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ROADS AND TRANSPORT

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21 Roads and Transport

21.1 Introduction

To assess the potential impacts of development generated traffic on the road network throughout construction, operation and decommissioning phases of the Project, a Road Impact Assessment (RIA) has been undertaken.

This chapter provides a summary of the RIA and includes objectives, legislative context, existing road environment conditions, assessment methodology, road values and sensitivity assessment, Project traffic generation, impact assessment, impact management and mitigation, residual impacts and cumulative impacts.

Details of the full RIA are contained in the Roads and Transport Technical Report (Appendix R) of this EIS. A cross reference to the locations where each of the requirements of the ToR has been addressed is given in Appendix B which references both the study chapters (Sections 1 through 34) and/or the Appendices (A through EE).

21.2 Objectives of Road Impact Assessment

The objectives of the RIA are as follows:

- Fulfil the requirements of the ToR for the EIS;
- Address all reasonable issues that are likely to be asked by stakeholders at the strategic EIS assessment stage;
- Identify the key environmental values;
- Determine the traffic impact of the Project on key environmental values using a significance assessment approach, as well as on the operational performance of roads used by Project traffic; and
- Develop management and mitigation measures to inform future planning and address identified impacts.

This study addresses the Project's road based transport impacts. Impacts associated with other transport modes (e.g. marine, rail and air) are beyond the scope of this assessment.

21.3 Legislative Context

This section outlines legislation and guides used by the State and local government roads authorities to assess the road impacts of development in Queensland. The Department of Transport and Main Roads (TMR) and local governments have a role in the implementation of the following:

1. ***Sustainable Planning Act, 2009.*** This is Queensland's primary planning reference guide, which manages the development process through the coordination and development of planning guidelines at a local, regional and state level.
2. ***Environmental Protection Act, 1994.*** This act aims to protect Queensland's environment while allowing for development that improves overall quality of life. Section 3 of the Act sets out the EIS

process. This requires proponents of development that may affect the environment to assess potential effects.

3. ***Petroleum and Gas (Production and Safety) Act, 2004.*** This Act regulates petroleum and gas development and commenced on 1 January 2005. It does not apply to development carried out under the *State Development and Public Works Organisation Act 1997*. Under this Act, any holder of a petroleum authority must not use a public road for a notifiable road use unless they notify the road authority. A notifiable road use can be:
   - The use of public roads in the proponent's area of authority for transport relating to a seismic survey or drilling activity.
   - The use of a public road to haul greater than 50,000 t per year of petroleum produced or processed in the area on a State controlled road (10,000 t a year for another public road) or the construction of a pipeline.

   Further, it is a condition of each petroleum authority that its holder must not carry out a notifiable road use on a public road unless:
   - The holder and the relevant public road authority have signed a compensation agreement for the use; or
   - The public road authority has given written consent to the carrying out of the use; or
   - A compensation application has been made to decide the holder's compensation liability to the public road authority relating to the road.

   With regard to receiving such notification, TMR may give a "road use direction", which may advise the petroleum authority holder how they may use the road to meet their requirements. As part of a road use direction, TMR can request an RIA to assess the impacts of the notifiable road use.
4. ***Transport Infrastructure Act, 1994.*** This act is TMR's primary legislation. It sets out the powers TMR has in relation to managing the State Controlled Road (SCR) network.
5. ***Transport Operations Act, 1995.*** This act provides broad guidelines for the placement of signage or Traffic Control Devices that may be erected on roads.

21.4 Existing Road Environment Conditions

21.4.1 Functional Road Types

Table 21–1 identifies the major Highways, Regional Connecting Roads and Local Connecting Roads within the Project area.

For the purpose of this study, a Highway is defined as a high order road of a high standard facilitating connectivity between regional centres. A Regional Connecting Road is defined as a high order road of a high standard facilitating connectivity between townships, whilst a Local Connecting Road is defined as a low order road facilitating connectivity between higher order roads.

