

Technical Review of Alternative Routes between Loganholme and Stapylton

Coomera Connector

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Document control options

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Executive summary

The Department of Transport and Main Roads (TMR) is progressing the planning for the M1 Pacific Motorway between Loganholme and Nerang including the Coomera Connector. In October 2019 the Premier of Queensland announced a Business Case would be progressed for Stage 1 of the Coomera Connector between Coomera and Nerang with Stage 2 between Loganholme and Coomera a future stage.

In November 2019, TMR undertook a community consultation program for the full length of the Coomera Connector and received feedback from the community, including a number of alternative alignments for the northern section of Coomera Connector corridor.

This report is focussed on a Technical Review of the alternative alignments provided by the community between Loganholme and Stapylton. The alternative routes are shown in the figure below.

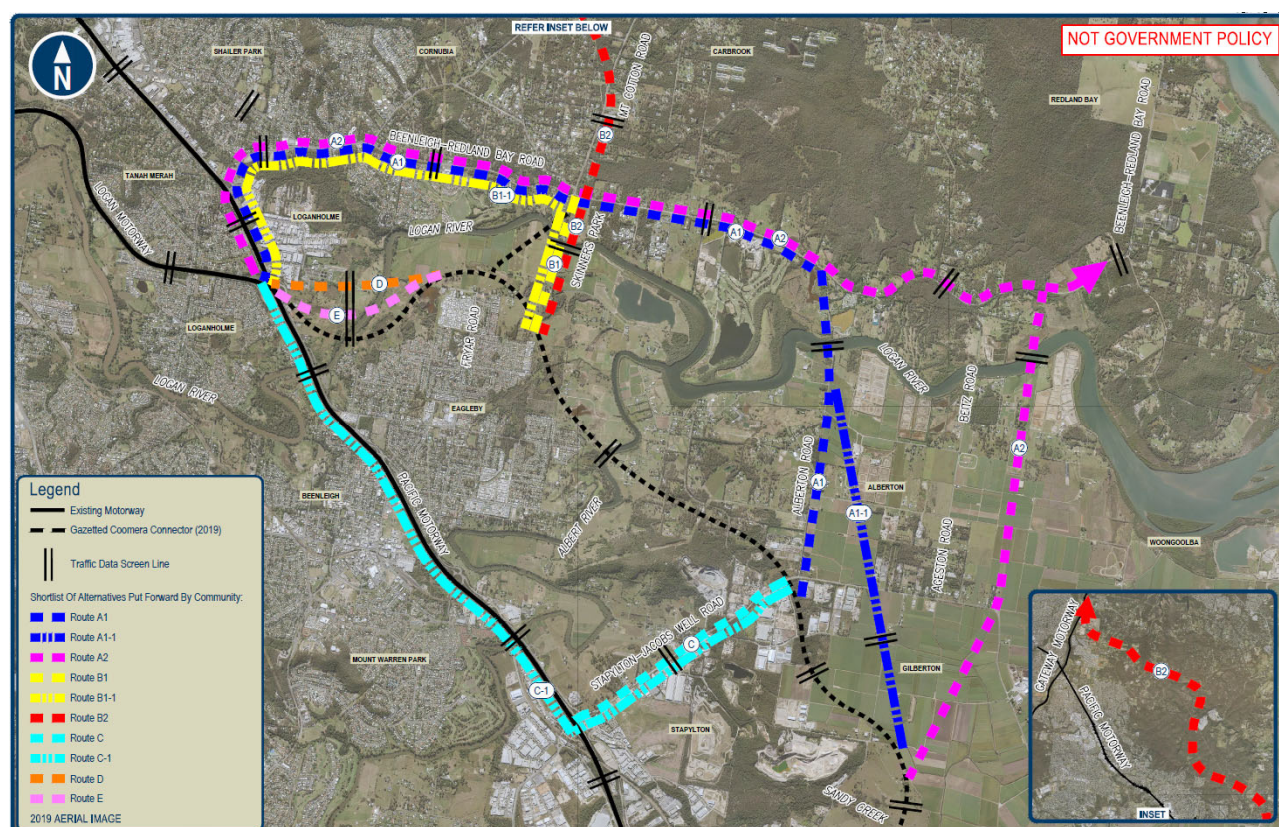


Figure 1: Proposed alternative alignments

The Technical Review will be carried out in two phases:

1. The initial phase being an assessment of the technical merits and feasibility of the alternative routes suggested by the community compared to the gazetted route.
2. The scope of the next phase depends on findings of this initial phase and further consideration by TMR.

The Technical Review divided the alternative routes into two categories:

- **Major deviations:** Routes A1, A1-1, A2, B1, B2 and C
- **Minor deviations:** Routes D and E are minor refinements to the gazetted route in the Eagleby area to reduce impacts to the human and natural environment.

To allow a meaningful comparison between all suggested routes and the gazetted Coomera Connector corridor, the following amendments were made to suggested Routes B1 and C:

- Route B1 was amended to Route B1-1 to include the upgrading of the Beenleigh-Redland Bay Road from Mt Cotton Road to the Logan Motorway which would be required to meet the 2041 travel demand forecasts; and
- Route C was amended to Route C-1 to include the upgrading of the M1 Motorway between Stapylton and Logan Motorway which would be required, also to meet the 2041 travel demand forecasts.

A multi criteria analysis was developed to assess the alternative routes against the gazetted Coomera Connector corridor. The criteria selected for comparing the routes were:

1. functionality
2. impacts on the human environment
3. impacts on the natural environment
4. estimated cost.

Inputs for the Technical Review was collected from previous investigations, advice from technical experts, site visits, and community feedback provided from the community consultation program in late 2019.

Summary of findings

This review has determined the gazetted Coomera Connector corridor:

- provides the best overall outcome compared to the major deviation alternative alignments. The amended Route B1-1 was the next best, followed by Routes A1, A1-1, A2 with amended Route C-1 ranked last
- provides the highest level of congestion relief at the Albert and Logan Rivers
- impacts the lowest number of properties between Loganholme and Stapylton
- impacts the environment that will be mitigated through design and construction, however avoids matters of national environmental significance that alternative alignments impact north of the Logan River
- provides the best value for money.

It should be noted that some alternative routes provided by the community were incomplete and did not provide a comparable solution. These options were adjusted to include additional upgrades that would be required to the adjacent road network with considerable property impacts to facilitate changes in traffic including:

- upgrading Beenleigh-Redland Bay Road to 6 lanes to accommodate increased traffic between the proposed alternative Coomera Connector route and the M1 at Loganholme for routes A1-1, B1-1 and A2
- upgrading Stapylton Jacobs Well Road from the Coomera Connector gazetted corridor at Stapylton to the M1 at Yatala (Exit 38) to accommodate increased traffic between Coomera Connector and the M1 for route C-1
- upgrading the M1 between Logan Motorway and Yatala (Exit 38) to accommodate increased traffic on the M1 as the Coomera Connector ends at Stapylton for route C-1.

Route B2 (connecting to the Gateway Motorway) is not supported due to the significant impact the route would have on the critically important koala habitat north of Beenleigh Redland Bay Road, listed under the Queensland Government's (draft) SEQ Koala Conservation Strategy and is not consistent with the current master plan and approved funding for upgrading the M1 north of Loganholme to Eight Mile Plains.

This review has assessed the relative technical merits of the alternative routes compared to the gazetted Coomera Connector corridor. The assessment has determined the gazetted Coomera Connector corridor is the best alignment for the Coomera Connector between Loganholme and Stapylton to achieve the necessary transport outcomes required to meet projected demand in 2041, whilst considering the impacts to the human and natural environment and cost.

Assessment summary of major deviations

Routes A1, A1-1, A2, B1, B2 and C

Functionality

Travelling demand modelling to 2041 found:

- The gazetted Coomera Connector corridor reduced the 2041 forecast daily volumes on the M1 at the Logan River by 45,000 vehicles while the next best alternative (Route B1-1) offered a reduction of 31,000 vehicles. Reducing traffic congestion on the M1 is a key objective of the Coomera Connector corridor
- The gazetted Coomera Connector has the added benefit of reducing daily volumes on the Beenleigh-Redland Bay Road by 16,800 vehicles (California Ck) and would not need further upgrade on this basis. The other routes (except Route C-1) require a significant upgrade of the Beenleigh- Redland Bay Road, to meet the forecast travel demands
- Route C-1 requires significant upgrading of the M1 to meet the future travel demand forecasts, noting the route still requires all traffic between Stapylton and Loganholme to use the M1 corridor with no alternative provided.

