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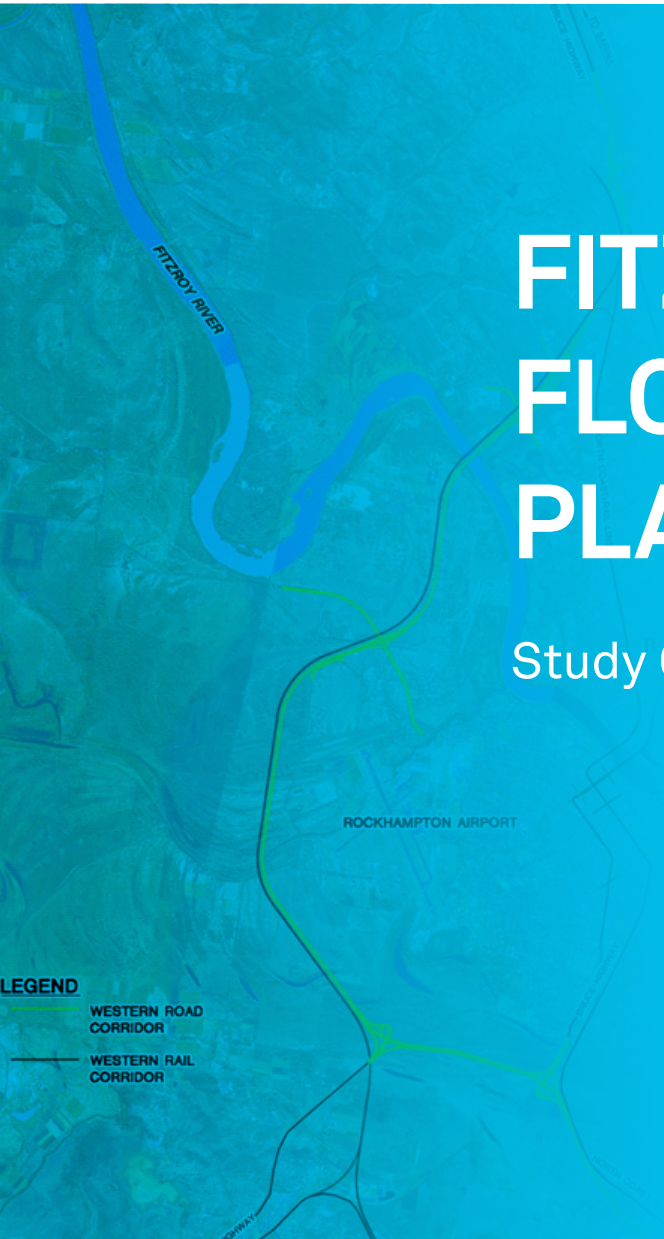

FITZROY RIVER FLOODPLAIN AND ROAD PLANNING STUDY

Study Outcomes and Implementation Plan

Fitzroy River Floodplain and Road Planning Study

Study Outcomes and Implementation Plan

Prepared for
Department of Transport and Main Roads

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1.0 BACKGROUND

The Fitzroy River Floodplain and Road Planning Study has investigated long term solutions for existing and forecast Bruce Highway and North Coast Rail Line flooding, freight and road transport impacts in and around the city of Rockhampton. While the study has assessed solutions with a 2031 time horizon, it has made recommendations for corridor protection for infrastructure that would provide for the transport needs of the region well beyond 2031.

The Study has assessed current and future demands on the Bruce Highway and the North Coast Rail Line and makes recommendations that will help inform long term transport infrastructure investment decisions in Central Queensland. Specifically, the study has examined ways of reducing congestion within Rockhampton and improving the highway's and railway line's accessibility during major flood events to reduce the impact of Fitzroy River flooding on these vital links.

This strategy draws on the work documented in the seven previous study technical reports and makes recommendations for actions to follow.

2.0 THE STRATEGY

The centrepiece of the strategy is the Western Combined Road and Rail Corridor, comprising the Western Road Corridor and the Western Rail Corridor. The strategy recommends the staged implementation of the western combined road and rail infrastructure to provide for the strategic transport needs of Rockhampton and Central Queensland to 2031 and beyond. It addresses the objectives of the study by:

providing improved access of the Bruce Highway and North Coast Rail Line at the Yeppen Crossing during major flood events, significantly reducing the isolation of Rockhampton and North Queensland during major flood events

providing an alternative route for heavy vehicles travelling through the city which will also connect the growth areas of Parkhurst and Gracemere where significant future industrial and residential growth is planned

removing heavy rail from Denison Street and providing faster travel times for through rail freight, while maintaining connections to existing rail infrastructure

improving safety and amenity within Rockhampton by reducing traffic including freight in urban areas

providing for long term economic and population growth for the entire region.

2.1 Western Combined Road and Rail Corridor

The strategy recommends that a combined corridor be protected with sufficient width to accommodate the ultimate Western Road Corridor and Western Rail Corridor. Corridor width has been nominally set at:

- combined corridor 140m
- rail only corridor 60m
- road only corridor 80m

These widths have been based on providing sufficient width for the ultimate long term development:

- 4 lane divided highway, 110km/hr, at Q100 flood levels
- 2 railway tracks, 100km/h standard operating speed, 120km/h for a tilt train, and
  service road at Q100 flood levels
- limited access corridor with grade separation of all intersections
- grade separation between road and rail, connection to existing rail infrastructure
  can be maintained as required
- services and ancillary infrastructure such as water treatment devices.

There will be opportunities to refine and optimise the corridors with further detailed planning including field investigation and consultation as the projects progress through further planning, design and delivery stages.

