curtis Island. .

Consideration should be given to restricting Road Train access during the shift change peak times.

7.6 Pavement Considerations

7.6.1 Pavement

TMR has advised that Road Trains generally are permitted the same axle load limits as B-Doubles and Semi-trailers. Therefore pavement resurfacing/upgrades are not suggested as part of this assessment, however extra care should be considered during maintenance and rehabilitation works.

7.6.2 Intersection Treatment

It is recommended that an effective road surfacing treatment be applied once the existing seal shows sign of excess damage at the two key intersections along the Gladstone Mount Larcom Road study area.



7.7 General Considerations

7.7.1 Field Trials

Field trials may provide an overall greater picture for the route along Gladstone Mount Larcom Road, particularly for the turning requirements and sight distance issues that may be faced at the Aldoga Drive/Gladstone Mount Larcom Road intersection.

7.7.2 Restricted Hours of Operation

It is recommended that road train restrictions are applied, particular during shift peak times of nearby major industries.



8 Landing Road

8.1 General

Landing Road is a GRC controlled, sealed undivided two lane carriageway that runs from Gladstone Mount Larcom Road to Fisherman's Landing Port Precinct, a distance of approximately 4km.

Landing Road services:

- Existing industries, inclusive of Cement Australia
- General port activities
- Quarry traffic, ie Yarwun Quarry which has a permit to extract up to a million tonnes per annum
- Intermittent traffic, with the current major traffic contributor associated with LNG construction traffic, with both worker and freight movements from Fisherman's Landing to Curtis Island. This is reducing as the construction phase winds down and is expected to be minimal from 2016 forward.

No traffic volume data was available at the time of the assessment, however the majority of traffic will be entirely as a result of the industrial and port developments accessed off Landing Road.

8.2 Environmental Considerations

8.2.1 Noise

As there are no sensitive receptors located along Landing Road, noise is unlikely to be a concern.

8.2.2 Dust, splash and spray

During periods of rainfall, trucks may spray surface rainwater on other road users, however the introduction of Road Trains operating at low speeds should not exacerbate this issue.

8.2.3 Vibration

Heavy vehicle vibration should not be an issue along Landing Road.

8.2.4 Odours and Fumes

Road train exhaust fumes and other associated odours should not be an issue along Landing Road, because of the nature of the existing heavy industry.

8.2.5 Environmental Factors

It is not envisioned that there will be major environmental impacts as a result of the heavy road train route given that Landing Road is a preapproved B-Double route.

8.2.6 Dangerous Goods

The proposed road train route should use the same protocol for hazard spillage as required for B-Double route approval. The exact details are unknown at the time of this assessment. It is recommended that TMR is consulted at later stages of the approval process. It is expected that the process will be explored through a risk assessment and recommendations made on special operation conditions that may be necessary.

8.3 Planning Considerations

8.3.1 Land Use

As Landing Road is located within the GSDA, the proposed land uses will follow as per Section 6.3.1 of this report.

There are various quarries, refineries and other industry related land uses accessed off Landing Road.

8.3.2 Planning Evaluation

The proposed freight route will need to follow the Development Scheme developed for the GSDA. Landing Road is located within the 'Materials Transportation & Services Corridor Precinct'.

8.3.3 Community Consultation

If not already undertaken as part of the NABRP or other relevant programmes, consultation with the local community should occur at later stages of the approval process.

8.3.4 Economic Factors

Refer to Section 3.3.4.

8.3.5 Intermodal Transport Evaluation

Refer to Section 3.3.5.

8.4 Technical Considerations

8.4.1 Pavement Widths

For the purpose of this assessment, Landing Road is considered to be within a rural area.

Traffic data for Landing Road was not available at the time of this assessment, however the differences in AADT along Gladstone Mount Larcom Road as per Section 7.5.3, would indicate traffic volumes greater than 1,000 vehicles per day using Landing Road.

For AADTs greater than 1,000, TMR recommends a minimum road width of 9.0 m for road train access. Initial site observations on the 14 October 2015 and subsequent desktop assessments has indicated that there should not be any pavement width issues on Landing Road.

8.4.2 Road Geometry

Road geometry checks including but not limited to crossfall, horizontal curves and superelevation, are difficult to assess without proper survey and input data available at the time of this assessment. It is imperative that further road geometry checks are undertaken at further stages of the approval process to assess the geometric upgrade requirements that may need to be undertaken to allow for road train use.

It is unlikely that there that there will be geometric issues given the surrounding land uses as well as Landing Road being an approved B-Double Route.