Table 1: Daily traffic volume (AWDT) change relative to 2041 Base Case

Locations	2016 (AWDT)	2041 (AWDT)	Change in AWDT Relative to Base Case						
			Coomera Connector	Route A1	Route A1 -1	Route A2	Route B1	Route B1-1	Route C & C-1
M1 Motorway									
4. M1 at Logan River	181,800	256,500	-45,000	-25,300	-26,300	-17,900	-19,900	-31,000	6,200
5. M1 at Albert River	166,400	234,000	-24,300	-6,200	-7,400	-500	-200	-12,000	24,000
Coomera Connector									
7. CC at Logan River			-	62,600	65,200	-	-	-	-
8. CC at Logan River			-	-	-	55,900	-	-	-
9. CC at Logan River			-	-	-	-	54,000	67,900	-
10. CC at Logan River			67,000	-	-	-	-	-	-
11. CC at Albert River			83,800	-	-	-	54,000	67,900	-
Key supporting roads									
18. Beenleigh-Redland Bay Rd (California Ck)	22,300	29,500	-16,800	15,000	16,700	8,700	-2,300	22,000	0
19. Beenleigh-Redland Bay Rd (east of Stern)	7,400	14,300	7,700	34,300	36,400	19,400	6,800	8,000	-200
22. Stapylton-Jacobs Well Rd	6,600	12,800	7,700	12,200	12,400	20,700	6,800	7,900	-200

Note: Volumes are bidirectional. Positive sign (Blue colour-coding) represent the increase in volumes compared to the Base Case. Negative sign (Green colour-coding) represent the decrease in volumes compared to the 2041 Base Case

It should also be noted the gazetted Coomera Connector corridor greatly improves accessibility and functionality for the Eagleby community by having another access to the M1 and Logan Motorway and to the Redland Bay area via Mount Cotton Road and Beenleigh Redland Bay Road.

Human Environment

All communities will experience some change in amenity impacts with a new road and this will vary from route to route. The assessment found the gazetted Coomera Connector will create the least impact on the human environment:

- The gazetted Coomera Connector corridor (between Loganholme and Stapylton) is directly impacting 104 properties and 22 dwellings. The property impacts from alternative routes A1, A1-1, A2 and Amended Route B1-1 are much greater with the property impacts 26% to 40% higher and dwelling impacts 27% to 86% higher. The impacts from amended Route C-1 are much greater again because of the need to upgrade the M1 to meet the forecast travel demand.
- While the Eagleby community will experience community impacts from the gazetted Coomera Connector corridor, the impacts will be much greater on the Cornubia and Loganholme communities due to the increased traffic volumes.
- The Eagleby community will have significantly improved accessibility as a result of the gazetted Coomera Connector.

Table 2: Direct Property Impacts

Nature of Direct Impacts		Route					
		Coomera Connector	Route A1	Route A1 -1	Route A2	Amended Route B1-1	Amended Route C-1
Properties	No.	104	138	137	146	131	394
	Change (%) to Coomera Connector	100%	133%	132%	140%	126%	379%
Dwellings	No.	22	33	28	41	38	>300
	Change (%) to Coomera Connector	100%	150%	127%	186%	173%	>1360%

Natural Environment

All routes fall within the catchments of the Logan and Albert Rivers that contain natural environmental values.

Amended Route C-1 created least impact of the all routes on the natural environment because it follows an existing road network that is already disturbed. Amended route B1-1 was next best and slightly better than the gazetted Coomera Connector corridor because it removed a second crossing of Logan River and avoided the wetlands to the west of Wharf Road at Eagleby.

Routes A1, A1-1 and A2 are located further to the east of the gazetted Coomera Connector and traverse more environmentally sensitive areas. Routes A1, A1-1 and A2 involve significant upgrading of the Beenleigh- Redland Bay Road which is within the Koala Priority Areas.

Estimated Project Cost

To allow a meaningful assessment of the cost of the alternative routes compared to gazetted Coomera Connector corridor:

- Base Cost Estimates which have not been adjusted for risk and escalation were prepared, and
- the cost of further upgrades of the M1 corridor to meet forecast travel demands has been added to both the cost of Routes A1, A1-1, A2, Amended B1-1, Amended Route C-1 and the gazetted Coomera Connector corridor.

As illustrated in **Table 3** below, all alternative routes are a higher cost than the gazetted Coomera Connector corridor. Alternative routes A1, A1-1, A2 and Amended Route B1-1 are 17% to 24% higher in cost, whilst Amended Route C-1 is much higher again at 117% as this requires significant upgrades to the M1.

Table 3: Cost comparison of alternative routes

Base Cost Component	Description of Works and Change in Cost Compared to Coomera Connector					
	Coomera Connector	Route A1	Route A1-1	Route A2	Amended Route B1-1	Amended Route C-1
Coomera Connector	Works required for the Coomera Connector between Loganholme and Stapylton					Works to upgrade Stapylton Jacobs Well Road from Coomera Connector to M1
M1 Corridor Upgrades	Works required to upgrade the M1 including Auxiliary lanes, interchange upgrades & smart motorway technologies from Computer Rd to Logan Motorway					
						New motorway of express lanes and collector distributor lanes + smart motorway technologies from south of Stapylton to Logan Motorway
% Change	100%	117%	124%	124%	117%	217%

Assessment of minor deviations

Routes D and E

The minor deviations (Routes D and E) have slightly different crossings of the Logan River which shifts the gazetted Coomera Connector corridor further away from the Eagleby community and further into the Logan River floodplain. Both routes have lesser natural and human environmental impacts than the gazetted Coomera Connector by:

- traversing sections with less environmental values
- replacing road embankment with bridging structure, and
- moving away from the urban areas of Eagleby.

While Route D has a more direct connection to the Logan Motorway, the route has a significant impact on Logan City Council's treatment plant and should be modified to avoid or minimise any impact to the plant.

Even though Routes D and E are shorter in length, the Base Cost Estimates are █████ and █████ million more respectively than the same section of the gazetted Coomera Connector corridor. This higher cost is directly a result of increase in the length of bridging required.

Given the cost estimates are at a strategic level and are based on limited information, there are potential economies of scale with longer bridging and reduced risks by replacing road embankments on floodplains of major rivers with bridging. Both options are worthy of further investigation.

Overall assessment outcome

Table 4 provides a summary of the assessment combining the assessments of the major and minor deviations into a overall ranking.

As illustrated in the multi-criteria assessment, the gazetted Coomera Connector corridor is the preferred alignment for a future transport corridor between Loganholme and Stapylton.

Table 4: Overall assessment summary of alterantive routes compared to gazetted Coomera Connector

	Alternative Routes						Gazetted Coomera Connector
	Route A1	Route A1-1	Route A2	Amended Route B1-1	Amended Route C-1	Routes D and E	
Non-price criteria							
Functionality	4	4	4	3	7	1	1
Human environment	4	4	4	3	4	1	1
Natural environment	5	5	7	2	1	3	3
Total Cost Comparison	117%	124%	124%	117%	217%	109 – 117%	100%
OVERALL RANKING	3	5	5	3	7	2	1

1. Introduction

1.1 Background

The Pacific Motorway (M1) corridor between Brisbane and the Gold Coast is experiencing significant growth and requires major upgrading to meet this demand.

Over many years of investigations, the Department of Transport and Main Roads (TMR) has identified and protected an additional corridor located to the east of the M1 between Loganholme and Nerang (known as the Coomera Connector) as well as enhancements to the existing M1 Motorway to help solve the problem.

The Queensland Government formally commenced gazetting sections of the 45 km long Coomera Connector corridor in March 2016, with the last section between Stapylton and Loganholme being formally gazetted in March 2019. **Figure 3** illustrates the gazetted Coomera Connector corridor with the study area for this review circled below in red from Loganholme to Stapylton



Figure 2: Gazetted Coomera Connector corridor and study area

In 2019 TMR received comments from residents adjacent to the corridor, community groups, industry bodies and local government including concerns from members of the Eagleby community. During the formal consultation period in November and December 2019, alternative alignments between Loganholme and Stapylton were identified and presented to the project team.

Key comments and concerns raised by the community of the gazetted corridor between Loganholme and Stapylton are:

- The gazetted route is located on the Logan River floodplain and will cause additional impacts from future floods
- Potential impacts to the Eagleby wetlands including lost opportunities with the associated wetlands based eco-tourism.
- Amenity (for example, traffic noise, air quality, visual) and economic (for example, loss in property values) impacts from a new motorway close to Eagleby residents.
- Increased traffic impacts with Eagleby being connected to the new motorway via a grade-separated interchange at Fryars Road.
- Construction impacts to both residents and wetlands as well as disturbance of acid sulphate soils, potential impacts to Indigenous cultural heritage and artefacts, and the spreading of fire ants.
- The cost of bridge infrastructure needed to cross the Logan and Albert rivers.
- residents and community groups raised concerns about the gazetted route and its potential natural and human impacts both during construction and operational
- while the residents and community recognise the need for another road to complement the M1 motorway, they feel strongly that the route for the Coomera Connector should be located away from the Eagleby area.

The Eagleby Community and Wetlands Group (ECGW) have made representations to project team, TMR, elected representatives and other Queensland Government departments to change the alignment of gazetted route.

To address the concerns raised by the community, the Queensland Government has agreed to assess the alternative routes put forward by the community in the vicinity of Eagleby.

1.2 Purpose of technical review

The purpose of this technical review is to compare the alternative routes between Loganholme and Stapylton that have been put forward by members of the community to the gazetted corridor.