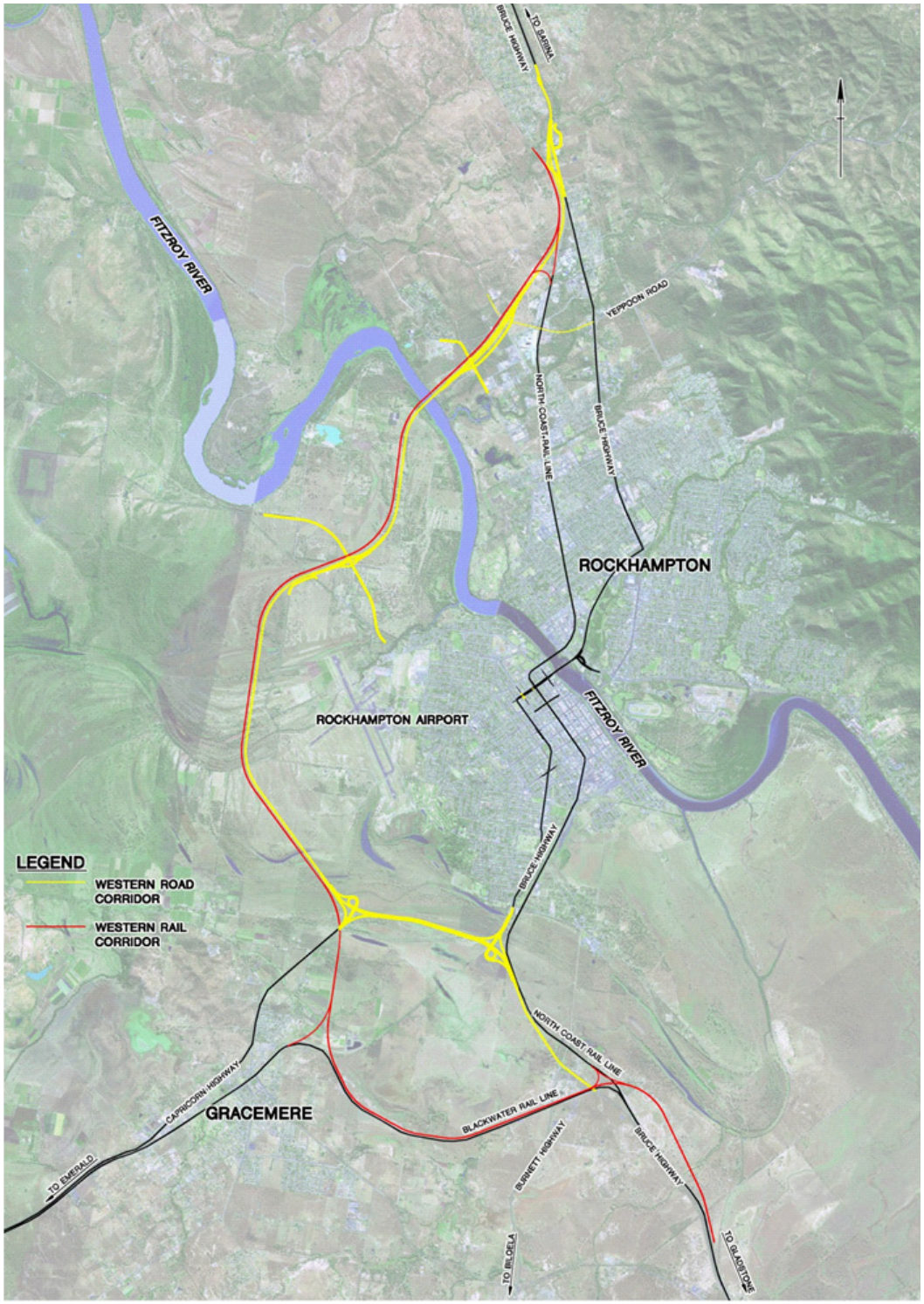
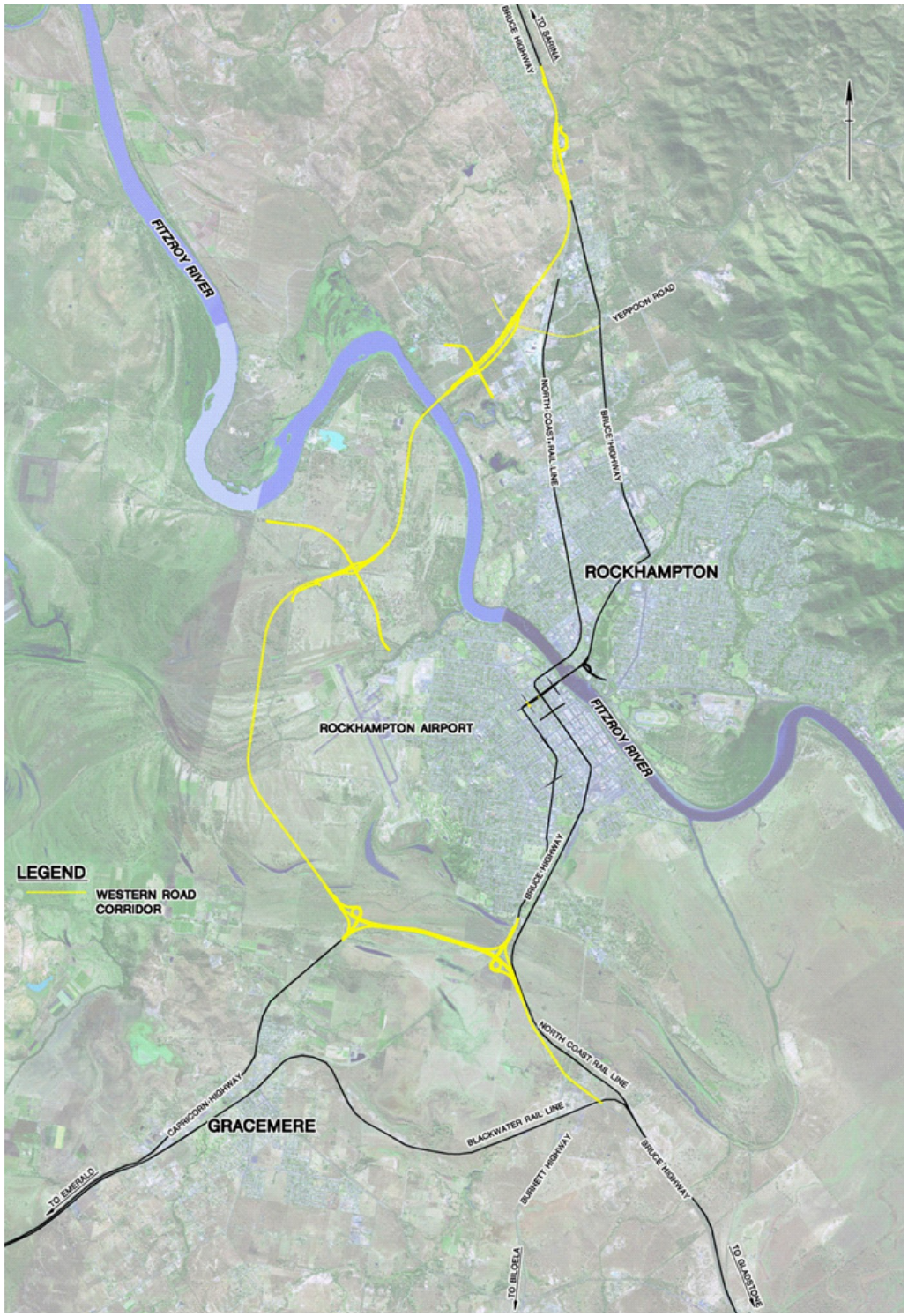


Figure 2-1 Western Combined Road and Rail Corridor



2.2 Western Road Corridor

A “Rockhampton Bypass” (Rockhampton Ring Road) has been identified in the Queensland Government *Bruce Highway Upgrade Strategy* July 2011 for planning and corridor preservation in the next 5 to 10 years.

The Western Road Corridor is a 22km deviation of the Bruce Highway. It extends as far south as the Burnett Highway intersection and north to Glenlee (north of Parkhurst). From the south the corridor alignment follows the Bruce Highway alignment until it deviates at the Capricorn Highway intersection (Yeppen Roundabout). It follows the Capricorn Highway for approximately 2km before it deviates north through the Yeppen Floodplain where it sweeps around the airport at Pink Lily and crosses (and connects to) Rockhampton Ridgelands Road before crossing the Fitzroy River north of Limestone Creek. From there it connects to Alexandra Street at Parkhurst and to the Yeppoon Road via a new connection. The western corridor connects back to the Bruce Highway at Glenlee near Ramsay Creek.

The fully developed corridor is not required until well beyond the timeframes of the study; as such its design has been used to determine a maximum long term corridor width in order to understand its physical impacts. To accommodate projected traffic to 2031, the infrastructure has been scaled down from its ultimate form and designed as a Q100 immune 2 lane road with at-grade intersections. As 2031 is the study horizon, this is the form of the proposed infrastructure which has been staged, costed, and had its performance assessed against the specific study objectives.

Figure 2-2 Western Road Corridor

2.3 Western Rail Corridor

The Western Rail Corridor is a 28km deviation of the North Coast Rail Line from the junction with the Blackwater Line at Rocklands south of Rockhampton to Glenlee north of Parkhurst. The corridor follows the Blackwater Line from its connection to the North Coast Line at Rocklands for approximately 5km before turning North and crossing over Scrubby Creek and the Capricorn Highway. From here the corridor runs parallel with the Western Road Corridor to Glenlee where it rejoins the North Coast Line. Angles are provided at Rocklands and Parkhurst to maintain connectivity to the existing North Coast Line for access to the station and other facilities and the Yeppoon Branch. This would enable the existing line along Denison Street and the Alexandra Bridge to be decommissioned.

To accommodate expected rail traffic to 2031 the corridor's infrastructure has been designed as a 1 track Q100 flood level line connecting from the existing Blackwater Line near Gracemere to Glenlee. While the Blackwater Line is currently single track it is near capacity and planning is underway by QR National for its duplication. Once duplicated the line would have the same capacity as the remainder of the combined North Coast/Coal Line between Rocklands and Gladstone. While the existing Blackwater Line is currently less than the Q100 flood level it has significantly better access during major flood events than the existing North Coast Line through the Yeppen Crossing. There are opportunities to improve this if required either with the planned duplication of the Blackwater Line or the construction of a dedicated freight/passenger line if required in the future.