Table 21-1 Functional Road Hierarchy

Road	Classification
Peak Downs Highway (70)	Highway
Capricorn Highway (16)	Highway
Suttor Developmental Road (82A)	Regional Connecting Road
Collinsville to Elphinstone Road	Regional Connecting Road
Newlands Access Road	Regional Connecting Road
Fitzroy Developmental Road (85C)	Regional Connecting Road
Moranbah to Dysart Road	Regional Connecting Road
Dysart to Middlemount Road (519)	Regional Connecting Road
Golden Mile Road	Local Connecting Road
Rolphe Creek Road	Local Connecting Road
Daunia Road / Annadale Road	Local Connecting Road
Iffley Road	Local Connecting Road

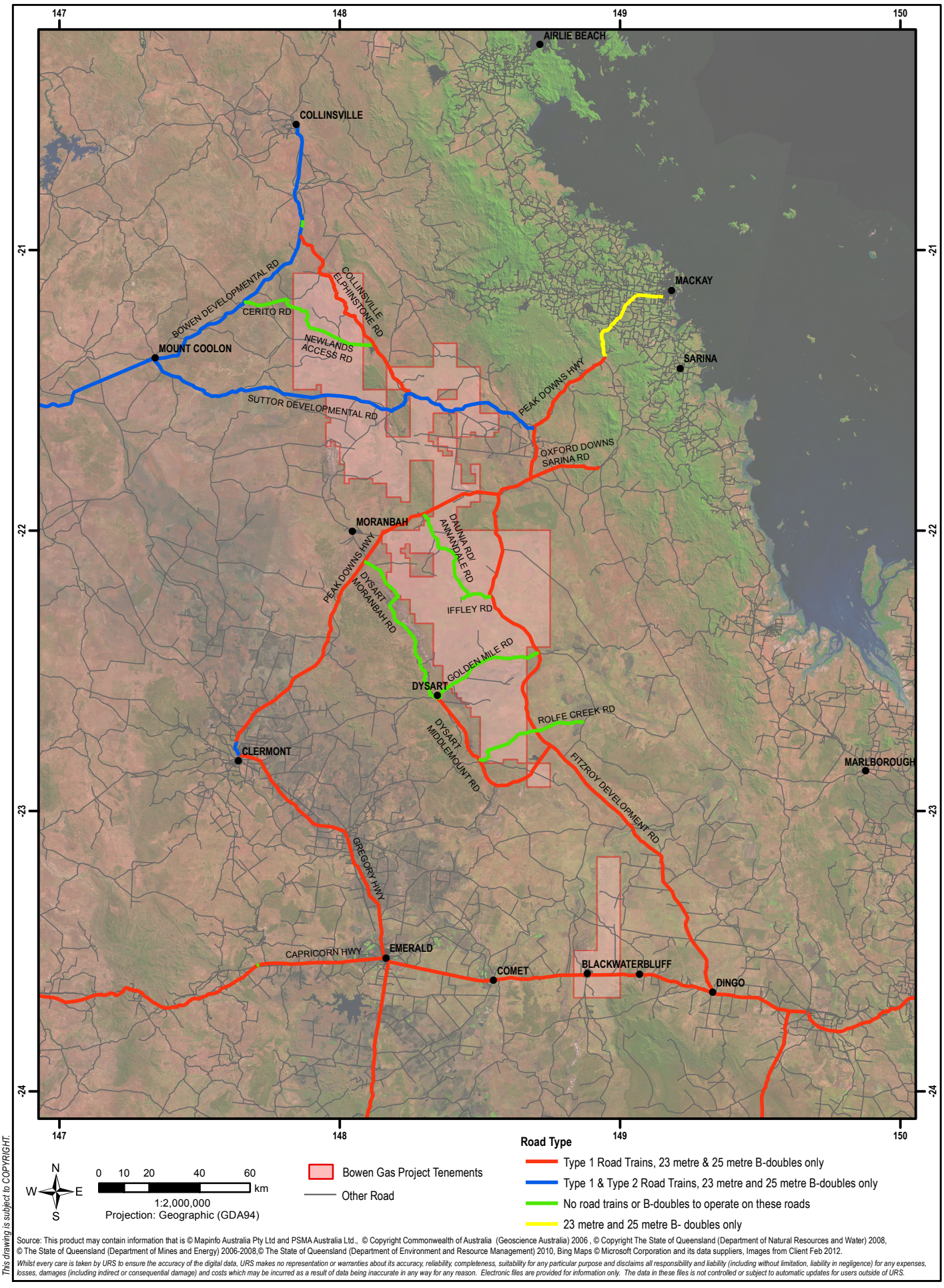
21.4.2 Existing Road Network

A site inspection was undertaken in April 2012 of roads likely to be utilised by Project traffic.