Terms of reference for the two-stage review includes:

- the first phase will be a preliminary assessment of the merits of the alternative routes compared to the gazetted Coomera Connector corridor
- the second phase will consider further refinements to the identified corridor from the findings of initial phase and consideration by TMR.

The first phase of this Technical Review involved:

- Examining past investigations for the Loganholme to Stapylton section of the Coomera Connector
- Assessing alternative routes. The limits of the review are:
 - the Sandy Creek crossing, Yatala in the south; and
 - the junction of the Beenleigh-Redland Bay and Logan Motorway (M1 Exits 30 and 31) in the north.

- Seeking advice from external technical experts in key areas including travel demands, impacts on the natural environment and project costs for the various alternative routes.
- Seeking specific information from the project team.
- Considering public feedback about the routes received during community consultation in November and December 2019.
- Site visits (via public roads) to view the topography, existing road network, river system as well the natural and human environments through which the routes traverse.

2. Key features of alignments

2.1 Gazetted Coomera Connector

2.1.1 Background history

The corridor for the Coomera Connector has been in various public documents (published street directories, regional transport plans, planning studies and City of Gold Coast planning schemes) for many years.

The Queensland Government formally recognised this corridor in three (3) sections:

- Nerang to Coomera section in March 2016
- Coomera to Stapylton section in May 2017, and
- Stapylton to Loganholme section in March 2019.

A detailed map of the full gazettal can be found on the Project's public website:

(<https://www.tmr.qld.gov.au/Projects/Name/C/Coomera-Connector>).

The need for another transport corridor to meet the growing traffic demands of the region commenced in the early 1990's, when the then road agency investigated another transport corridor to the east of the Pacific Highway (between Nerang and Loganholme). This corridor was known as the Intra-Regional Transport Corridor (IRTC) and has been included for many years in relevant South East Queensland and City of Gold Coast planning policies as a planned road corridor to support growth within the region.

A joint 2015 study between TMR and the City of Gold Coast confirmed the corridor is a future strategic transport link that could relieve traffic congestion on the M1 and surrounding local roads.

For this Technical Review of the routes including the gazetted route, information from the following previous studies and investigations was reviewed:

- Preferred Options Development Coomera Connector, 2019 (GHD/WSP)
- Northern Extension of Coomera Connector – Corridor Protection Report, 2018 (HDR)
- Coomera Connector – Northern Section: Hydraulic Options Analysis, 2018 (TMR)
- Intra-Regional Transport Corridor- Northern Connection: Existing and Options Hydraulic Analysis, 2017 (TMR)
- Environmental Scoping Report: IRTC Northern Connection: Beenleigh-Redland Bay Road to Stapylton - Jacobs Well Road, 2017 (TMR)
- Logan East Link Route Investigation Study (Stapylton-Jacobs Well Road to Logan Motorway), 2011 (Aecom)
- Modified South Coast Motorway and South East Connector, 1996 (Queensland Transport)
- Eastern Corridor Planning Study, 1992 (Connell Wagner)

2.1.2 Key features

The gazetted Coomera Connector corridor between Sandy Creek (south of Stapylton) and the junction of the M1 Motorway and Logan Motorway has the following key features:

- 12.9 km of 6 lane divided carriageway with a "greenfield" alignment to suit 110 km/h design speed, with a 100km/h posted speed;
- Gazetted corridor width of 120 metres.
- Two major crossings of the Albert (0.75 km) and Logan (0.75 km) Rivers

- Major grade-separated interchanges comprising:
 - Major road system connection with the M1 Motorway and Logan Motorway (M1 Exit 31);
 - Stapylton- Jacobs Well Road; and
 - Fryar Road, Eagleby.
- 3.1 km of four lane arterial road connection (including a 0.9 km long crossing of Logan River) from the Fryars Road Interchange to the Mount Cotton Road / Beenleigh-Redland Bay Road intersection. (Note: No direct connection is planned between Mt Cotton Road and Fryar Road.)
- Supporting cycleways and footpath systems
- Measures to mitigate impact on the human and natural environment.

2.2 Alternative routes suggested by community

2.2.1 Community Submissions

TMR received a range of submissions and representations from residents and community groups on the gazetted Coomera Connector corridor. **Table 4** summaries the submissions from residents who have made suggestions for alternative routes. The alternative routes fall into two categories:

- major deviations to the gazetted route; and
- minor deviations to the gazetted route, to reduce the impacts on Eagleby area.

Logan City Council have provided feedback on the gazetted corridor adjacent to Eagleby. Council recognised and supported an alternative corridor to ease congestion on M1 motorway, provided further planning considers a balanced approach towards:

- minimising and mitigating impacts to the environment;
- minimising and mitigating impacts to residents; and
- economic impacts are considered.

Gold Coast City also made a submission strongly supporting the project but did not raise in specific issues or concerns with the location of northern part of the gazetted route.

The alternative routes are presented in **Figure 4** between Loganholme and Stapylton.

Table 5: Summary of alternative routes

Who	Description of alternative route	TMR identifier (refer Figure 2)
[REDACTED]	An alternative route where the Coomera Connector deviates to the east of Eagleby, crossing the Logan River at Skinners Park, traversing through Venman Bushland National Park to join with the Gateway Arterial near the Mt Gravatt-Capalaba Road /Gateway Motorway junction	B2
[REDACTED]	<p>Several alternative routes where the Coomera Connector:</p> <ul style="list-style-type: none"> deviates to east of Eagleby, crossing the Logan River at locations between Alberton Road and to the east of Beitz Road and then connecting to the Beenleigh-Redland Bay Road, follows an upgraded Beenleigh-Redland Bay Road to join at Pacific Highway/ Logan Motorway Junction (M1 Exits 30 and 31). Joins with Stapylton-Jacobs Well Road near Alberton Road, follows an upgraded Stapylton-Jacobs Well Road to join with the M1 Pacific Motorway at the Yatala (North) interchange (Exit 38) A refined route which is straighter and shorter than A1 and lessens property impact by traversing more rural property 	<p>Multiple routes suggested which have been short listed to Routes A1 and A2</p> <p>Route C</p> <p>Route A1-1</p>
[REDACTED]	<p>An alternative Coomera Connector:</p> <ul style="list-style-type: none"> Which straightens the gazetted route's crossing of Logan River and floodplains between Eagleby and the M1 Motorway/ Logan Motorway junction (M1 Exit 31). Where a section between Eagleby Road and Logan Motorway is deleted and replaced with a connection across the Logan River near Skinners Park to join at junction with the Beenleigh-Redland Bay Road and Mt Cotton Rd 	<p>Route D</p> <p>Route B1(no upgrade of Beenleigh- Redland Bay Rd) and</p>
[REDACTED]	<p>An alternative Coomera Connector which joins the M1 Motorway just south of M1 crossing of Logan River.</p> <p>(Not a practical engineering and transport solution given the short distance between Logan Motorway and Beenleigh North interchanges (Exits 31 and 34)</p>	Not progressed as not practical
[REDACTED]	An alternative Coomera Connector that deviates to east of Eagleby via Ageston Road and across Logan River to the Beenleigh-Redland Bay Road, follows an upgraded Beenleigh- Redland Bay Road to join at M1/ Logan Motorway Junction (M1 Exits 30 and 31). The alternative route also includes a connection to Fryar Road at Eagleby.	Similarities to other routes and will be assessed accordingly but not as separate route
[REDACTED]	An alternative Coomera Connector which also straightens the gazetted route's crossing of Logan River and between Eagleby and the M1 Motorway/ Logan Motorway Junction (M1 Exit 31).	Route E