8.4.3 Intersections

Intersections along this route include:

- Guerassimoff Road – at grade T-intersection, Guerassimoff Road services existing industry and quarry.
- Obodin Road – at grade T-intersection under GRC control. No current uses for this road.
- Serrant Road – unsealed, at-grade T-intersection utilised to service the port as secondary access to Esplanade Road.
- Forrest Road - unsealed, at-grade T-intersection utilised to service Targinnie Precinct of GSDA as secondary access to Targinnie Road

If users wish to utilise road trains on the connecting roads, application would need to be made to GRC with respect to the connecting road and its intersection with Landing Road.

8.4.4 Turning

At the time of this assessment, swept path analysis has not been undertaken for the Landing Road/Gladstone Mount Larcom Road intersection. Initial site observations and a subsequent desktop review of the Landing Road/Gladstone Mount Larcom Road intersection has indicated that road trains should be able to turn within existing seal. As previously mentioned, it is understood that there are plans to upgrade the Landing Road/Gladstone Mount Larcom Road intersection to signalised control. It is recommended that road train considerations are considered as part of that design.

8.4.5 Terminal/Destination Connections

Esplanade Road, which is the continuation of Landing Road into the port precinct, is considered to be the destination being serviced by the proposed route.

It is also probable that if the route is designated, other existing users, ie Cement Australia, oil refinery plant, may pursue the utilisation of road trains in lieu of b-doubles. These proponents would need to undertake an individual assessment as to the impacts of accessing Landing Road with road trains.

8.4.6 Overtaking Requirements

Overtaking requirements are not envisioned to be necessary along Landing Road.

8.4.7 Steep Ascending Grades

Overtaking requirements on steep ascending grades are not required along Landing Road.

8.4.8 Acceleration Lanes

Acceleration lanes are not required on Landing Road.

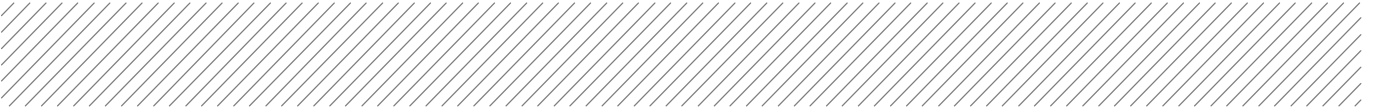
8.4.9 Railway Crossings

There are no railway crossings along Landing Road

8.4.10 Structures

There is a bridge structure located approximately 130 m northwest of the Gladstone Mount Larcom Road intersection.

No information was available at the time of this assessment. Initial site observations and desktop reviews indicates that the bridge width should be greater than 9.0 m width, and as such should be compliant with road train access.



It is highly recommended that the width and condition of this structure is confirmed at future approval stages.

8.4.11 Vertical Clearances

There are no known vertical clearance restrictions along Landing Road.

8.4.12 Off-road Parking

Off-road parking for heavy vehicles is assumed to be not required along Landing Road.

8.5 Traffic Interaction Considerations

8.5.1 Crash Reports

At the time of this assessment, no crash data was available for Landing Road. It is envisioned that the introduction of the road train route would be unlikely to exacerbate the crash rate.

8.5.2 Traffic Composition

Given the location and the industrial land uses along Landing Road, it is likely that road users will be made up entirely of staff accessing these industries, familiar with the type of vehicles using Landing Road.

8.5.3 Traffic Volumes

Traffic data for Landing Road was not available at the time of this assessment, however the differences in AADT along Gladstone Mount Larcom Road as noted in Section 7.5.3 would indicate traffic volumes greater than 1,000 vehicles per day using Landing Road.

8.6 Pavement Considerations

8.6.1 Pavement

TMR has advised that Road Trains generally are permitted the same axle load limits as B-Doubles and Semi-trailers. Therefore pavement resurfacing /upgrades are not suggested as part of this assessment, however extra care should be considered during maintenance works.

8.6.2 Intersection Treatment

It is recommended that an effective road surfacing treatment be applied once the existing seal shows sign of damage at the Landing/Gladstone Mount Larcom Road intersection.

Aurecon understands that there are plans to upgrade the Landing Road/Gladstone Mount Larcom Road intersection to signalised control. It is recommended that the static loads of Road Trains are considered when designing the pavements.

8.7 General Considerations

8.7.1 Field Trials

Field trials may provide an overall greater picture for the route along Landing Road, particularly for the turning requirements at the Landing Road/Gladstone Mount Larcom Road intersection.