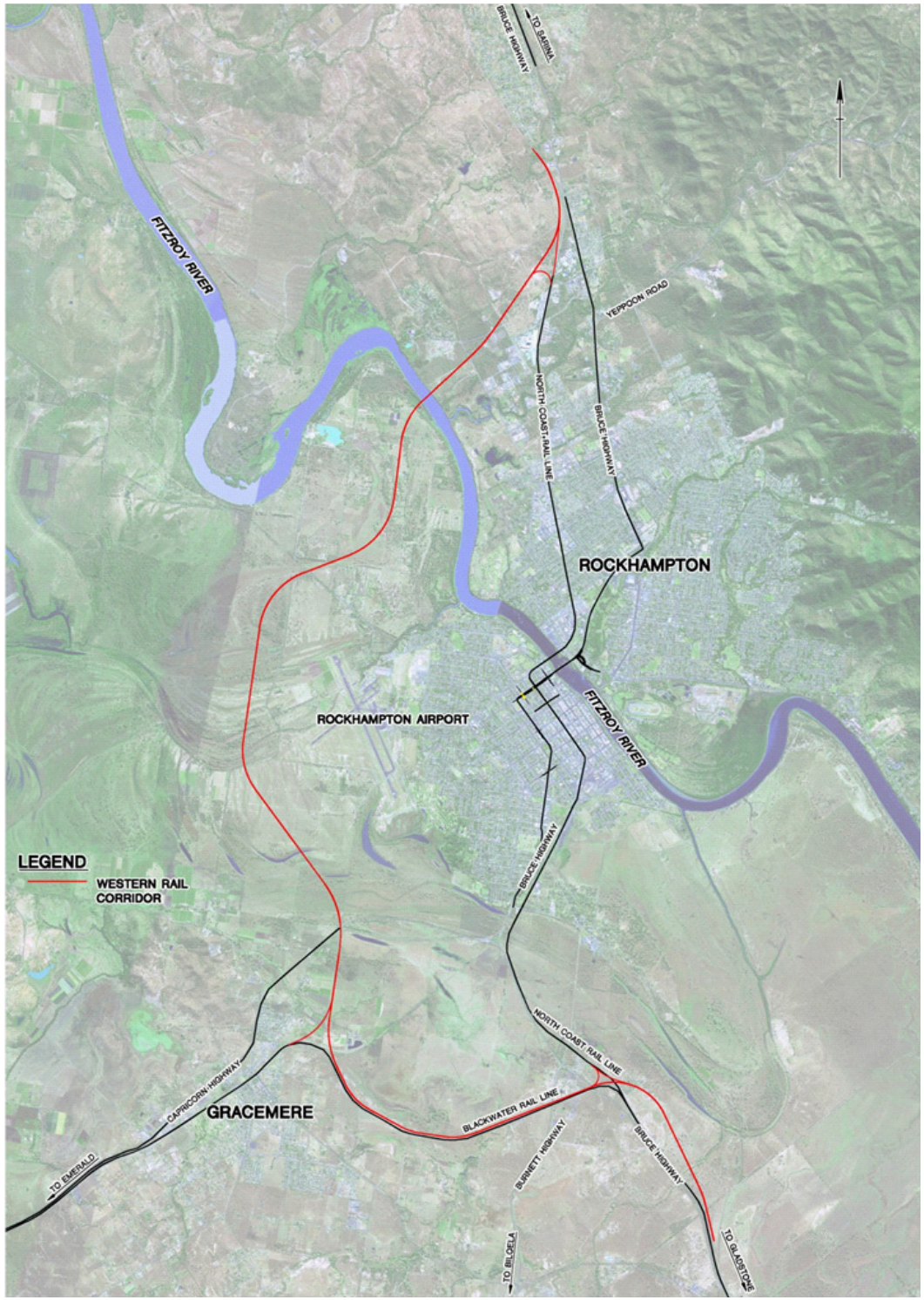


Figure 2-3 Western Rail Corridor

3.0 IMPLEMENTATION

An indicative program for the staged implementation of the Western Combined Road and Rail infrastructure has been developed. This program includes works already in planning as well as upgrades to the existing network that will enable the work to be staged.

Indicative timeframes have been assigned to stages of developing the Rockhampton Ring Road (within the Western Road Corridor), within the timing being determined based on projected traffic growth and capacity. Timing of the implementation of the Western Rail Corridor's is not able to be defined at this stage as the need for the corridor is based on operational and amenity issues rather than capacity restrictions. A key recommendation of the study is that further work be undertaken to understand the triggers for the relocation of the North Coast Rail Line through Rockhampton.

Individual components of the implementation program as depicted in Figure 3 1 (road strategy) and Figure 3 13 (rail strategy) are described in the following:

3.1 Rockhampton Ring Road Stages

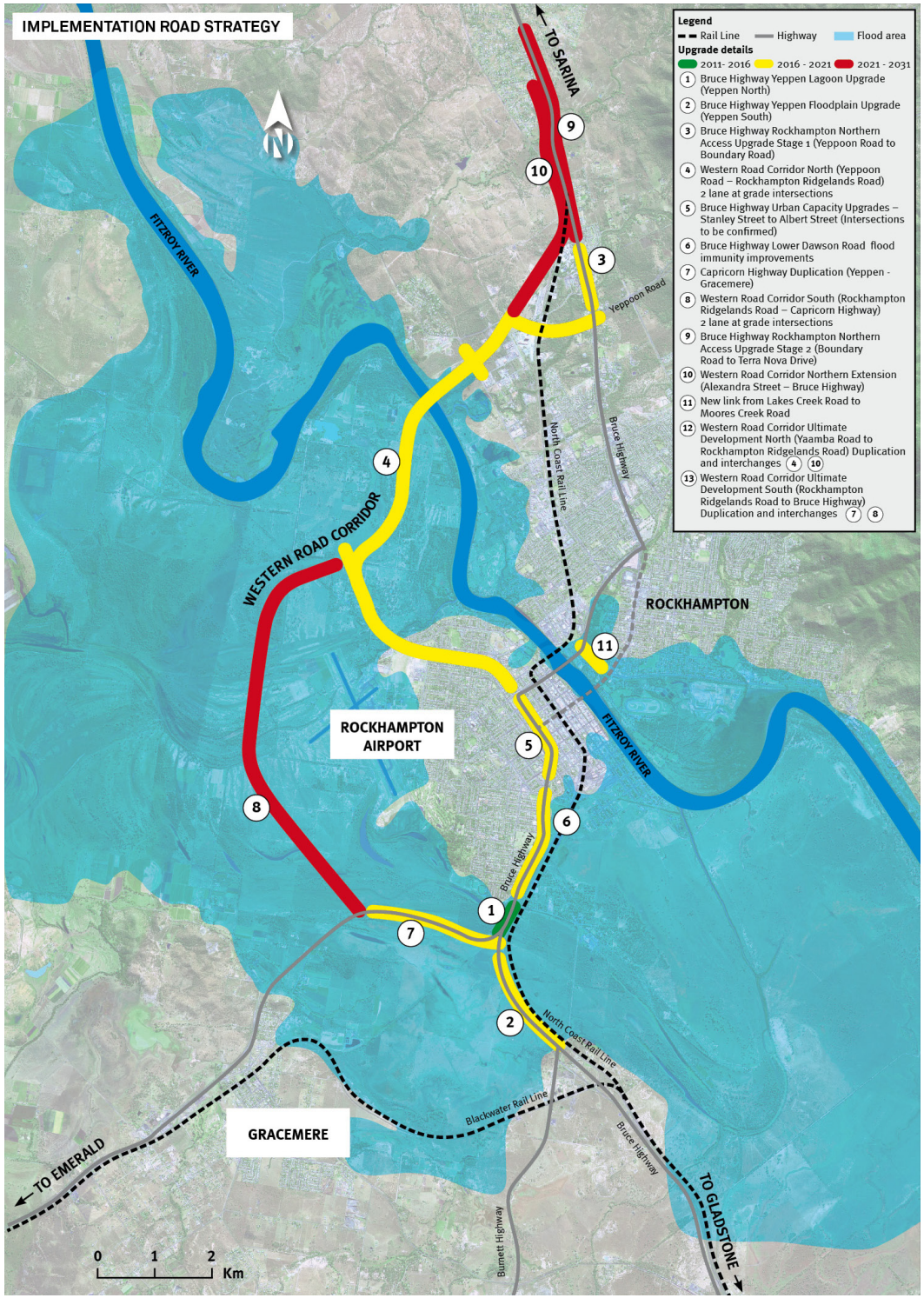


Figure 3-1 Rockhampton Ring Road Stages

1. Bruce Highway Yeppen Lagoon Upgrade (Yeppen North)

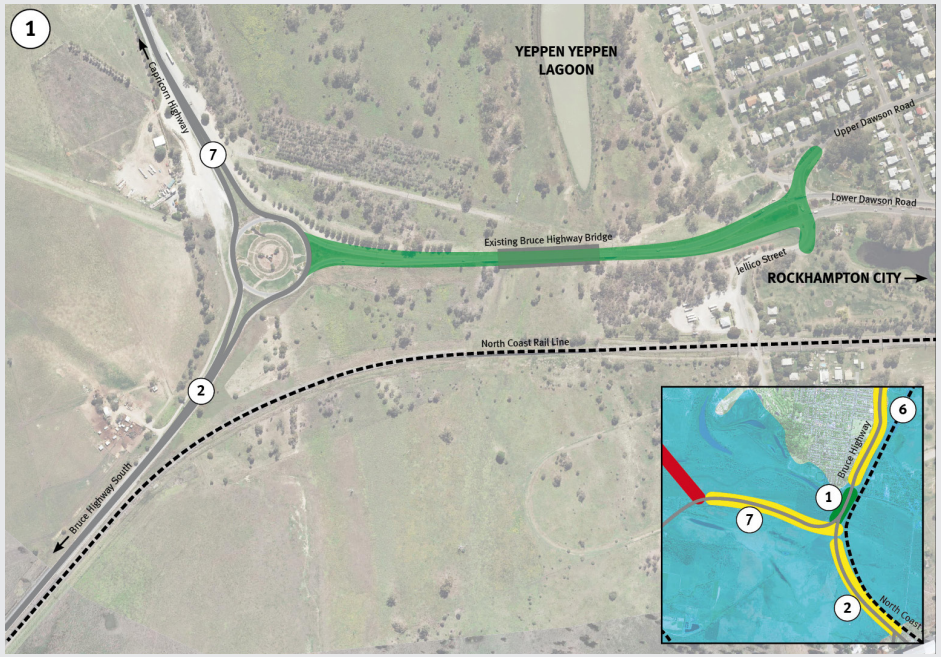


Figure 3-2 Existing Bruce Highway – Capricorn Highway to Jellico Street

It is envisaged that Stage 1 will provide:

- improved safety and congestion
- approximately 1km long with 70km/hr speed zone
- additional two lanes to provide a total of four lanes
- new 420m two lane bridge
- two new lanes built to Q100 flood heights (excluding roundabout)
- upgrade Jellico Street to an at-grade signalised intersection
- slip lane from the Capricorn Highway east bound, to the Bruce Highway north bound lanes.

2. Bruce Highway Yeppen Floodplain Upgrade (Yeppen South)

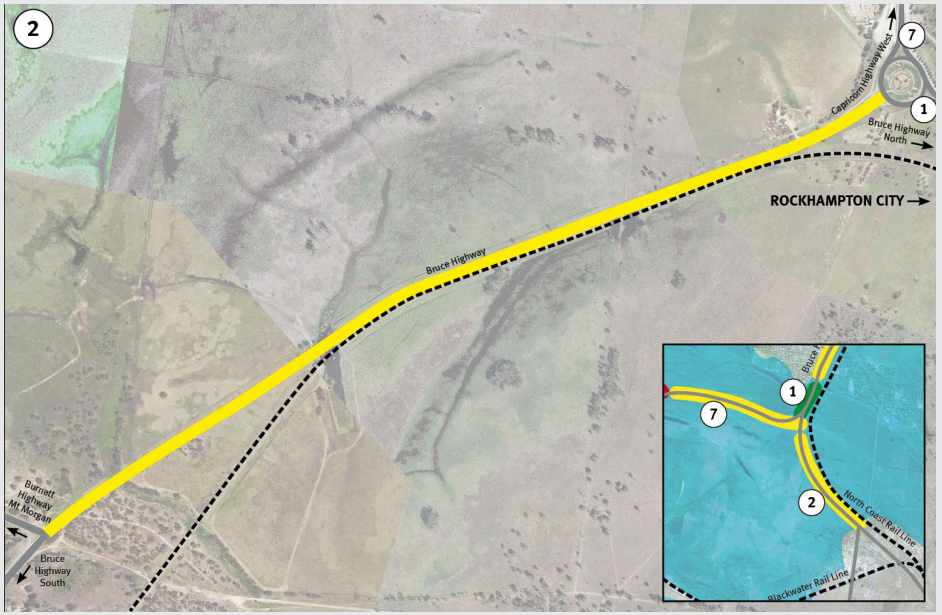


Figure 3-3 Existing Bruce Highway – Burnett Highway to Yeppen Roundabout

It is envisaged that Stage 2 will provide:

- improved access to Rockhampton during major flood events
- approximately 3km long with 90km/hr to 110km/hr design speed
- additional two lanes to provide a total of four lanes
- significant length of new two lane bridge
- two new lanes built to Q100 flood heights which connect to the Q100 embankment at the southern end of the Yeppen Lagoon Upgrade (Yeppen North)
- upgrade Bruce Highway and Burnett Highway intersection - at-grade unsignalised intersection
- south bound slip lane bypassing the Yeppen Roundabout.

3. Bruce Highway Rockhampton Northern Access Upgrade Stage 1 (Yeppoon Road to Boundary Road)

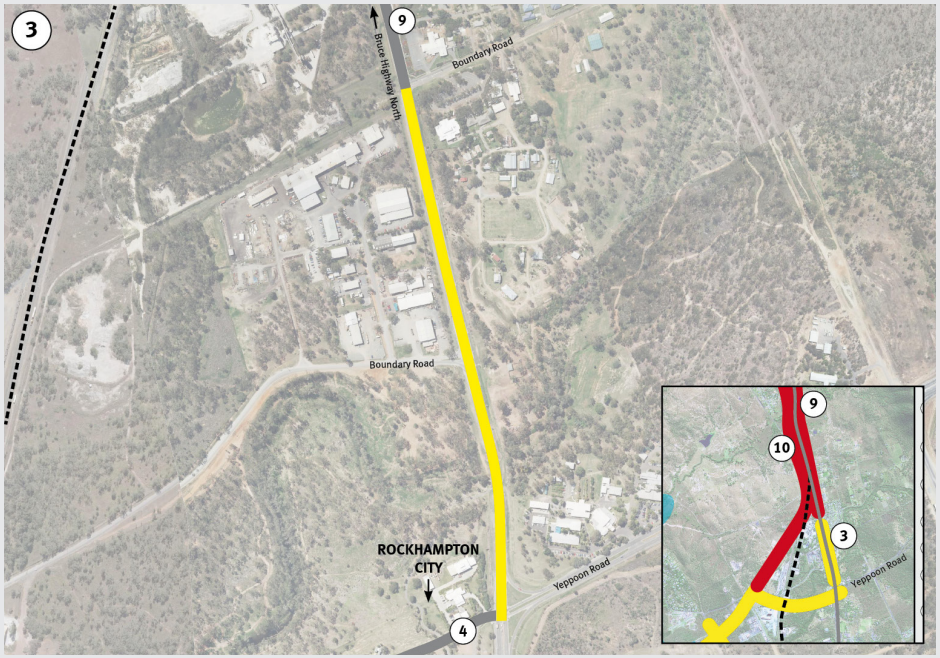


Figure 3-4 Stage 3, Existing Bruce Highway - Yeppoon Road to Boundary Road

It is envisaged that Stage 3 will provide:

- improve road safety, reduce congestion and reduce travel times on the northern approach to Rockhampton
- additional two 1.2km long lanes to provide a total of four lanes with 90km/h design speed
- in conjunction with Rockhampton Northern Access Upgrade Stage 2 this upgrade could defer the need for Stage 10, the Northern Extension of the Western Road Corridor
- upgrade Bruce Highway / Yeppoon Road intersection and both Bruce Highway / Boundary Road intersections (all at-grade).

4. Rockhampton Ring Road North (Yeppoon Road – Rockhampton Ridgelands Road) 2 lane at-grade intersections

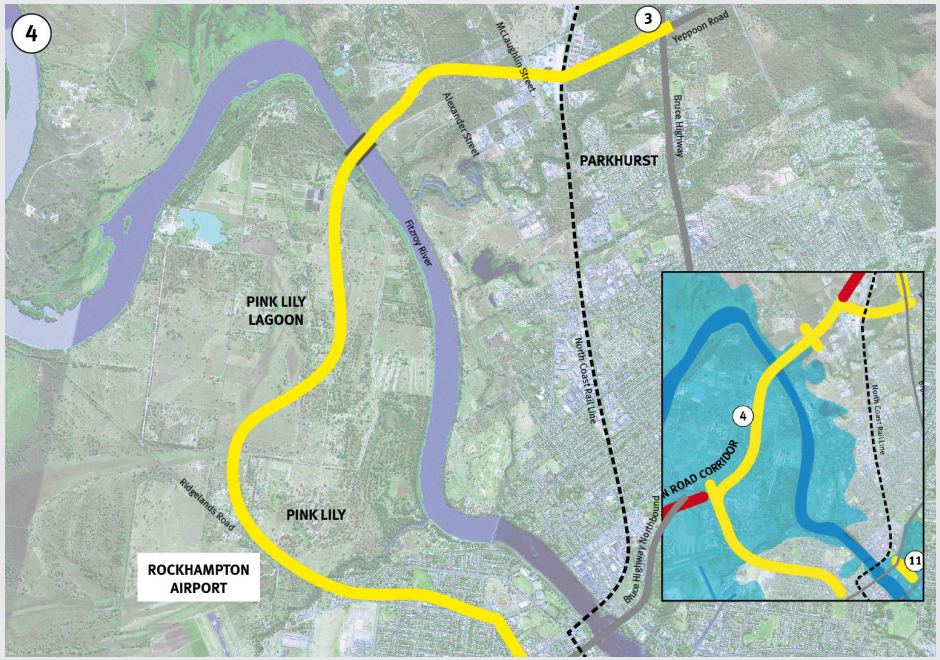


Figure 3-3 Existing Bruce Highway – Burnett Highway to Yeppen Roundabout

It is envisaged that Stage 4 will provide:

- reduced congestion within Rockhampton particularly on the two existing bridges
- new two lane rural road constructed to Q100 flood levels including a major crossing of the Fitzroy River
- upgrades to existing roads to provide a sufficient connection to the existing Bruce Highway
- at-grade intersection at Rockhampton Ridgelands Road, Alexandra Street and McLaughlin Street
- add south bound slip lane bypassing the Yeppen Roundabout.