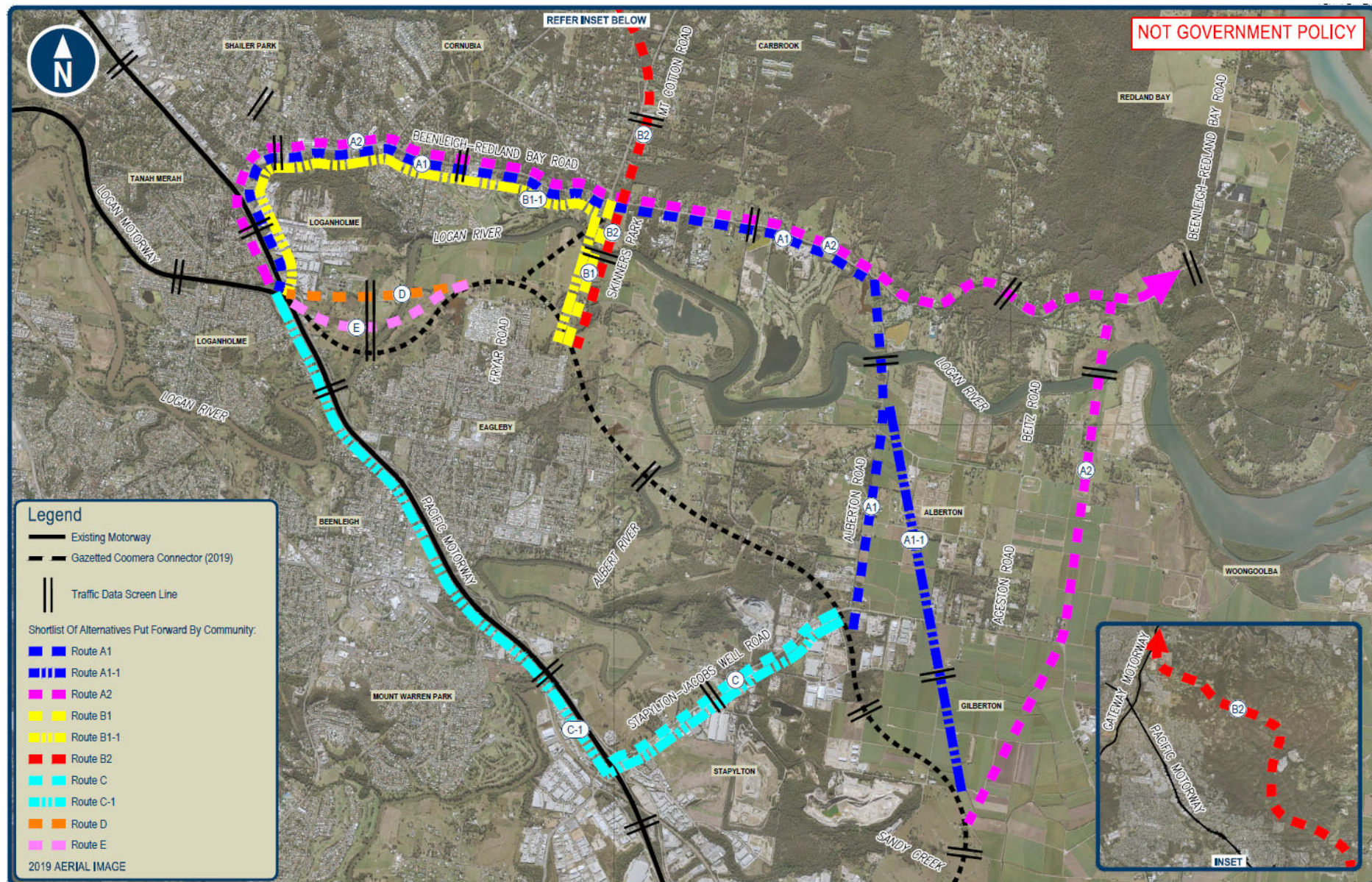


Figure 3: Alternative routes and gazetted Coomera Connector corridor

2.2.2 Key features of alternative routes

Appendix A outlines the key features of alternative routes compared to the gazetted route. Typical type cross sections have also been included for the mainline bridging and roadway for the Coomera Connector and upgrading of the Beenleigh-Redland Bay Road and the Stapylton- Jacobs Well Road.

Key points to note:

- **Two categories of Alternative Routes:**

The alternative routes have been grouped into two categories:

- Routes A1, A1-1, A2, B1, B2 and C are major deviations away from Eagleby.
- Routes D and E are refinements (or minor deviations) to the gazetted route.

- **Limitations with the community suggested Route B1 and C:**

Route B1 joins to the Beenleigh-Redland Bay at its junction with Mt Cotton Road. Route B1 does not provide for any upgrading of the Beenleigh-Redland Bay Road from Mt Cotton Road to its junction with M1 Motorway/ Logan Motorway (M1 Exits 30 and 31).

Route C involves an upgrade of the Stapylton-Jacobs Well Road with a connection to the M1 Motorway (Exit 38) at Yatala. Route C does not assume any further upgrading of the M1 Motorway between the Yatala North Interchange (Exit 38) and Logan Motorway (Exit 31).

Route B1 has been amended to Route B1-1 and Route C amended to Route C-1, to allow a more meaningful assessment and comparison with the other alternative routes and the gazetted Coomera Connector.

- **The difficulties with Route B2 traversing critical Koala Habitat**

As highlighted in Sections 2.3 and 3.1.3 in Environmental Technical Note of **Appendix C**, Route B2 traverses the Venman Bushland National Park between Mt Cotton Road and Gateway Motorway. This area is regarded nationally as one of the most significant Koala populations because of its size and genetic structure.

The Koala is of national significance and listed as vulnerable under the EPBC Act.

The Queensland Government has introduced a (draft) SEQ Koala Conservation Strategy to protect and conserve the remaining Koala habitat within South East Queensland. Under the strategy:

- The clearing of core Koala habitat within a Koala Priority Area (KPA) is prohibited as of 7 February 2020.
- Koala Habitat Restoration Areas (KHRA) have been mapped to identify areas most suited for habitat restoration and offset liabilities.

Route B2 is considered unsuitable for further assessment, as the route traverse's large tracts of KPA and KHRA where the removal of vegetation could be detrimental to viability of local populations and clearing is prohibited.

This Technical Review does not evaluate Route B2 any further.

- **Information available on the Alternative Routes**

As indicated in Section 2.1, there is much more information available on the gazetted route than the alternative routes.

While the alternative routes are conceptual in nature, the assessment has been able to:

- use a strategic traffic model to compare alternatives;
- assess impacts to the human and natural environment; and
- prepare cost estimates at a strategic level.

For this technical review, information and data has been collected from reliable sources. Where information is not readily available, judgements have been made and noted in this report accordingly.

- **Applicable Design Standards**

Both the gazetted and alternative routes will be required to meet:

- TMR policies and standards for design and roads and bridges; and
- Local Government standards for local roads.

The key design features for this Technical Review are outlined in **Appendix A**. In summary:

- The Coomera Connector portions of alternative routes will have similar design features to gazetted route; a 6-lane divided carriageway motorway with a posted speed of 100 km/hr.
- To meet 2041 travel demand forecasts:
 - The Beenleigh-Redland Bay section of Routes A1, A1-1, A2, and Amended Route B1-1 will need to be upgraded to a 6-lane divided carriageway arterial road with signalised at grade intersections and rationalised local access via a two-lane service road system.
- For Amended Route C-1:
 - the Stapylton-Jacobs Well Roads section will need to be upgraded to a 6-lane divided carriageway arterial road with signalised at grade intersections and rationalised local access via a two-lane service road system; and
 - the M1 between Logan Motorway and Stapylton will need to be upgraded by:
 - converting the current 8-lane M1 motorway into express lanes with posted speed of 110 km/hr and restricted access; and
 - developing motorway standard collector-distributor roads alongside, but separated from, the express lanes. (These lanes will provide the access and function that the M1 currently provides and will accommodate intra-regional trips).

(The scope of upgrading the M1 motorway is based on a concept design option developed as part of the Preliminary Evaluation (PE) phase for the Coomera Connector project)
- The waterway openings for crossings of the major rivers and associated floodplains have been obtained from previous hydraulic investigations of similar routes except for Route A2.

For this technical review, Route A2 waterway openings have been estimated from previous hydraulic investigations for the Logan River, the 1% AEP flood map of the Logan River shown in **Figure 5** and topographical features of the area.