This allowed a wide range of parameters to be identified relevant to the characteristics and condition of roads, including whether the road is designated as state or local, who the road is maintained / managed by, number of lanes, width, sealed / unsealed, speed limit, presence of road markings, floodways, cattle grids, bridges, overtaking lanes, gradients, corrugations and rutting, edge break, pot holing, as well as suitability for use as a haulage route for Project traffic. Recent upgrades and scheduled improvements are also identified.

A review of multi-combination vehicle routes, school bus routes, rail crossings, stock routes, pedestrian networks, public transport networks, motorist rest areas and road crash data was also undertaken.

The above are presented in Figures 21–1 through 21–6 to follow and full details for all roads considered are contained in the Technical Report (Appendix R) of this EIS.



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BOWEN GAS PROJECT EIS

MULTI-COMBINATION VEHICLE ROUTES

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Figure: **21-1**

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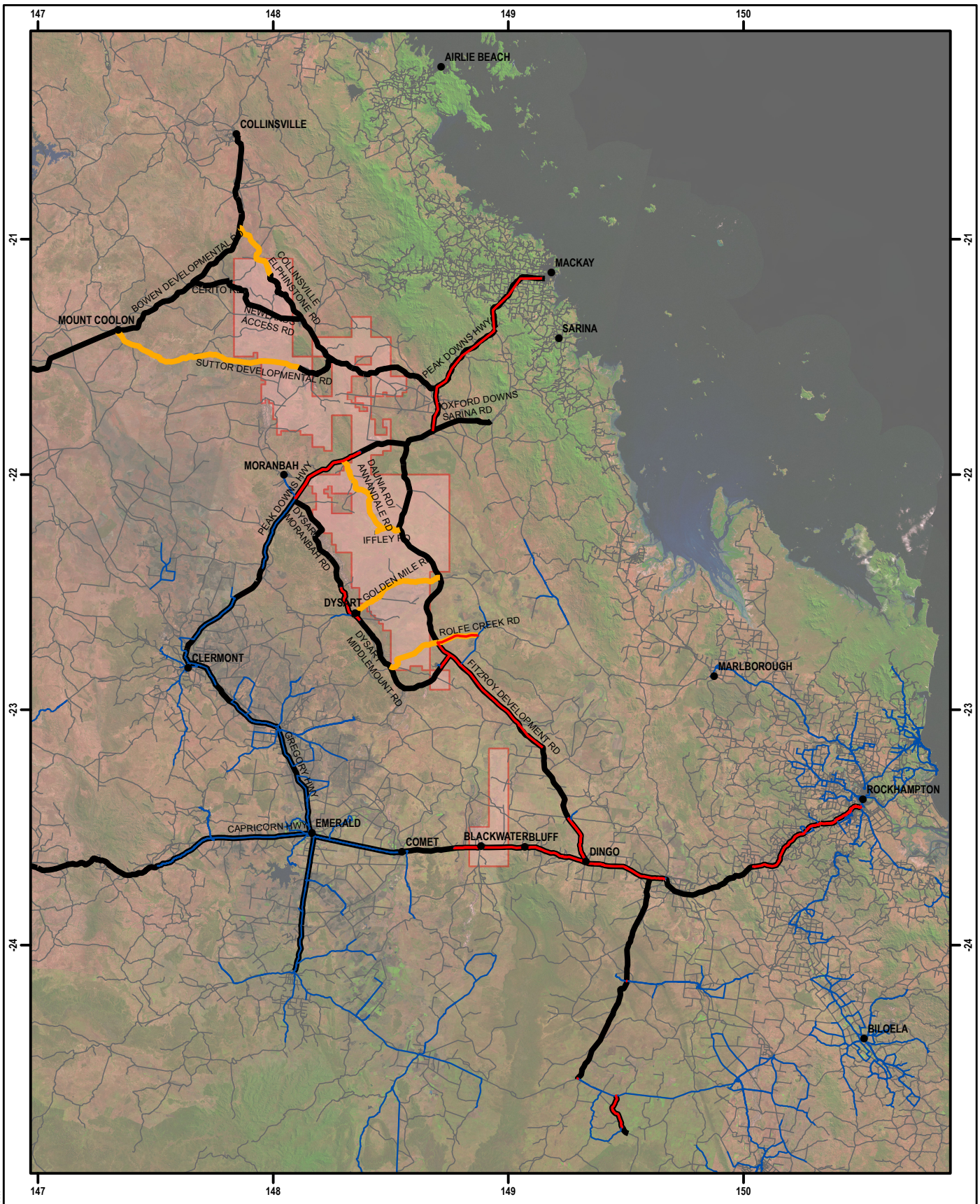