5. Bruce Highway Urban Capacity Upgrades – Stanley Street to Albert Street (Intersections to be confirmed)

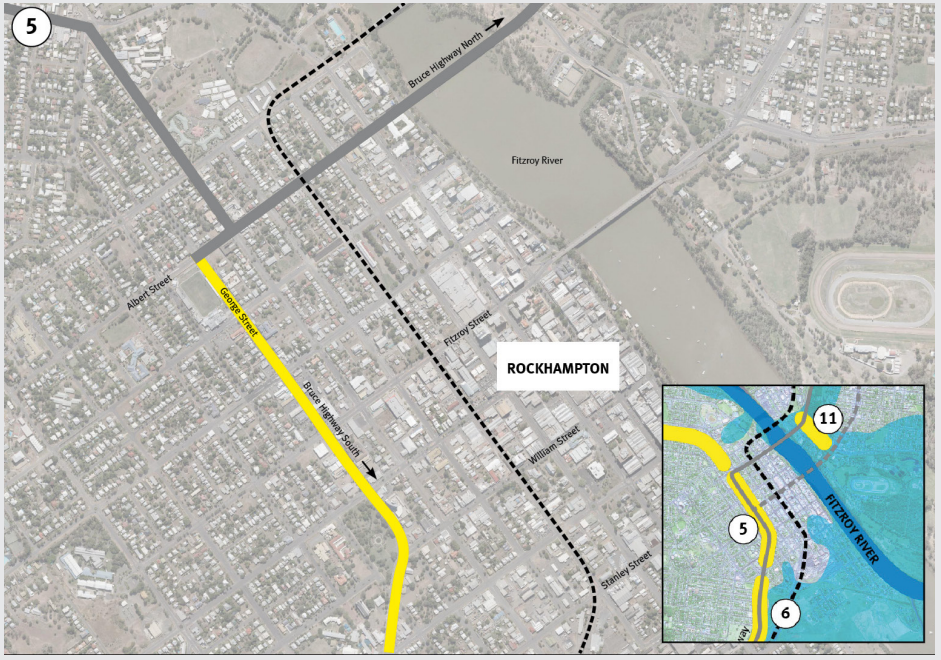


Figure 3-6 Stage 5, Albert Street to Stanley Street

It is envisaged that Stage 5 will provide:

- existing intersection capacity upgrades to reduce congestion through the urban area of South Rockhampton
- while the detail of each intersection treatment is to be confirmed in future planning including consultation, these upgrades could defer the timing of the Western Road Corridor South (Stage 8, the proposed link from Rockhampton Ridgelands Road / Albert Street to the Capricorn Highway).

6. Bruce Highway Lower Dawson Road flood improvements

Further investigations in regard to the feasibility of this work needs to be carried out prior to any formal commitments. Alternative routes via local roads may be an acceptable solution given the low frequency of major floods.

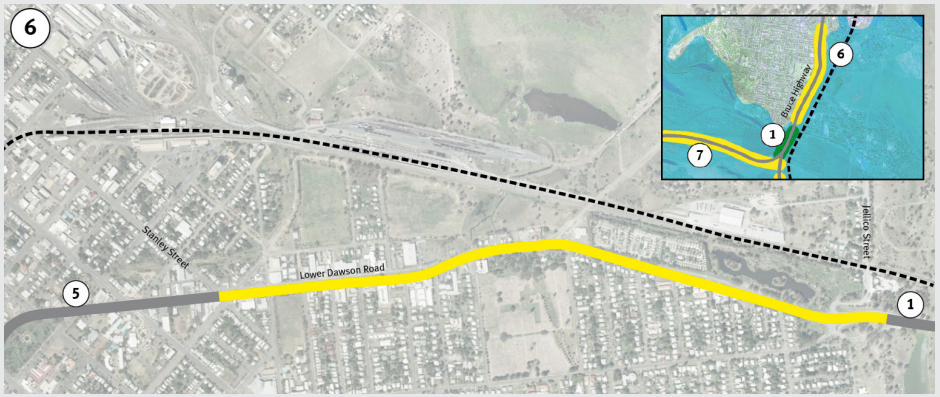


Figure 3-7 Stage 6, Jellico Street to Stanley Street

It is envisaged that, if required Stage 6 will provide:

- two lanes of the existing Bruce Highway above the Q100 flood level
- a Q100 level route for the Bruce Highway that may defer the need to provide high level immunity on the Rockhampton Ring Road.

Access to existing businesses, residents and local roads would need to be addressed.

7. Capricorn Highway Duplication (Yeppen - Gracemere)

Figure 3-8 Stage 7, Gavial-Gracemere Road to Yeppen Roundabout

It is envisaged that Stage 7 will provide:

- low level duplication of the Capricorn Highway between Gavial-Gracemere Road and the Yeppen Roundabout
- capacity for growing traffic volumes between Gracemere and Rockhampton
- no improvement to flood immunity
- a connection between the Rockhampton Ring Road and the Bruce Highway.

8. Rockhampton Ring Road South (Rockhampton Ridgelands Road – Capricorn Highway) 2 lane at grade intersections

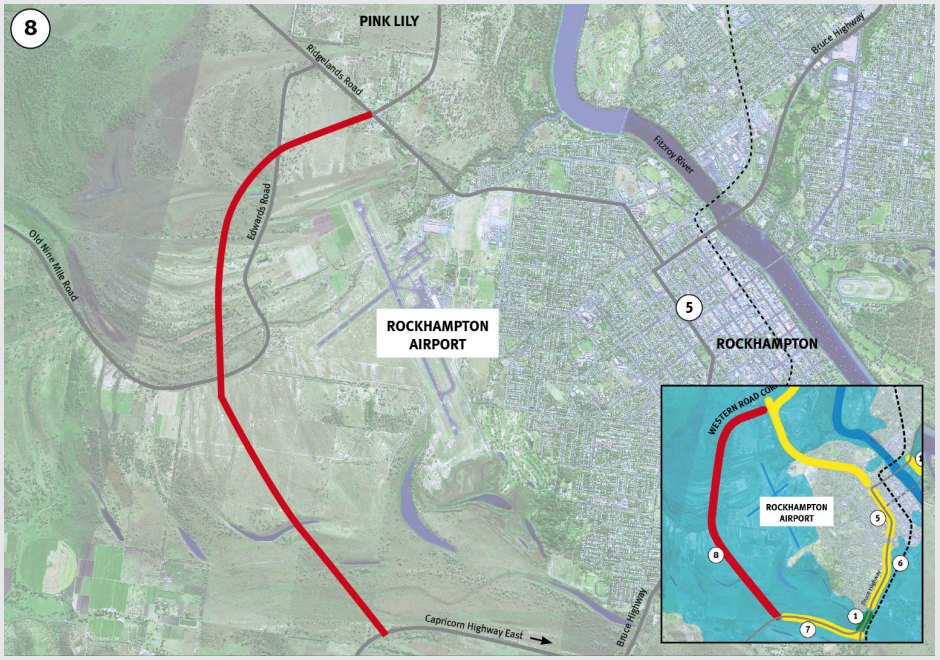


Figure 3-9 Stage 8, Rockhampton Ridgelands Road to Capricorn Highway

It is envisaged that Stage 8 will provide:

- 2 lane rural highway from Rockhampton Ridgelands Road to the Capricorn Highway possibly initially constructed at a lower than Q100 flood level
- intersection at Capricorn Highway and overpass at Nine Mile Road
- the southern extent of the Rockhampton Ring Road.