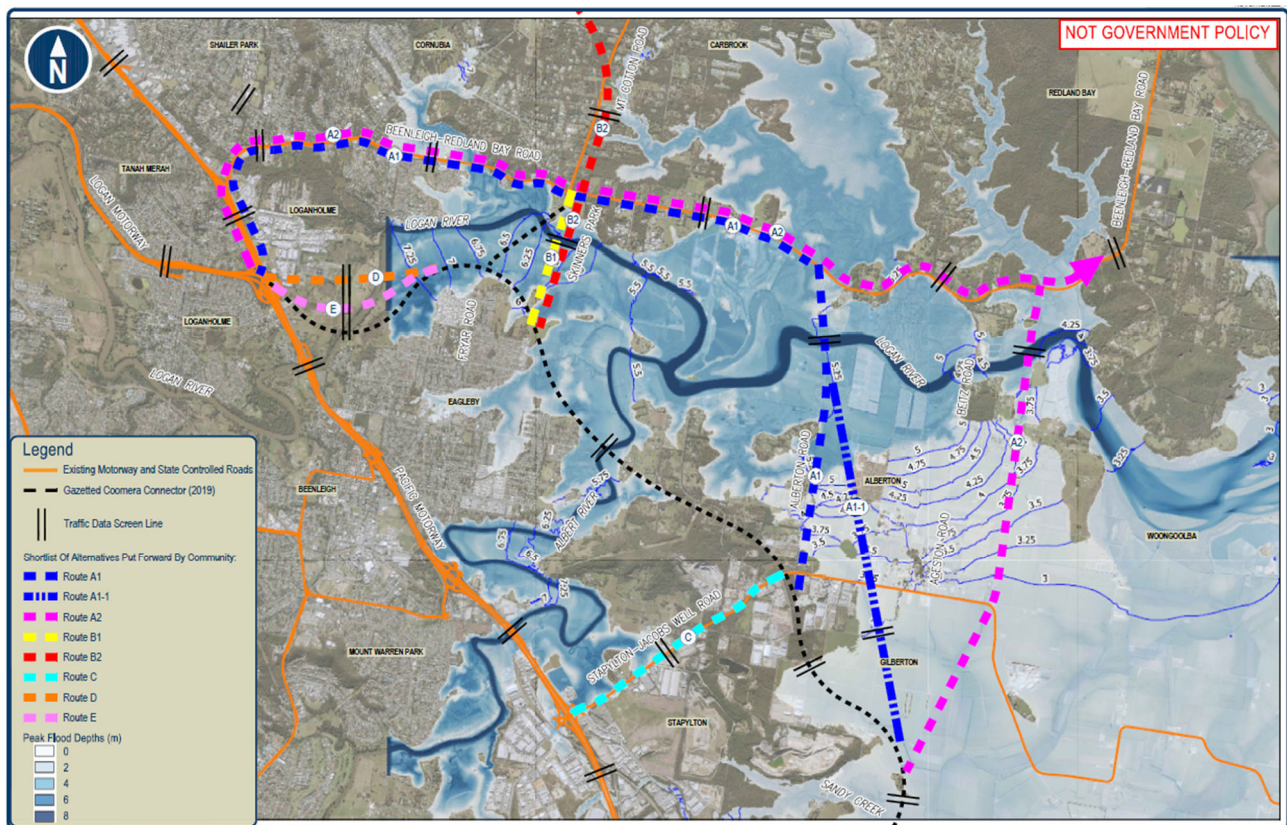


Figure 4: Logan River 1% AEP flooding map (TMR 2018)

3. Technical Assessment

3.1 Coomera Connector as a future transport corridor

TMR have identified constraints with M1 corridor through an Investment Logic Mapping process undertaken as part of the M1 Loganholme to Nerang and Coomera Connector Strategic Assessment of Service Requirements (SASR) for transport demand forecasts to 2041.

The primary strategic problems to be solved are:

- A compromised freight corridor: The M1 is a critical component of the National Land Transport Network (NLTN) and its ability to service freight and inter regional travel is compromised by the congestion caused by intra-regional/local trips.
- Constrained river crossings: The limited available crossings at the Logan, Albert, Nerang and Coomera Rivers has constrained the development of alternative north/south routes to the M1 in the northern Gold Coast, impacting network reliability and resilience.

In addition, there are another two secondary strategic problems beyond the road network that contribute to the forecast deterioration on the M1 corridor:

- Unsustainable M1 commuter trips: Continuation of a low jobs to population growth in the northern Gold Coast is leading to an unsustainable level of commuter trips on the M1.
- Limited PT mode share: The demographics and land use in the northern Gold Coast has led to limited public transport (PT) mode share with a high number of local and intra-regional car trips in the area.

To solve these primary and secondary problems, improvements transport network between Loganholme and Nerang through the provision of an alternate corridor, the Coomera Connector has been identified as the preferred option to meet the following objectives:

- Maintaining the road hierarchy and preserving the design purpose of the M1, protecting it for freight and inter-regional travel into the future
- Improved network reliability and resilience
- Improved accessibility for local traffic
- Improved balance of mode share between active, PT and private vehicles
- Connecting economic and residential nodes by bringing forward the development of the economic and residential centres as outlined in ShapingSEQ.
- Improved road safety and incident management.

These objectives are important criteria in any assessment of the routes.

3.2 Assessment approach

The approach to the assessment of the alternative routes compared to the gazetted Coomera Connector corridor has considered:

- The performance a route in the transport network at both a local and regional level
- Impacts on the natural environment (for example flora, fauna, water quality cultural heritage).
- Impacts on human environment (for example amenity to residents such road traffic noise, air quality, visual, local accessibility and property.
- Cost of building the road itself.

A Multi-Criteria Assessment (MCA) methodology has been selected for assessing the various alternative routes against each other and the gazetted route. The methodology involves evaluating the overall performance (scoring and/or ranking) of the routes against a series of selected criteria. The key points with this approach are:

(a) **Key selection criteria**

The key criteria and sub criteria selected for this assessment are described in **Table 5**, based on:

- the functionality objectives established for the Coomera Connector at both a local and regional level;
- the human environment impacts likely to be created by each route;
- the natural environment impacts likely to be created by each route; and
- the estimated capital cost of each route and associated risks.

Table 6: Key selection criteria

Element	Evaluation criteria		Comments
	Key criteria	Sub-criteria	
Value	Functionality	<ul style="list-style-type: none"> • Performance of road network at a local level • Contribution towards objectives for upgrading the M1 corridor 	<ul style="list-style-type: none"> • Veitch Lister Consulting Pty Ltd (VLC) provided demand forecasting and key metrics to assess routes against the two key sub-criteria. • Refer Appendix B
	Human Environment	<ul style="list-style-type: none"> • Extent and nature of land impacts • Amenities to residents (noise, air quality, visual) • Local accessibility and movement 	<ul style="list-style-type: none"> • Refer Appendix D for land use mapping / metrics on property impacts. • Traffic volume impacts on local roads from VLC report used as a key metric for local accessibility and movement
	Natural Environment	<ul style="list-style-type: none"> • Impact on State, Regional and Local Corridors • Impacts on Wetlands • Impacts on Koala habitat • Impacts on remnant vegetation • Impacts on EPBC listed Flora and Fauna 	<ul style="list-style-type: none"> • Five key sub-criteria selected to represent the environment values for the area and to assess the various routes. • PLANIT Consulting Pty Ltd provided expert advice. Refer Appendix C
Money	Capital Cost	<ul style="list-style-type: none"> • Capital cost and quantified risks 	<ul style="list-style-type: none"> • Cost estimates at a strategic level • Fission Pty Ltd provided strategic cost estimates. Refer Appendix E

The key points are:

- The nominated sub-criteria under the functionality, human environment and natural environment criteria have been chosen to distinguish between the various routes. Several key metrics have been collated to assist in the assessment.

- All routes including the gazetted corridor have features that meet TMR's policies and design standards and are reflected in the project cost. For example:
 - Waterway openings are designed to meet specific flooding performance criteria (trafficability, rise in water level called afflux and inundation times) with their size included in the project cost. No specific set of criteria for flooding performance is required; otherwise it would be assessed twice.
 - The project's design is required to meet basic engineering safety standards and again is reflected in the project cost.
- Sub criteria for impacts on cultural heritage require a detailed investigation and risk assessment. To date, a Cultural Heritage Risk Assessment (CHRA) has been undertaken on the gazetted corridor only. The CHRA found that while there are no recorded Indigenous cultural artefacts on this section of the gazetted corridor, the CHRA rated the gazetted corridor as high risk and will require more detailed investigations. Given the other routes are also located in and around the floodplains of the Logan and Albert Rivers, it is reasonable to assume the alternative routes are also high risk. Given there is no information at this time to distinguish between the routes on this basis, no sub criteria were selected for this reason.
- The alternative routes were assessed and compared against the gazetted route under two categories:
 - major deviations (Routes A1, A1-1 and A2, and amended Routes B1-1 and C-1); and
 - minor deviations (Routes D and E), to reduce the impacts on Eagleby area.
- The concept design for the Coomera Connector assumes that there will be ongoing safety and efficiency improvements to the M1 in parallel to the delivery of the Coomera Connector to meet objectives for M1 corridor and maximise the efficiency of the transport network in the northern Gold Coast and Logan. To enable a meaningful cost comparison between the routes including amended Routes B1-1 and C-1, the following improvements and upgrades to the M1 has been included in the estimated project cost:
 - Routes A1, A1-1 and A2, Amended B1-1 and gazetted Coomera Connector: Sequenced building of auxiliary lanes, interchange upgrades & smart motorway technologies from Eggersdorf Rd to Logan Motorway
 - Amended Route C-1: Converting the M1 to a new express motorway with collector distributor lanes, and smart motorway technologies from south of Stapylton to Logan Motorway, as described in Section 2.2.2.1

(b) **Scoring and ranking**

See **Table 6** for an example of a five-point scoring scale of the sub criteria of the Value Element for each route. The Base Case is the gazetted route and has been given a score of 3.

The alternative routes are evaluated against the Base Case in terms of being better or poorer in accordance with **Table 6**. No weighting of sub-criteria or criteria has applied.

Scores were then totalled for each criterion. Based on this total score, each route was then ranked against each other, with a ranking of 1 for the highest score and the lowest score given the lowest ranking.

While Route B1 and its amended Route B1-1, and Route C and its amended Route C-1 have been individually scored, only amended Routes B1-1 and C1 have been used in ranking step.

Table 7: Scoring scale for value element

Score	Description
5	Significantly better than Base Case
4	Better than Base Case
3	Neutral
2	Poorer than Base Case
1	Significantly poorer than Base Case

3.3 Assessment of major deviations of gazetted Coomera Connector corridor

3.3.1 Detailed multi-criteria assessment

Routes A1, A1-1 and A2, and Amended B1-1 and C-1 involve major deviations to the east and west of the Eagleby community have been investigated at a strategic level and compared against the gazetted route.