8.7.2 Restricted Hours of Operation

It is recommended that road train restrictions are applied, particular during shift peak times of nearby major industrial and port operations.



9 Summary of Findings and Recommendations

9.1 Summary

The proposed route put forth by the GRC for inclusion within the NABRP that runs from Biloela to the Port of Gladstone has been assessed for the suitability for Type 1 Road Train Access. A total of six road elements were assessed, and the areas of note are presented as follows.

9.1.1 Dawson Highway (Gladstone to Biloela)

The section of the proposed route that runs through the town of Biloela may cause noise, spray, vibration, odours and fume issues.

Significant sections of the Dawson Highway that have not been subject to recent (last 10 years) upgrade programs display less than the desirable 9.0 m seal pavement widths of road train access.

Twelve of the 14 bridge structures that are located along the route may not be compliant for road train access in terms of bridge widths. It is noted that TMR has identified five bridge structures to be upgraded to meet current and forecast demand on the Dawson Highway and is developing a Business Case for the upgrade of these structures to meet existing route requirements.

Intersection upgrades have been identified at the Dawson Highway and Calliope Station Road intersection, with works typically comprising left turn auxiliary lane provision, seal widening, acceleration lane provisions and asphalt surfacing.

9.1.2 Calliope Station Road

The entire length of Calliope Station Road will require road width upgrades to at least 9.0m width to accommodate road train access.

Intersection priority on the approach to the Calliope Station and Mt Alma Road intersection will need to change in order to provide priority to road trains along the route.

The single lane floodway structure that crosses the Calliope River will need to be upgraded to accommodate road train access as well as flood immunity requirements that may come about as part of a detailed immunity/AATOC assessment.

9.1.3 Mt Alma Road

The entire length of Mt Alma Road will require road width upgrades to at least 9.0 m width to accommodate road train access.

The five floodway structures will need to be assessed and upgraded for road train access.



9.1.4 Aldoga Drive

The proposed Aldoga Drive extension would need to be constructed to be compliant for road train access. Considerations will need to be provided for the final GSDA development in terms of noise, spray, vibration, odours and fumes.

A new intersection/intersection upgrade is required at the Mt Alma Road/Bruce Highway intersection to align with the proposed Aldoga Drive extension. Two possible connectivity options are available to either realign Mt Alma Road with the currently planned Aldoga Drive alignment, or the realignment of the Aldoga Drive extension to align with the Mt Alma Road and Bruce Highway intersection.

The Aldoga Drive and Gladstone Mount Larcom Road intersection may need to be upgraded for sight distance issues and road train turning movements.

9.1.5 Gladstone Mount Larcom Road

Assessment has not resulted in any known road train compliance issues on Gladstone Mount Larcom Road.

It is understood that TMR has undertaken long term corridor planning assessment for this road corridor and is currently undertaking the design of the Gladstone Mount Larcom Road and Landing Road intersection upgrade.

9.1.6 Landing Road

Road train assessment has not resulted in any known road train compliance issues on Landing Road.

Road train restrictions during shift peak times of nearby major industrial and port operations may be required.

9.1.7 TMR Submission

The following template summarises the Biloela to Fisherman's Landing beef roads funding submission and indicative costs.