9. Bruce Highway Rockhampton Northern Access Upgrade Stage 2 (Boundary Road to Terra Nova Drive)

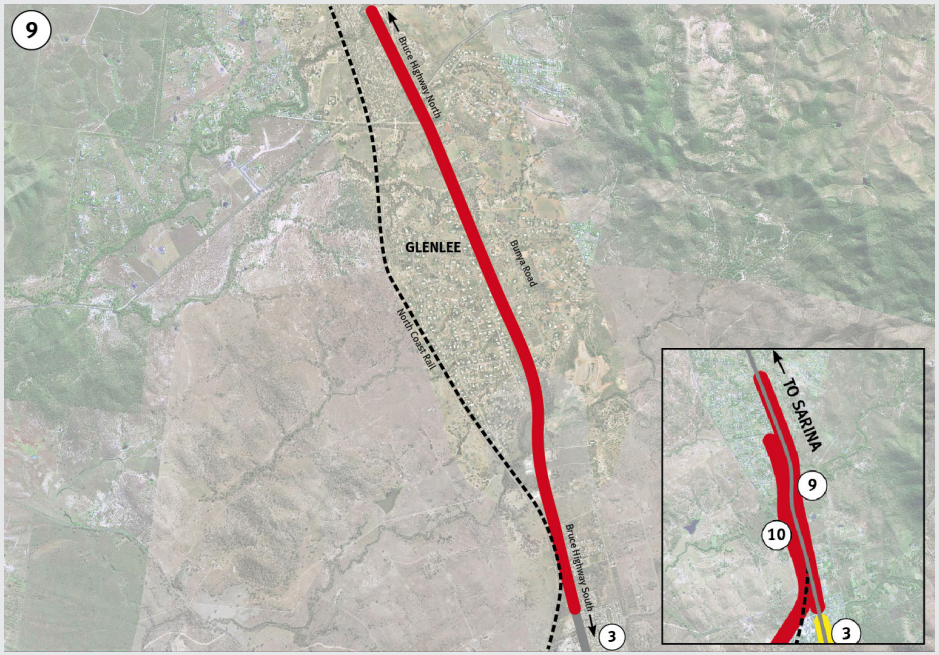


Figure 3-10 Stage 9, Boundary Road to Terra Nova Drive

It is envisaged that Stage 9 will provide:

- 4 km upgrade of the Bruce Highway to four lanes between Boundary Road and Terra Nova Drive, north of Parkhurst
- improved road safety and reduced congestion and travel times on the northern approach to Rockhampton
- potential to defer the need for the northern extension of the Rockhampton Ring Road (Stage 10).

10. Rockhampton Ring Road Northern Extension (Alexandra Street – Bruce Highway)

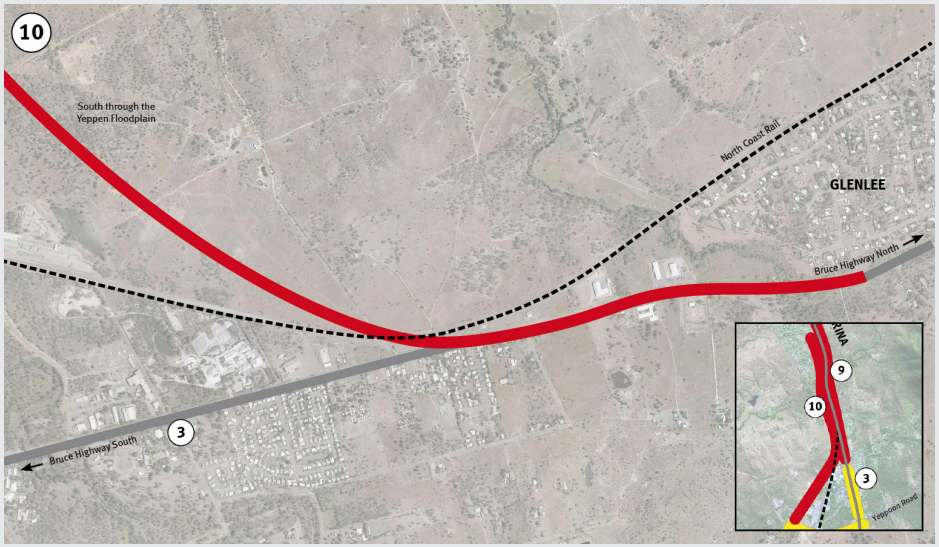


Figure 3-11 Stage 10, Boundary Road to Terra Nova Drive

It is envisaged that Stage 10 will provide:

- the final stage of the Rockhampton Ring Road
- bypass of a number of intersections and accesses

11. New link from Lakes Creek Road to Moores Creek Road

Figure 3-12 Stage 11, Moores Creek Road to Lakes Creek Road

It is envisaged that Stage 11 will provide:

- a connection between Lakes Creek Road and the Neville Hewitt Bridge
- opportunity to ban heavy vehicles from the Fitzroy Bridge
- opportunity to remove cattle trucks from the centre of the CBD.

12. Rockhampton Ring Road Ultimate Development North (Yaamba Road to Rockhampton Ridgelands Road) Duplication and interchanges

It is envisaged that Stage 12 will provide:

- long term construction (beyond 2031) of the ultimate cross section (4 lanes, Q100, grade separated) for the northern part of the Rockhampton Ring Road between Yaamba Road and Rockhampton Ridgelands Road

13. Rockhampton Ring Road Ultimate Development South (Rockhampton Ridgelands Road to Bruce Highway) Duplication and interchanges

It is envisaged that Stage 13 will provide:

- long term construction (beyond 2031) of the ultimate cross section (4 lanes, Q100, grade separated) for the southern part of the Rockhampton Ring Road between Rockhampton Ridgelands Road and the Bruce Highway at the Yeppen Roundabout

3.2 Rockhampton Ring Road Implementation Plan

An indicative staging program for the delivery of the Rockhampton Ring Road is shown below and in Table 3 1. The optimum staging strategy, including the economic impacts and benefits of each stage will need to be investigated and confirmed during future study phases.

Stage	Description	2011- 2016	2016 - 2021	2021 - 2031	Beyond 2031
		Short Term		Medium Term	Long Term
1	Bruce Highway Yeppen Lagoon Upgrade (Yeppen North)				
2	Bruce Highway Yeppen Floodplain Upgrade (Yeppen South)				
3	Bruce Highway Rockhampton Northern Access Upgrade Stage 1 (Yeppoon Road to Boundary Road)				
4	Rockhampton Ring Road North (Yeppoon Road – Rockhampton Ridgelands Road) 2 lane at grade intersections				
5	Bruce Highway Urban Capacity Upgrades – Stanley Street to Albert Street (Intersections to be confirmed)				
6	Bruce Highway Lower Dawson Road flood improvements				
7	Capricorn Highway Duplication (Yeppen - Gracemere)				
8	Rockhampton Ring Road South (Rockhampton Ridgelands Road – Capricorn Highway) 2 lane at grade intersections				
9	Bruce Highway Rockhampton Northern Access Upgrade Stage 2 (Boundary Road to Terra Nova Drive)				
10	Rockhampton Ring Road Northern Extension (Alexandra Street – Bruce Highway)				
11	New link from Lakes Creek Road to Moores Creek Road				
12	Rockhampton Ring Road Ultimate Development North (Yaamba Road to Rockhampton Ridgelands Road) Duplication and interchanges				
13	Rockhampton Ring Road Ultimate Development South (Rockhampton Ridgelands Road to Bruce Highway) Duplication and interchanges				

Table 3-1 Rockhampton Ring Road Implementation Plan

3.2.1 Potential Costs

Estimates have been prepared for the preferred road implementation strategy. The estimates have been based on the following assumptions:

- the estimates have been developed in accordance with the Department of Main Roads Project Cost estimating Manual
- Stage 3 estimate was provided by the Department of Transport and Main Roads
- the projects are delivered by traditional Road Construction Contract (RCC) delivery as a single project.
- costs are in 2011 dollars with no allowance for escalation
- a contingency of 60% has been applied
- the estimates are based on the first two lanes being constructed to an estimated Q100 height (except for Stage 7, which is low level).

Note: Additional costs to the local network upgrades that will be required as a result of the implementation of the Rockhampton Ring Road work has not been included in the above costs.