Refer to Appendices B and C for external expert advice on the Functionality and Natural Environment criteria of the MCA process and **Appendix E** for external expert advice on the cost estimates of the various routes. Further information was also collected internally from data and records held by TMR.

The following key points are highlighted:

(a) Functionality Criteria

Two (2) sub criteria were selected:

- Performance of road network at a local level.
- Contribution towards objectives for upgrading the M1 corridor.

TMR engaged VLC to provide travel demand forecasts for the various routes compared to the gazetted corridor using the multi-modal Zenith transport model. This is the same transport model used by TMR on all M1 project business cases between Eight Miles Plains and Tugun, covering most transport modes and provides a range of travel demand outputs.

Three scenarios were modelled:

- The 2016 scenario (census year) of "current day" demands on the transport network.
- A 2041 Base Case of future travel without a Coomera Connector. This scenario includes committed upgrades to the M1.
- Future 2041 travel demands for the various routes including the gazetted corridor.

The report also provides a range of metric outputs to assist in assessing the alternative routes and the gazetted corridor against the functionality criteria.

Table 7 has been extracted from the report to show the relative change in the local traffic network. This metric is core to assessing the performance of the transport network. **Table 7** illustrates the gazetted Coomera Connector corridor:

- Reduces the 2041 forecast daily volumes on the M1 at Logan River by 45,000 vehicles while the next best alternative (Route B1-1) offered a reduction of 31,000 vehicles.

- Reduces the daily volumes on Beenleigh Redland Bay Road by 16,800 vehicles (California Ck), removing the need for further upgrades of this road. The other routes (except Route C-1) require a significant upgrade of the Beenleigh Redland Bay Road, to meet the forecast travel demands.
- Amended Route C-1 results in additional 6,200 vehicles on the M1 at Logan River, from a 2041 Base case of 256,500 vehicles to 262,700 vehicles. Significant upgrading of the M1 would be required to meet the future 2041 travel demand forecasts.

Table 8: Daily traffic volume (AWDT) change relative to 2041 Base Case

Locations	2016 (AWDT)	2041 (AWDT)	Change in AWDT Relative to Base Case						
			Coomera Connector	Route A1	Route A1 -1	Route A2	Route B1	Route B1-1	Route C & C-1
M1 Motorway									
4. M1 at Logan River	181,800	256,500	-45,000	-25,300	-26,300	-17,900	-19,900	-31,000	6,200
5. M1 at Albert River	166,400	234,000	-24,300	-6,200	-7,400	-500	-200	-12,000	24,000
Coomera Connector									
7. CC at Logan River			-	62,600	65,200	-	-	-	-
8. CC at Logan River			-	-	-	55,900	-	-	-
9. CC at Logan River			-	-	-	-	54,000	67,900	-
10. CC at Logan River			67,000	-	-	-	-	-	-
11. CC at Albert River			83,800	-	-	-	54,000	67,900	-
Key supporting roads									
18. Beenleigh-Redland Bay Rd (California Ck)	22,300	29,500	-16,800	15,000	16,700	8,700	-2,300	22,000	0
19. Beenleigh-Redland Bay Rd (east of Stern)	7,400	14,300	7,700	34,300	36,400	19,400	6,800	8,000	-200
22. Stapylton-Jacobs Well Rd	6,600	12,800	7,700	12,200	12,400	20,700	6,800	7,900	-200

Note: Volumes are bidirectional. Positive sign (Blue colour-coding) represent the increase in volumes compared to the Base Case.

Negative sign (Green colour-coding) represent the decrease in volumes compared to the Base Case.

The metrics in the report shows all routes perform well against the broader objectives set by TMR for the upgrade of the M1 corridor between Loganholme and Nerang. The differences in the metrics between the various routes is generally small except for the metric "*Cost of Excessive Congestion*". The gazetted route provides a \$230 million greater reduction annually than the next best alternative Route B1-1 and reduction of over \$100 million annually on the M1 itself.

The travel demand forecasts on the supporting local roads also provide useful information to assess the human impacts (amenity and accessibility) on local communities from changes in daily traffic volumes. **Table 7** shows the substantial increase in traffic volumes on the Beenleigh Redland Bay for most of the alternative routes whereas the traffic volumes substantially drop for the gazetted route.

The travel demand forecasts also show, by adding an interchange on the gazetted corridor at Eagleby, there will be improved accessibility to the Eagleby community. Another metric "*Average Number of jobs accessible by car within 30 mins from Eagleby area*" showed all routes improved local accessibility for the Eagleby area with the gazetted route providing the greatest improvement (88% increase) in accessible jobs compared to the Base Case.

(b) Human Environment Criteria

Three (3) key human environmental values have been considered:

- Extent and nature of land impacts.
- Amenity to residents (noise, vibration, air quality and visual).
- Local accessibility and movement.

The various routes traverse the following suburbs and localities as highlighted on the **Figure 6**:

- Loganholme, Cornubia and Carbrook on the northern side of the Logan River; and
- Beenleigh, Eagleby, Alberton, Stapylton and Gilberton on the southern side of the Logan River.

All communities will experience some change in amenity, and this vary with each route.

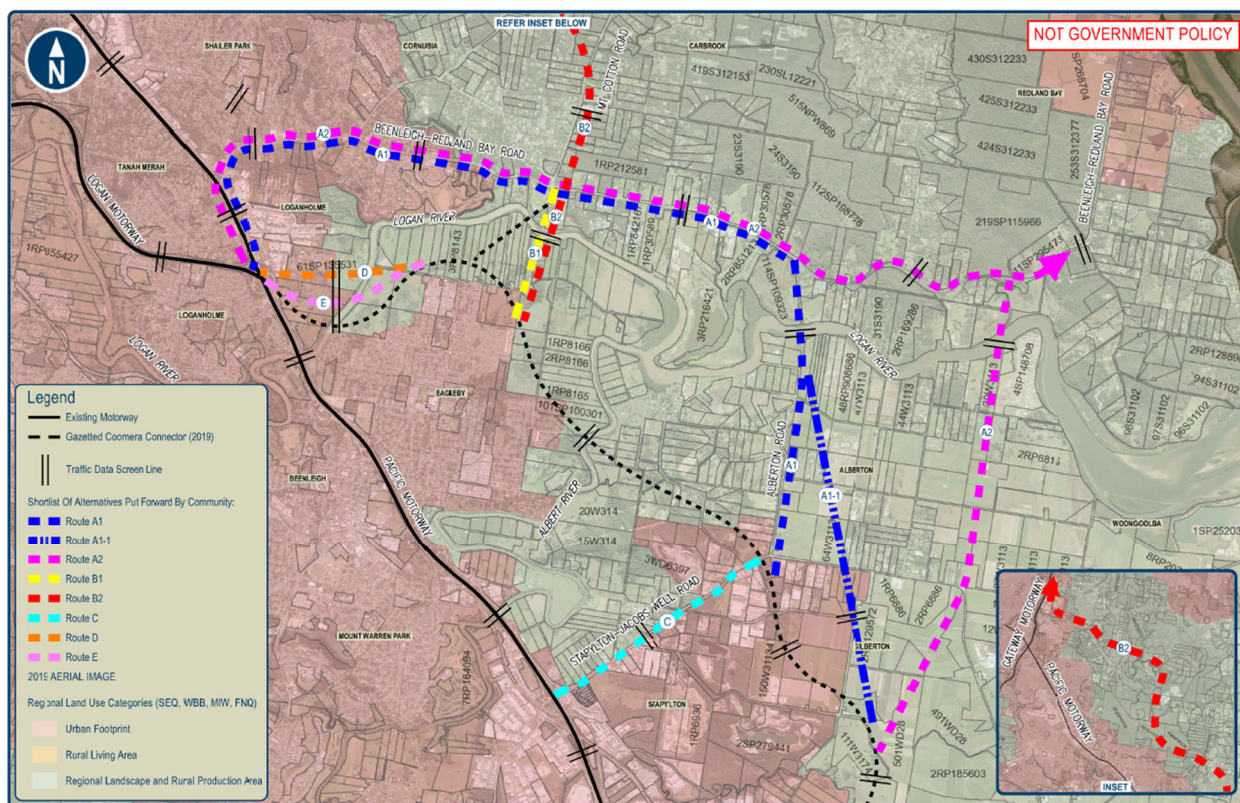


Figure 5: Extent of urban footprint

More detailed information on how the routes impact on rural areas, urban communities and commercial zones are highlighted on the land use mapping in **Appendix D** and illustrates the number and types of property impacts. **Table 8** provides a summary of the direct property impacts.