Dawson Highway to Gladstone Type 1 Road Train Route								
Road Starts At: Biloela			Road Ends At: Fisherman's Landing			Road Connects to: Port of Gladstone		
Gladstone Regional Council								
Paul Keech - Director of Engineering Services								
This road is important because: EG: Local connector to abattoir.			The provision of a Road Train Type 1 Route into Gladstone is important to service future growth within the export beef industry, associated with the movement of live cattle into new facilities including meat processing (abattoir) and live cattle export. Road Train Type 1 vehicle access currently terminates at Biloela with B-Double access, based on servicing the existing abattoir at Biloela. The Port of Gladstone and surrounding area is ideally suited to the development of new facilities, but is currently disadvantaged by the requirement to break down live cattle movements to utilise the existing B-Double routes east of Biloela.					
Funding the projects on this road will result in: EG: Sealing this road will allow for an increase from Type 1 to Type 2 road trains			The route has been selected to allow for a staged development to a Road Train Type 1 Route, with initial stage providing access from Biloela to the Bruce Highway adjacent the Aldoga Precinct of the Gladstone State Development Area. Works comprise upgrades to the Dawson Highway (Biloela to Calliope Station Road) from B-Double to Road Train Type 1, and Calliope Station Rd/Mt Alma Rd from a local road to Road Train Type 1 standard. The upgrade to the local road connection could be staged if funding is constrained by initially widening the existing gravel carriageway, secondly improving strength, width and immunity of stream crossings and thirdly the provision of a high standard sealed pavement. The finalisation of the route requires the extension of Aldoga Dr (8km of new sealed road) within the the Aldoga Precinct to connect the Bruce Highway to Gladstone Mt Larcom Road and utilisation of Gladstone Mt Larcom Road and Landing Road to access port facilities at Fisherman's Landing.					
Projects needed on this road								
Your Priority	Start location (Lat/Long or name)	End location (Lat/Long or name)	Project Type - Sealing unsealed road - Upgrading of bridge - New road or segment - New or expansion of facilities	Project Summary	Project Scope	Project Location	Proposed connectivity outcome (consider identified safety issue/deficiency/link need the project will address)	Estimated Cost
1	Example town A	Example Town B	Upgrading of bridge	Bridge XYZ at Q creek needs to be upgraded to cater for Type 2 road trains	Construction of a new concrete bridge to support heavy vehicle access along the example highway. It is proposed the new concrete bridge will have Q100 flood immunity.	12.6km north of Example Town	Upgrading of the bridge to remove load limiting and will enable access by higher productivity vehicles. Connectivity will be improved during the wet season.	\$3,000,000
1a	Calliope Station Road and Dawson Highway Intersection (-24.027409, 150.986459)	Calliope Station Road and Mt Alma Road Intersection (-24.021607, 150.965173)	Widening unsealed carriageway	The upgrade of Calliope Station Road to cater for Type 1 Road Trains.	Upgrade of 2.5km existing unsealed road formation from 3m to 10m and 100mm gravel surfacing.	Approximately 35km southwest of Gladstone. Accessed off Dawson Highway (Gladstone to Biloela) at Chainage 46.5km.	Part of link from Dawson Highway to Bruce Highway avoiding Calliope.	\$2,500,000
1a	Calliope Station Road and Mt Alma Road Intersection (-24.021607, 150.965173)	Mt Alma Road and Bruce Highway Intersection (-23.890651, 151.021312)	Widening unsealed carriageway	The upgrade of Mt Alma Road to cater for Type 1 Road Trains.	Upgrade of 17km existing unsealed road formation from 3m to 10m and 100mm gravel surfacing.	Approximately 25km southwest of Gladstone. Accessed off Bruce Highway (Benaraby to Rockhampton) at Chainage 35.8km.	Part of link from Dawson Highway to Bruce Highway avoiding Calliope.	\$17,000,000
1a	Calliope Station Road and Dawson Highway Intersection (-24.027409, 150.986459)	-	Intersection upgrade of an existing priority controlled intersection.	Intersection upgrade of an existing priority controlled intersection for road train movements.	Upgrade of intersection to include a left turn auxiliary lane and an acceleration lane on the Dawson Highway running with gazetted that will double as an overtaking lane.	Approximately 35km southwest of Gladstone. Accessed off Dawson Highway (Gladstone to Biloela) at Chainage 46.5km.	Safe access from Dawson Highway to/from local road link to Bruce Highway	\$1,000,000
							Subtotal	\$20,500,000
1b	Calliope Station Road Chainage 2.4km (-24.021949, 150.967079)	Calliope Station Road Chainage 2.42km (-24.021917, 150.966996)	Upgrading of river crossing	Upgrade of Calliope River Crossing for width, strength and minor improvement to immunity	Provide for 80m long, 2 lane concrete causeway to river crossing for adopted route immunity and road train loadings	Approximately 35km southwest of Gladstone	Improved safety and minor improvement to route flood immunity	\$2,500,000
1b	Calliope Station Road and Mt Alma Road Intersection (-24.021607, 150.965173)	Mt Alma Road and Bruce Highway Intersection (-23.890651, 151.021312)	Upgrade of five existing concrete floodways	Upgrade of minor stream floodways for width, strength and improvement to immunity	Provide for 2 lane concrete causeway or culvert structures to minor stream crossings for adopted route immunity and road train loadings	Approximately 35km southwest of Gladstone	Improved safety and improvement to route flood immunity	\$2,500,000
							Subtotal	\$5,000,000
1c	Dawson Highway (Biloela)	Dawson Highway (Calliope Station Road Intersection)	Strengthening and widening of 3 bridge structures	TMR has identified 3 existing structures that need replacing under the current B-Double route designation, revise design criteria to allow for Road Train Type 1 vehicles	Modify design criteria for these structures. Add benefits associated with Road Train route adoption into Business Case for these projects within TMR approval processes	TMR to advise	Addresses identified issues with increased loadings on structures by Road Train Type 1 vehicles along the Dawson Highway	Nil Assumes that funding will be sourced under TMR Qtrip
							Subtotal	\$0
							Total Stage 1	\$25,500,000
2	Mt Alma Road and Bruce Highway Intersection (-23.890651, 151.021312)	Aldoga Drive and Gladstone Mount Larcom Road Intersection (-23.845269, 151.090710)	New segment of sealed road	Aldoga Dr extension to connect to Bruce Highway	8km of new 9.0m sealed carriageway	Aldoga precinct of GSDA	Provides road link from Road Train Route Stage 1 through to Port facilities	\$12,000,000
2	Mt Alma Road and Bruce Highway Intersection (-23.890651, 151.021312)	-	New staggered T intersection	New staggered T, priority controlled intersection and lighting	Construction of a new staggered T intersection to connect Mt Alma Road with the proposed Aldoga Drive extension, on the Bruce Highway	Approximately 25km southwest of Gladstone. Accessed off Bruce Highway (Benaraby to Rockhampton) at Chainage 35.8km.	Provides road link from Road Train Route Stage 1 through to Port facilities	\$2,000,000
							Total Stage 1	\$14,000,000
Subtotal for Road Link								\$39,500,000