Stage	Description	Estimate (2011 dollars)	Length	Bridge
1	Bruce Highway Yeppen Lagoon Upgrade (Yeppen North)	$85M	1km	420m
2	Bruce Highway Yeppen Floodplain Upgrade (Yeppen South)	$450M-$550M	3.7km	2.5km
3	Bruce Highway Rockhampton Northern Access Upgrade Stage 1 (Yeppoon Road to Boundary Road)	$100M-$150M	0.8km	70m
4	Rockhampton Ring Road North (Yeppoon Road – Rockhampton Ridgelands Road) 2 lane at grade intersections	$700M-$850M	8.7km	640m
5	Bruce Highway Urban Capacity Upgrades – Stanley Street to Albert Street (Intersections to be confirmed)	$35M-$40M	2km	
6	Bruce Highway Lower Dawson Road flood improvements (if required)	$35M-$40M	1.5km	
7	Capricorn Highway Duplication (Yeppen - Gracemere), Low level / existing carriage way height (not to Q100 height)	$60M-$100M	2.5km	200m
8	Rockhampton Ring Road South (Rockhampton Ridgelands Road – Capricorn Highway) 2 lane at grade intersections	$500M-$650M	8.4km	1.14km
9	Bruce Highway Rockhampton Northern Access Upgrade Stage 2 (Boundary Road to Terra Nova Drive)	$120M-$160M	2.4km	
10	Rockhampton Ring Road Northern Extension (Alexandra Street – Bruce Highway)	$450M-$550M	4.3km	100m
11	New link from Lakes Creek Road to Moores Creek Road	$60M-$100M	1.3km	80m
12	Rockhampton Ring Road Ultimate Development North (Yaamba Road to Rockhampton Ridgelands Road) Duplication and interchanges	Very Long Term		
13	Rockhampton Ring Road Ultimate Development South (Rockhampton Ridgelands Road to Bruce Highway) Duplication and interchanges	Very Long Term		
TOTAL (NO ESCALATION i.e. 2011 dollars)		**$2.6B-$3.2B**	**36.6km**	**5.15km**

Table 3-1 Rockhampton Ring Road Implementation Plan

3.3 Rockhampton Rail Bypass Stages

1. Parkhurst to Gracemere (connection to Blackwater Line)

It is envisaged that Stage 1 will provide:

- single track rail line at Q100 flood levels
- bridges and embankments to match the Rockhampton Ring Road
- a bypass of the urban area of Rockhampton
- connection to the Blackwater line (assumed already duplicated) near Gracemere
- connections to existing rail infrastructure such as the station, maintenance yard, intermodal terminals and ballast quarry
- ability to decommission the line in Denison Street and across the Alexandra Bridge

2. Dedicated North Coast Line track adjacent to Blackwater Line

It is envisaged that Stage 2 will provide:

- dedicated freight and passenger line adjacent to the Blackwater Line
- long term capacity to accommodate growth in coal haulage

3. Ultimate Development Parkhurst to Rocklands (Duplication)

It is envisaged that Stage 3 will provide:

- long term ultimate development - 2 tracks at Q100 flood heights

Staging of the Rockhampton Rail Bypass could also include potential relocation of associated infrastructure such as:

- Rockhampton Station
- maintenance yard
- intermodal terminals.

It was not in the scope of this study to investigate the feasibility of relocation of associated infrastructure.

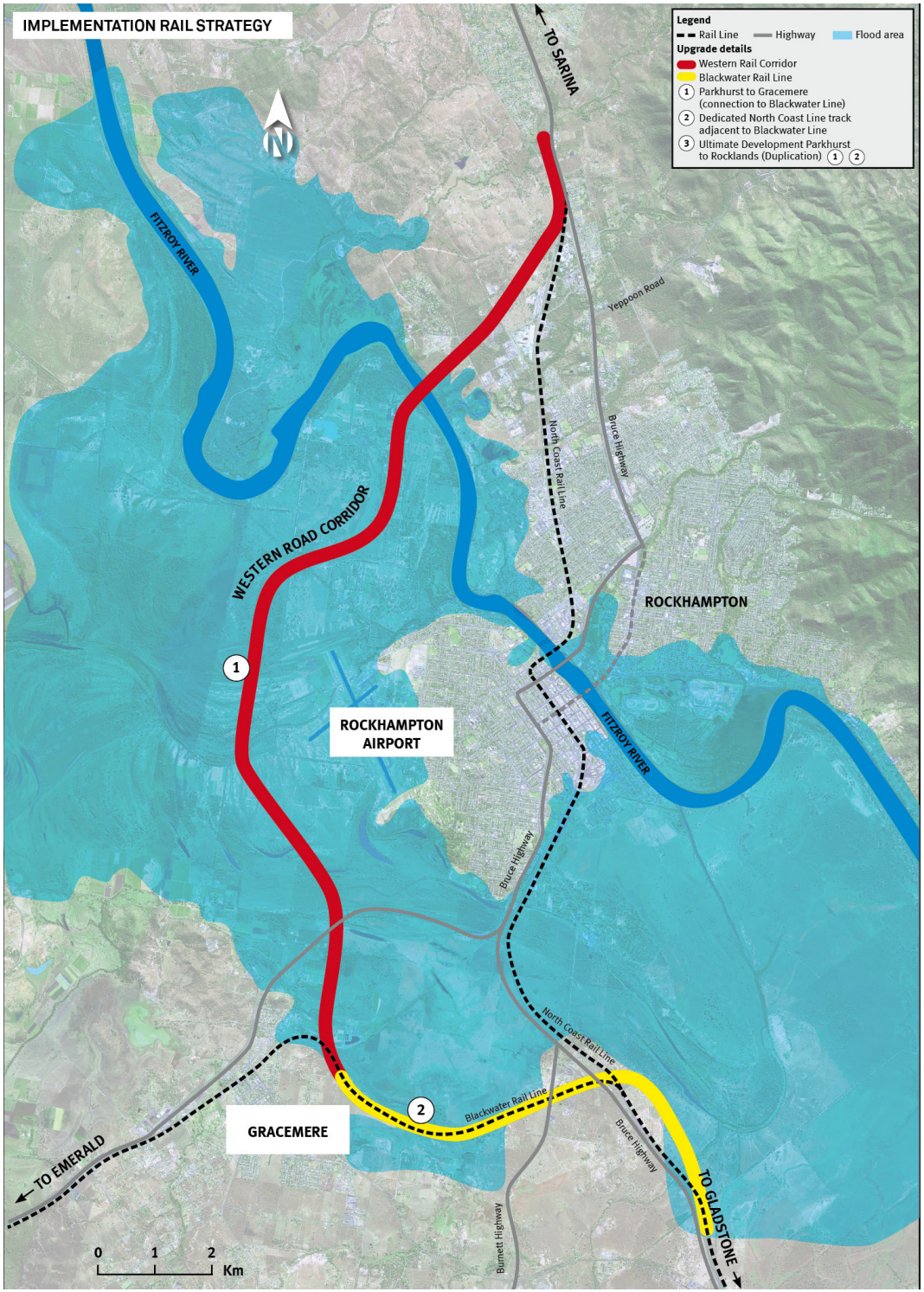


Figure 3-13 Rockhampton Rail Bypass Stages

3.3.1 Rockhampton Rail Bypass Implementation Plan

Stage	Description	Stage 1	Stage 2	Stage 3
1	Parkhurst to Gracemere (connection to Blackwater Line)			
2	Dedicated North Coast Line track adjacent to Blackwater Line			
3	Ultimate Development Parkhurst to Rocklands (Duplication)			

Table 3-3 Rockhampton Rail Bypass Implementation Plan

3.3.2 Potential Costs

Estimates have been prepared for the preferred road implementation strategy. The estimates have been based on the following assumptions:

- the estimates have been developed in accordance with the Department of Main Roads Project Cost estimating Manual
- the projects are delivered by traditional Road Construction Contract (RCC) delivery as a single project
- costs are in 2011 dollars with no allowance for escalation
- a contingency of 60% has been applied
- the estimates are based on the first two lanes being constructed to an estimated Q100 height.

Stage	Description	Estimate (2011 dollars)	Length	Bridge
1	Parkhurst to Gracemere (connection to Blackwater Line)	$600M - $700M	9.4 km	4.9 km
2	Dedicated North Coast Line track adjacent to Blackwater Line	Very Long Term		
3	Ultimate Development Parkhurst to Rocklands (Duplication)	Very Long Term		
TOTAL (NO ESCALATION i.e. 2011 dollars)		**$600M - $700M**	**9.4 km**	**4.9 km**

Table 3-4 Rockhampton Rail Bypass Implementation Plan – Potential Costs

4.0 FURTHER RECOMMENDATIONS

4.1 Rockhampton Transport Model development

4.1.1 Rockhampton SATURN Model

The Rockhampton SATURN model provided for the study, while being suitable for comparing alternative corridor options, was limited in its ability to accurately assess the re-assignment of traffic within the network due to congestion. This was because the model has no road hierarchy coded in the network.