Table 9: Direct Property Impacts

Nature of Direct Impacts		Route					
		Coomera Connector	Route A1	Route A1 -1	Route A2	Amended Route B1-1	Amended Route C-1
Properties	No.	104	138	137	146	131	394
	Change (%) to Coomera Connector	100%	133%	132%	140%	126%	379%
Dwellings	No.	22	33	28	41	38	>300
	Change (%) to Coomera Connector	100%	150%	127%	186%	173%	>1360%

The gazetted Coomera Connector will directly impact on 104 properties and 22 dwellings. The property impacts from alternative routes A1, A1-1, A2 and amended Route B1-1 are much greater with the property impacts 126% to 140% higher and dwelling impacts 127% to 186% higher. The impacts from amended Route C-1 are much greater again because of the need to upgrade the M1 to meet the 2041 forecast travel demand

The travel demand forecasts by VLC for supporting local roads also provide useful metrics on the relative change of AWDT. As highlighted in **Table 7**, the daily traffic volumes are expected to drop by 24,000 on the Beenleigh Redland Bay Road and may not require any further upgrading whereas routes A1, A1-1, A2 and B1-1 will increase daily traffic flows by 8,700 to 22,000 and require significant upgrading. This gives a good indication of the relative change in amenity and accessibility in the more urban suburbs Cornubia and Loganholme.

While the Eagleby community will also experience increased amenity impacts from the gazetted route, it is noted the community will have significantly improved accessibility through provision of an interchange at Eagleby.

(c) Natural Environment Criteria

All routes fall within the catchments of the Logan and Albert Rivers and their associated floodplains that contain sensitive natural environments. The alternative routes and the gazetted route will need to comply with both Queensland and Australian government legislation, and TMR's policy and standards for transport projects.

TMR engaged PLANIT Consulting Pty Ltd (Planit) to assess the natural environmental impacts of the various routes. Five (5) environmental values to assess the impacts:

- State, Regional and Local Biodiversity corridors.
- Mapped wetlands.
- Koala habitat.
- Remnant vegetation.
- EPBC Act Flora and Fauna Records.

Refer **Appendix B** for a copy of Environmental Technical Report. In summary:

- Route B2 involved significant disturbance to the environmental values, particularly the removal of sensitive core Koala habitat that is subject prohibition by the Queensland Government. Route B2 had an unacceptable outcome to the natural environment. It was on this basis that no further assessment was undertaken on Route B2.
- Route C (and separately assessed as Amended Route C-1) was found to create the least impact on natural environment because it follows the existing road network which is already disturbed. Route B1 (and separately assessed amended Route B1-1) was the next best route. The primary reasons for Route B1 having a slightly better outcome on environmental values than the gazetted route is that it avoided a second crossing of Logan River and does not traverse wetlands to the west of Wharf Road.
- The other routes (Route A1, A1-1 and A2) are located further east and as highlighted in the report's mapping of the five (5) environmental values, traverse and affect more environmentally sensitive areas than the gazetted route. Of note is that Routes A1, A-1 and A-2 involve much more significant upgrades of the Beenleigh-Redland Bay Road which is within the Koala Priority Areas (KPA) albeit to a less extent than Route B2.

(d) Estimated Project Costs

TMR engaged Fission to prepare strategic costs for the various routes. A copy of their report is enclosed as **Appendix E. Table 9** summarises the outputs.

Table 10: Estimated Cost of Routes for the Coomera Connector

		ALTERNATIVE ROUTES							Coomera Connector	COMMENTS
		Route A1	Route A1-1	Route A2	Route B1	Amended Route B1-1	Route C	Amended Route C-1		
BASE COSTS (Excludes Risks and Escalation)										
Gazetted CC + Alternative Routes	Client Costs	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	< Costing at as strategic level in 2019 \$'s without escalation and contingent risks.
	Property Acquisition	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
	Services	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
	Construction Costs	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
	Contractors Preliminaries & Supervision	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	< Base costs used to provide comparison can be made between CC and the Alternative Routes
	Base Cost (x \$million)	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
	Base Cost (x \$billion)	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	
RISK ADJUSTED TOTAL COST (Excludes Escalation)										
Coomera Connector + Alternative Routes (X \$billion) (low - high)		<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	< Strategic project cost expressed as a range to reflect low and high contingent risks

The following key points are highlighted:

- The costs estimates are based on the design features described in **Appendix A**.
- The cost estimates have been prepared at a strategic level suitable to estimate the relative comparative costs between the routes. The estimates are:
 - based on the cost M1 upgrade projects; and
 - in 2019 dollars for both the Base Costs (excludes risk and escalation) and Total Project Cost (adjusted for risk but excludes escalation).
- For a meaningful cost comparison between routes:
 - The cost of upgrading the relevant section of the M1 has been estimated, based on the cost estimates prepared for the PE phase of the Coomera Connector project. See **Table 10** for a summary of the Base Cost and Risk Adjusted Total Project Cost for the two upgrade options.
 - The scope of the M1 motorway upgrade options are better defined with P90 cost estimates whereas the alternative routes for the Coomera Connector have not been defined to the same level of detail and hence, estimates have been prepared at a strategic level. The Base Cost (without risk adjustments) provides a meaningful comparison and is summarised in **Table 11**.

Table 11: Estimated Cost of Upgrading the M1

Description of Upgrade Option						Estimated Cost (\$ million)	
OPTION	From	To	Length (km)	Cost of upgrading (\$ million /lineal metre)		Base Cost	Risk Adjusted Total Cost (P90)
				Base Cost	Risk Adjusted Total Cost (P90)		
Auxiliary lanes, interchange upgrades & smart motorway technologies	Beenleigh-Redland Bay Rd	Computer Rd (Exit 41)	11.1	■	■	■	■
New motorway of express lanes and collector distributor lanes + smart motorway technologies	0.5 km north of Beenleigh-Redland Bay Rd (Exit 30) to allow for weaving clear of Logan Motorway junction with M1 motorway	2 km south of Staplyton-Jacobs Well Rd / M1 junction (Exit 38) to allow weaving between express lanes/ collector distributor lanes	10.3	■	■	■	■

Table 12: Estimated Project Cost

Base Cost Component		Route					
		Route A1	Route A1-1	Route A2	Amended Route B1-1	Amended Route C-1	CC
Coomera Connector		■	■	■	■	■	■
M1 corridor Upgrade	Auxiliary lanes, interchange upgrades & smart motorway technologies from Computer Rd to Logan Motorway	■	■	■	■	■	■
	New motorway of express lanes and collector distributor lanes + smart motorway technologies from south of Staplyton to Logan Motorway	■	■	■	■	■	■
Total Base Cost		■	■	■	■	■	■
% Change		117%	124%	124%	117%	217%	100%

3.3.2 Summary of multi-criteria assessment outcome

Refer **Appendix F** for the assessment worksheet for the scoring and ranking of the Value Elements of Functionality, Human Environment and Natural Environment criteria. The ranking outputs from the MCA process for the Value Elements as well as the Money Element are summarised in **Table 12**.

Table 13: Outcome of MCA - major deviations of the gazetted Coomera Connector corridor

		Alternative Routes					Gazetted Coomera Connector (GCC)
		Route A1	Route A1-1	Route A2	Amended Route B1-1	Amended Route C-1	
Value element criteria							
Functionality		3	3	3	2	6	1
Human environment		3	3	3	2	3	1
Natural environment		4	4	6	2	1	3
OVERALL RANKING		3	3	5	2	6	1
Money element criteria (x 2019 \$Billion Base Cost - excludes adjustments for risk)							
Coomera Connector		<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Upgrading of M1	Auxiliary lanes, interchange upgrades & smart motorway technologies from Computer Rd to Logan Motorway	<div></div>	<div></div>	<div></div>	<div></div>		<div></div>
	New motorway of express lanes and collector distributor lanes + smart motorway technologies from south of Stapylton to Logan Motorway					<div></div>	
Total Cost Comparison		<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
OVERALL RANKING		2	4	4	2	6	1

Note: The cost of the routes has been estimated at a strategic level whereas the estimated cost of upgrading the M1 is based on business case estimates. The use of the Base Cost in 2019 dollars provides a valid basis for comparing between the various routes. The Base Cost includes client costs, property acquisition costs, cost of relocating services, construction costs and contract preliminaries & supervision but excludes adjustments for risk.

The multi-criteria assessment has determined while all routes performed well against the project objectives for the M1 corridor between Loganholme to Nerang project, the gazetted Coomera Connector was found on balance, to provide the best overall outcome against the assessment criteria. The amended Route B1-1 was the next best, followed by Routes A1, A1-1, A2 with amended Route C-1 ranked last.

Functionality: travelling demand modelling to 2041 by VLC found:

- The gazetted Coomera Connector route reduced the 2041 forecast daily volumes on the M1 Motorway at Logan River by greatest number of 45,000 vehicles while the next best alternative (Route B1-1) offered a reduction of 31,000 vehicles. Reducing traffic on the M1 Motorway is a core element of the objectives for the corridor.