10 References

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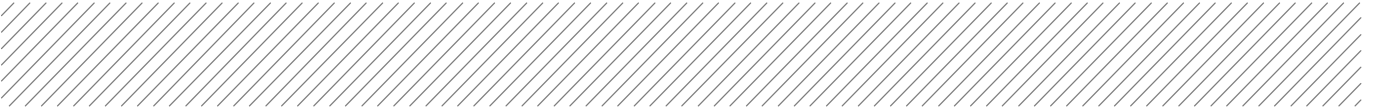
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National Transport Commision 2007, *Performance Based Standards Scheme Network Classification Guidelines*. NTC, Melbourne.

Northern Australia Ministerial Forum 2012, *Strategic directions for the Northern Australia beef industry*, Northern Australia Ministerial Forum.

Appendices





Appendix A

Letters of Support

GROWING
QUEENSLAND

25 Appleson Rd Parkhurst QLD 4702
PO Box 307 Rockhampton QLD 4700
Phone 07 4921 4000
Email gq@nla.gov.au

23rd October 2015

Growing Central Queensland
PO Box 307
Rockhampton QLD 4700

Attention: Paul Keech Director Engineering Services

Dear Paul,

Northern Australia Beef Roads Programme

Growing Central Queensland are delighted to endorse the application of Gladstone Regional Council for funding under the Northern Australia beef Roads Programme.

The upgrade of the Dawson Highway and Mount Alma Road to provide access to the Gladstone State Development Area will offer significant benefit to the beef industry in Central Queensland.

The provision of efficient supply chain networks, as identified in the *Growing Central Queensland Review* document (attached) provides enormous efficiencies and opportunities for the beef industry transport and logistics sector as well as the broader horticultural and intensive agriculture industries.

Impediments and opportunities in supply chain networks in Central Queensland, specifically around the Gladstone Port were ranked highest in a review of stakeholders conducted by the Growing Central Queensland project.

Any funding towards solutions for this problem would contribute toward growing Central Queensland agricultural prosperity.

Regards,



Anne Stünzner
Growing Central Queensland

23rd October 2015

Growing Central Queensland
PO Box 307
Rockhampton QLD 4700

Attention: Paul Keech Director Engineering Services

Dear Paul,

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The upgrade of the Dawson Highway and Mount Alma Road to provide access to the Gladstone State Development Area will offer significant benefit to the beef industry in Central Queensland.

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Impediments and opportunities in supply chain networks in Central Queensland, specifically around the Gladstone Port were ranked highest in a review of stakeholders conducted by the Growing Central Queensland project.

Any funding towards solutions for this problem would contribute toward growing Central Queensland agricultural prosperity.