This means that the highways, collector roads and even local streets have all been given the same capacity and one which is relatively high for an urban street network.

The model therefore has a limited ability to accurately reflect delays and potentially the route choice associated with a congested network. The implication of this limitation is that solutions to congestion will potentially demonstrate lower benefits than those which could be ultimately achievable. To update this model with appropriate capacities and road hierarchy will be a significant task and will require a re-validation to include journey time and queue observations.

It is recommended that the model be updated in this way to enable a detailed evaluation of the strategy and to more accurately define the benefits and staging of the Rockhampton Ring Road.

4.2 Rockhampton Ring Road Levee Land Use Investigation

4.2.1 Potential Land Use Benefits

Throughout the study anecdotal reports of the benefits of providing flood improvements to the airport and areas at the northern end of the airport have been received from the community and other stakeholders. These benefits include not only the protection of the airport during floods but also the opportunity to provide additional Q100 immune land for industrial or other development. The Western Road and Rail infrastructure potentially provide the opportunity to utilise embankment in the Pink Lily area to act as a levee and divert flood waters from the airport and areas to the north of the runway. For example, levee investigations have been carried out to reduce the flood impacts on the entire runway at the Rockhampton Airport.

4.2.2 Potential Flooding Impacts

Providing this additional developable land would result in higher levels of afflux in the upper areas of the floodplain. The study has modelled two potential levee scenarios that show varying levels of additional afflux to the north of the corridor resulting in greater than existing flood impacts on a number of properties.

It is recommended that a land use study be carried out to determine the benefit or otherwise of the additional land for development that the levee option provides. This study would need to determine the land use planning and economic benefit of the land which would be made available compared to the cost of providing for it (flooding impacts).

4.3 Rail Infrastructure and Operations Investigation

4.3.1 Intermodal Hub Investigation

The combined western corridor would provide the opportunity to consider a new location for an intermodal terminal either on the new corridor or to the south of the connection to the existing network. The key requirements for intermodal terminals are:

1. efficiency: The terminal needs to be located along the corridor in an appropriate location to support an efficient supply chain

2. hours of operation: Restriction on hours of operation due to neighbouring land uses adversely affects the flexibility of the terminal to match the arrival and departure times of containers and trains

3. connection to Strategic Road Network: A terminal within the western corridor or south of the interface with the existing network would have strong connections to the road network heading north, south, and west of Rockhampton, as well as connection to major arterial roads within Rockhampton

4. size of terminal: appropriate for train and truck size, as well as size for container stacking.

While it was not the objective of this strategy to force current operations and activities to move from their current location, the benefits that the Western Rail Corridor could provide for a future intermodal facility should be considered as part of long-term planning for freight. Other locations that should be considered would include south of the connection to the existing North Coast Line. However, the benefits of being able to provide a more optimal intermodal terminal on the western corridor should be further investigated.

4.3.2 Workshop Operation and Location Investigation

The western corridor could provide opportunities for further enhancement of operations at the rail workshops adjacent to the railway station, as the holding capacity for wagons and locomotives waiting to be maintained or having completed their maintenance could be increased. The western corridor could also make available currently undeveloped land adjacent to the new rail corridor for augmenting the capacity of the existing facility with additional facilities. Although the workshop is owned by QR National, further investigation of opportunities should be considered to capture the benefits of the western corridor.

4.3.3 Passenger Station Operation and Location Investigation

Existing passenger train operations would be maintained at the existing railway station in South Rockhampton as part of the western corridor. An opportunity was identified on the western corridor close to the northern connection for a potential future station if further investigations identified this to be a more suitable long-term location. It is recommended that an investigation of the origin or destination of passengers who catch rail services is undertaken to identify the most suitable location for a station.

4.3.4 Denison St/Alexander Bridge Future Use Investigation

The removal of heavy rail from Denison Street and the Alexandra Bridge could provide an opportunity to transform the existing corridor into a community asset. Throughout the project it was identified by many stakeholders that the corridor should be retained for local public transport and active transport options.

Alexandra Bridge is heritage listed and is likely to need to be retained in its current form. This would still allow for a new deck to be provided for both public transport and active transport across the Fitzroy River. Further investigations would be required to identify the most suitable use for the corridor and the Alexandra Bridge when rail operations relocate to the western corridor.

4.3.5 Triggers for the Western Rail Corridor

There are a variety of potential triggers for the development of the western corridor for rail that are not able to be modelled. Most of them are related to the operation of the whole North Coast Line corridor and cannot be considered in isolation. The rail related triggers could include:

- demand for additional capacity of the rail network through more trains or longer trains. It is not just the pure capacity of the network through Rockhampton that would be the driver but also the impact that more or longer trains would have on level crossing safety, road network delays, and the community
- increased tonnage limits for trains on the corridor would be a trigger for the new corridor as the Alexandra Bridge has a load limit that restricts the axle load tonnage for trains
- improving journey times for freight along the North Coast Line could also be a trigger for the western corridor as it improves through journey times for freight services
- there are many locations along the existing North Coast Line that do not currently have a suitable level of flood immunity for the robustness of the rail corridor. When the improvement in flood immunity the western corridor provides becomes a high priority when compared with other locations along the network this would trigger the project.

Each of these potential triggers cannot be considered in isolation, as a combination of the triggers will likely drive the development of the western corridor. Further network wide (North Coast Line) investigation is required to clarify these triggers and the likely timing of the western rail corridor.

5.0 ASSUMPTIONS AND LIMITATIONS

The overall objective of the strategy is to identify a long term corridor for the Bruce Highway and North Coast Rail Line at Rockhampton. The road and rail alignments have been designed based on a number of assumptions to ensure that the corridors identified are robust enough to accommodate any variations to design assumptions that may occur during the development of the corridor designs.

5.1 Corridor Extents

The corridors have been designed based on limited ground investigation and with aerial survey. No geotechnical field investigation has been carried out at this stage. There will be opportunities to refine and optimise the corridors with further detailed planning including field investigation and consultation as the projects progress through to design and delivery.

5.2 Accessability

The scheme design that is documented and costed is based on construction to Q100 flood heights. Assuming that the Yeppen Crossing upgrades (Yeppen North and Yeppen South) are in place, there may be opportunities to provide for lower road heights that will cater for the smaller flood events, particularly for the section south of the Fitzroy River (Stage 8). Any lower level options would need to be assessed for their flood impacts. Any reduction in the target flood event would result in a lowering of grade line and subsequent reduction in required corridor width. Designing for Q100 throughout ensures that the corridor will have sufficient width for all cases.

5.3 Flood Impacts

A number of factors that are beyond the scope of this study to resolve will affect the ultimate design of the infrastructure within the corridor. A major factor is the determination of an acceptable level of flood impacts caused by afflux as a result of the corridor and the desirability of providing for areas of improved flood impacts, for industrial or other developments immediately north of the airport. Resolving this issue is beyond the scope of this strategy, so the approach taken has been to:

- investigate an option with a relatively small length of bridging that provides a high level of improved flood impacts immediately north of the airport and a high level of afflux north and west of the proposed alignment (levee option)
- investigate an option with a longer length of bridging that provides minimal or no level of improved flood impacts immediately north of the airport and a lower level of afflux north and west of the proposed alignment (low afflux option).

For both cases assumptions have been made about the design of the Yeppen Floodplain Upgrade (Yeppen South), as its design has not been determined yet.

The two options represent a “high cost” and a “low cost” scenario, with the low afflux option expected to be more costly than the levee option due to the significantly increased length of bridging. They also represent the two different types of outcomes or opportunities that the corridor provides. For costing and design purposes a third option was developed that was between the high and low cost scenarios. This was developed to provide an indication of the “average” cost of developing the corridor. It also provides a design basis for identifying the extents of the corridor that will accommodate a range of solutions.

5.4 Population Projections

Updated PIFU population projections (May 2011) have been revised higher than the projections used for this study. The revised demographics were not able to be accommodated within the time frames of this study, but it is understood that population projections have been revised up to 7% higher than the study projections. The implication of this increased population projection is a potentially large increase in trips on the network. While this is not expected to change the overall outcomes of the study, it could impact on the timing of its recommendations.

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