- The gazetted Coomera Connector has the added benefit of reducing daily volumes on the Beenleigh-Redland Bay Road by 16,800 vehicles (California Ck) and would not need further upgrade on this basis. The other routes (except Route C-1) require a significant upgrade of the Beenleigh- Redland Bay Road, to meet the forecast travel demands.
- Amended Route C-1 requires significant upgrading of the M1 motorway to meet the future travel demand forecasts, noting the route still funnels all traffic between Stapylton and Loganholme into one corridor.
- All routes have similar metrics for the broader M1 Corridor except for the overall congestion metric. The gazetted Coomera Corridor provides a \$230 million greater reduction than the next-best alternative Route B1-1 and a reduction of \$100 million on the M1 itself. As noted in the VLC Technical Note, this would present a substantial retained problem if one of these alternative routes was adopted and would require further investment to achieve a similar outcome.
- The gazetted Coomera Connector greatly improves accessibility for the Eagleby community by having another access point to M1 and Logan Motorways.

Human Environment:

- All communities will experience some change in amenity impacts with a new road and this will vary from route to route.
- The assessment found the gazetted Coomera Connector will create the least impact on the human environment:
 - The gazetted Coomera Connector will directly impact on 104 properties and 22 dwellings. The property impacts from alternative routes A1, A1-1, A2 and Amended Route B1-1 are much greater with the property impacts 126% to 140% higher and dwelling impacts 127% to 186% higher. The impacts from Amended Route C-1 are much greater again because of the need to upgrade the M1 Motorway to meet the forecast travel demand
 - While the Eagleby community will experience increased community impacts from the gazetted Coomera Connector, the impacts will be much greater on the Cornubia and Loganholme communities due to the increased traffic volumes.
 - The Eagleby community will have significantly improved accessibility as a result of the gazetted Coomera Connector.

Natural Environment:

- All routes fall within the catchments of the Logan and Albert Rivers that contain sensitive natural environmental values.
- Amended Route C-1 created least impact of the all routes on the natural environment because it follows an existing road network that is already disturbed. Route B-1 was next best and slightly better than the gazetted Coomera Connector because it removed a second crossing of Logan River and avoided the wetlands to the west of Wharf Road at Eagleby.
- Routes A1, A1-1 and A2 are located further to the east of the gazetted Coomera Connector and traverse more environmentally sensitive areas. Routes A1, A1-1 and A2 involve significant upgrading of the Beenleigh- Redland Bay Road which is within the Koala Priority Areas.

Estimated Project Cost:

- The gazetted Coomera Connector has 2019 Base Cost of [REDACTED]. Alternative routes A1, A1-1, A2 and Amended Route B1-1 are noticeably 117% to 124% higher in cost. Amended Route C-1 is much higher again at 217%.

3.4 Assessment of minor deviations of gazetted Coomera Connector corridor

3.4.1 Detailed multi-criteria assessment

Routes D and E are minor deviations to the gazetted route and involve shifting the Coomera Connector more into the floodplain of Logan River and further away from the Eagleby. Routes D and E are more direct connections to the Logan Motorway and involve replacing road embankment with extra bridging and provide a better outcome in terms of reducing the human and natural environmental impacts by these additional costs of additional bridge spans.

The following key points are highlighted:

(a) Functionality Criteria

Routes D and E were not tested by VLC tested for functionality as travel demands and patterns for these options would not differ materially from the gazetted route.

(b) Human Environment Criteria

Three (3) key human environmental values have also been considered:

- Extent and nature of land impacts.
- Amenity to residents (noise, vibration, air quality and visual).
- Local accessibility and movement.

As highlighted in **Figure 5**, the routes are located on the northern fringe of the urban areas of Eagleby with Routes D and E located further away than the gazetted corridor. More detailed information on how the routes impact rural areas, urban communities and commercial zones are highlighted on the land use mapping in **Appendix D**.

Routes D and E impact on a comparable number of properties to the gazetted Coomera Connector, with Route D creating significant impact on Logan City Council Council's sewerage treatment plant at Loganholme.

All routes will reduce amenity impacts to the Eagleby community. Routes D and E will have lesser impacts as they are located further away than the gazetted route.

There is no material difference between the routes in local accessibility and movement.

(c) Natural Environment Criteria

All routes fall are located within the Logan and associated floodplain that contain sensitive natural environments. As with the major deviations, both the alternative routes and the gazetted corridor will need to comply with both Queensland and Commonwealth legislation, and TMR's policy and standards.

TMR engaged PLANIT Consulting Pty Ltd (Planit) to assess the natural environmental impacts of the various routes. Five (5) environmental values to assess the impacts:

- State, Regional and Local Biodiversity corridors.
- Mapped wetlands.
- Koala habitat.
- Remnant vegetation.
- EPBC Act Flora and Fauna Records.

Refer **Appendix C** for a copy of Environmental Technical Report. In summary:

- Route D and E have less impacts than the gazetted route as traverse fewer riparian corridors and wetlands with slightly lesser impact on koala habitat, remnant vegetation and endangered fauna.

- Routes D and E have similar impacts on the natural environment with no material difference between them.

(d) Estimated Project Costs

Fission prepared strategic costs for the various routes. A copy of their report is enclosed as **Appendix F**. **Table 13** summarises the outputs.

3.4.2 Summary of multi-criteria assessment outcome

Refer **Appendix F** for the assessment worksheet for the scoring and ranking of the Value Elements of Functionality, Human Environment and Natural Environment criteria. The ranking outputs from the MCA process for the Value Elements as well as the Money Element are summarised in **Table 13**.

Table 14: Outcome of MCA - minor deviations of the gazetted Coomera Connector corridor

	Alternative routes		Coomera Connector
	Route D	Route E	
Value element criteria			
Functionality	1	1	1
Human environment	2	1	3
Natural environment	1	1	3
OVERALL RANKING	2	1	3
Money element criteria (x 2019 \$ Billion which excludes risk adjustment)			
Total Base Cost and change in Base Cost	████	████	████
OVERALL RANKING	2	3	1

In summary:

- The alignment refinements (Routes D and E) have the same functionality as gazetted corridor but have lesser natural and human environmental impacts. Both alternative routes traverse sections with less environmental values, have reduced impacts on the natural environment by replacing road embankment with bridging structure, and less human impacts by moving away from the urban areas of Eagleby.
- Route D is a more direct connection to the Logan Motorway but impacts on Logan City Council's treatment plant.
- Even though Routes D and E are shorter in length, they are higher in cost than the gazetted route because of the longer bridging involved. Given potential economies of scale with longer bridging and reduced risks in replacing road embankments on floodplains of major rivers with bridging, both routes are worthy of further investigation.

4. Summary

In response to concerns raised by the community and alternative routes submitted during community consultation in November and December 2019, a technical review of the alternative routes suggested by community compared to the gazetted Coomera Connector corridor.

An MCA methodology has been used to assess the routes against the key criteria of functionality, natural environment, human environment and estimated cost. The technical review relied on past investigations, advice from technical experts, site visits and feedback from the community consultation. No further public engagement was undertaken as part of this technical review.

In summary, the technical review found:

- **Major Deviations of the gazetted Coomera Connector (Routes A1, A1-1, A2, B1-1, B2 and C-1)**
 - Alternative Route B2 could be discarded due to the route's significant impact on the critically important Koala habitat, listed under the (draft) SEQ Koala Conservation Strategy and the current investment in the M1 between Eight Mile Plains and Loganholme.
 - Routes B1 and Route C were amended to Route B1-1 and Route C-1 respectively to enable a meaningful comparison to the other routes. (Route B1-1 includes upgrading of Beenleigh Redland Bay Road to 6 lanes and Route C-1 included upgrading Stapylton Jacobs Well Road to 6 lanes and upgrading the M1 with express lanes and collector distributor lanes to cater for future demand between Logan Motorway and Yatala).
 - While all routes performed well against the project objectives for the M1 between Loganholme to Nerang project, the gazetted Coomera Connector corridor was found on balance, to provide the best overall outcome against the assessment criteria. The amended Route B1-1 was the next best, followed by Routes A1, A1-1, A2 with amended Route C-1 ranked last.
- **Minor Deviations of the Coomera Connector (Alternative Routes D and E)**
 - The alignment refinements (Routes D and E) have reduced natural and human environment impacts by:
 - traversing sections with less environmental values;
 - replacing road embankment with bridging structure, and
 - moving away from the urban areas of Eagleby.
 - Route D is a more direct connection to the Logan Motorway but impacts on Logan City Council's treatment plant.
 - Even though Routes D and E are shorter in length, they are higher in cost because additional bridging is required.

Table 15 provides a summary of the assessment combining the assessments of the major and minor deviations into a overall ranking. As illustrated in the multi-criteria assessment, the gazetted Coomera Connector corridor is the preferred alignment for a future transport corridor between Loganholme and Stapylton.

Table 15: Overall assessment summary of alterantive routes compared to gazetted Coomera Connector

	Alternative Routes	
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	Route A1	Route A1-1	Route A2	Amended Route B1-1	Amended Route C-1	Routes D and E	Gazetted Coomera Connector
Non-price criteria							
Functionality	4	4	4	3	7	1	1
Human environment	4	4	4	3	4	1	1
Natural environment	5	5	7	2	1	3	3
Total Cost Comparison	117%	124%	124%	117%	217%	109 – 117%	100%
OVERALL RANKING	3	5	5	3	7	2	1