Regards,

Anne Stünzner
Growing Central Queensland

Jeffery Hamelink

From: Peter Dougherty <Peter.Dougherty@dsd.qld.gov.au>
Sent: Friday, 23 October 2015 9:23 AM
To: Paul Keech; Jeffery Hamelink
Cc: Richard Austin
Subject: RE: Northern Australia Beef Roads Programme - Gladstone Submission

Hi Paul and Jeff,

I have made senior departmental staff aware that the Gladstone Regional Council intends to make an application for funding under the Northern Australia Beef Roads Programme and that you are seeking a letter of support from the Department. The advice I have received is that the Department is not in a position to provide a letter as such but that I could indicate our support via this email. I have been asked to assure you that the Department encourages and supports the development of and upgrading of transport infrastructure that would connect beef and other agriculture producers with the Gladstone Port and a possible meat processing plant on the Gladstone State Development Area (GSDA).

I further acknowledge that the application will form the basis for a longer term strategy that will support the upgrading of the Dawson Highway and its bridges to accommodate road trains plus the possible sealing of the Mt Alma Rd and its connection to the GSDA. I am pleased to advise that I have received approval to participate in any working group that is put together to further develop the strategy. I have also made Economic Development Queensland (EDQ), who administer those precincts of the GSDA that would be connected to the upgraded infrastructure, aware of your intent to lodge an application. I believe that they intend to also send you an email with in principle support and an expression of interest to be part of any working group.

Regards

Peter

Peter Dougherty,
Manager,
Central Queensland Regional Office – Gladstone Office
Regional Services Group
Department of State Development
Queensland Government
(Also delivering services on behalf of the Department of Tourism, Major Events, Small Business and Commonwealth Games.)

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Gladstone Ports Corporation

Growth, Prosperity, Community.

Our Ref: #1203536: CDD:GC

21 October 2015

Gladstone Regional Council
PO Box 29
Gladstone Qld 4680

Attention: Mr Paul Keech – Director Engineering Services

Dear Paul

Northern Australia Beef Roads Programme

Gladstone Ports Corporation would like to endorse the application of Gladstone Regional Council for funding under the Northern Australia Beef Roads Programme.

The upgrade of the Dawson Highway and Mt Alma Road to provide access to the Gladstone State Development Area will offer significant benefit to the beef industry in the Central Queensland Region. By providing an efficient supply chain network, the potential for access to international markets through the Port of Gladstone and Port Alma is greatly enhanced.

The development of the upgraded network would not only benefit the cattle industry in the short term, but would have the potential to allow greater access to markets for the wider agriculture industry.

Yours sincerely

Craig Doyle
Chief Executive Officer

Jeffery Hamelink

From: Amanda J Hinds <Amanda.J.Hinds@tmr.qld.gov.au> on behalf of Dave J Grosse <Dave.J.Grosse@tmr.qld.gov.au>
Sent: Friday, 23 October 2015 11:51 AM
To: Jeffery Hamelink; paulK@gladstonerc.qld.gov.au
Cc: mayor@gladstonerc.qld.gov.au
Subject: FW: Strategy to export live and boxed beef from the Port

Hi Paul/Jeff

Thanks for discussing Councils thinking with my Planning Manager (Rex Cowan) on long term heavy Vehicle access into the Gladstone Port Precinct and the Aldoga Industrial Area.

The proposal via Mt Alma Road directly into the Aldoga area seems to have merit, and as such TMR provide in principal support to GRC's beef road submission to seal Mt Alma Road. This will provide direct access for heavy vehicles into the Aldoga Precinct.

Happy to continue these discussions.

Regards

Dave Grosse

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Customers first Ideas into action Be courageous Unleash potential Empower people



From: Paul Keech [<mailto:PaulK@gladstonerc.qld.gov.au>]
Sent: Monday, 19 October 2015 1:42 PM
To: Jeff Hamelink (Jeff.Hamelink@aucongroupp.com) <Jeff.Hamelink@aucongroupp.com>; Ian Munro <IanM@gladstonerc.qld.gov.au>; Peter Dougherty (Peter.Dougherty@deedi.qld.gov.au) <Peter.Dougherty@deedi.qld.gov.au>; Owen Barton (BartonO@gpcl.com.au) <BartonO@gpcl.com.au>; Gary Carter (garycarter58@icloud.com) <garycarter58@icloud.com>; carterg@gpcl.com.au; Rex Z Cowan <Rex.Z.Cowan@tmr.qld.gov.au>; Anne Stunzner (priorpark@bigpond.com) <priorpark@bigpond.com>; Leo Neill-Ballintyne (leo@apacific.com.au) <leo@apacific.com.au>
Cc: Gail Sellers <GailS@gladstonerc.qld.gov.au>
Subject: Strategy to export live and boxed beef from the Port

Hi all



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