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SCHOOL BUS ROUTES

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Figure: **21-2**

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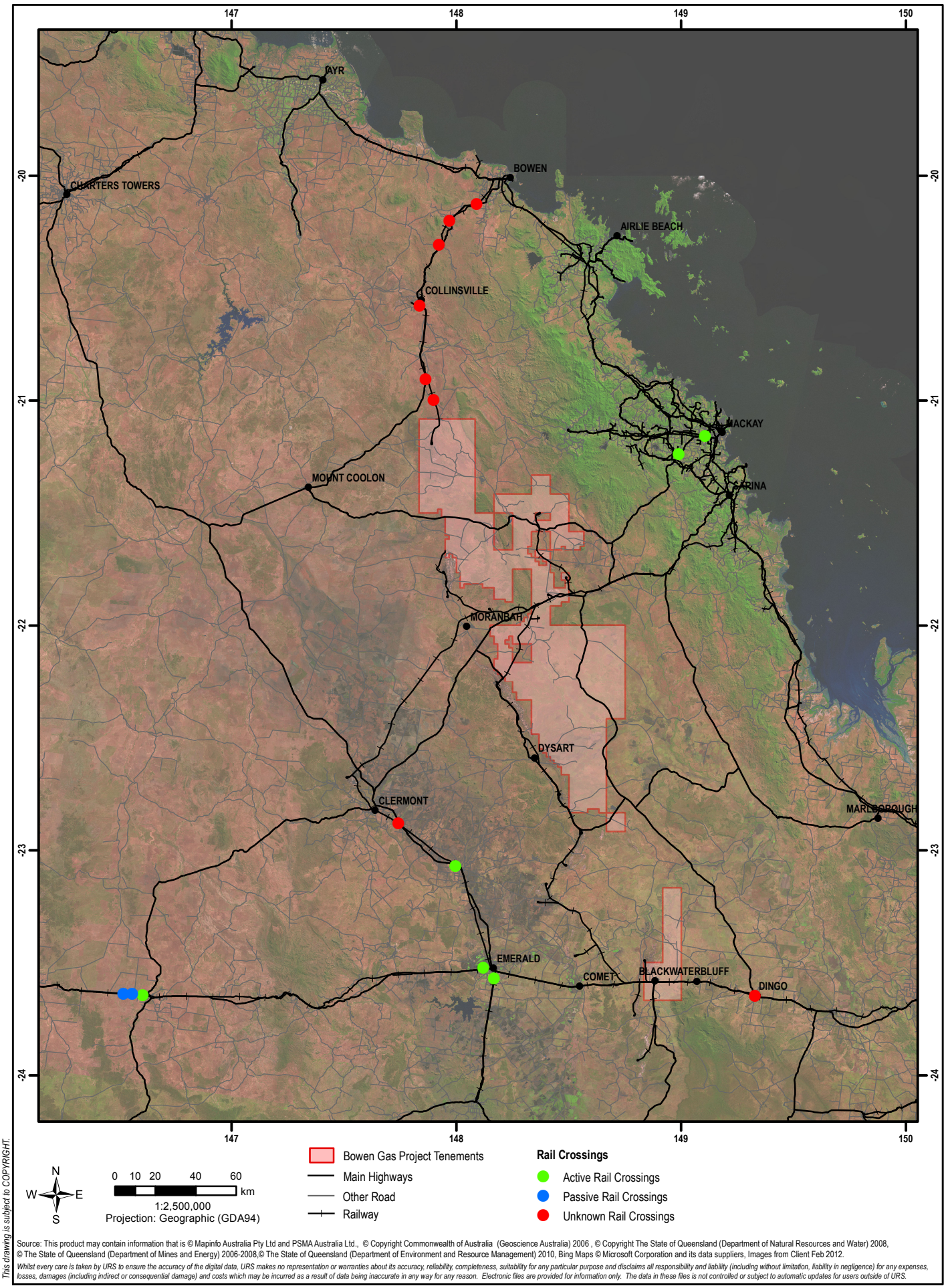

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RAIL CROSSINGS

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Figure: **21-3**

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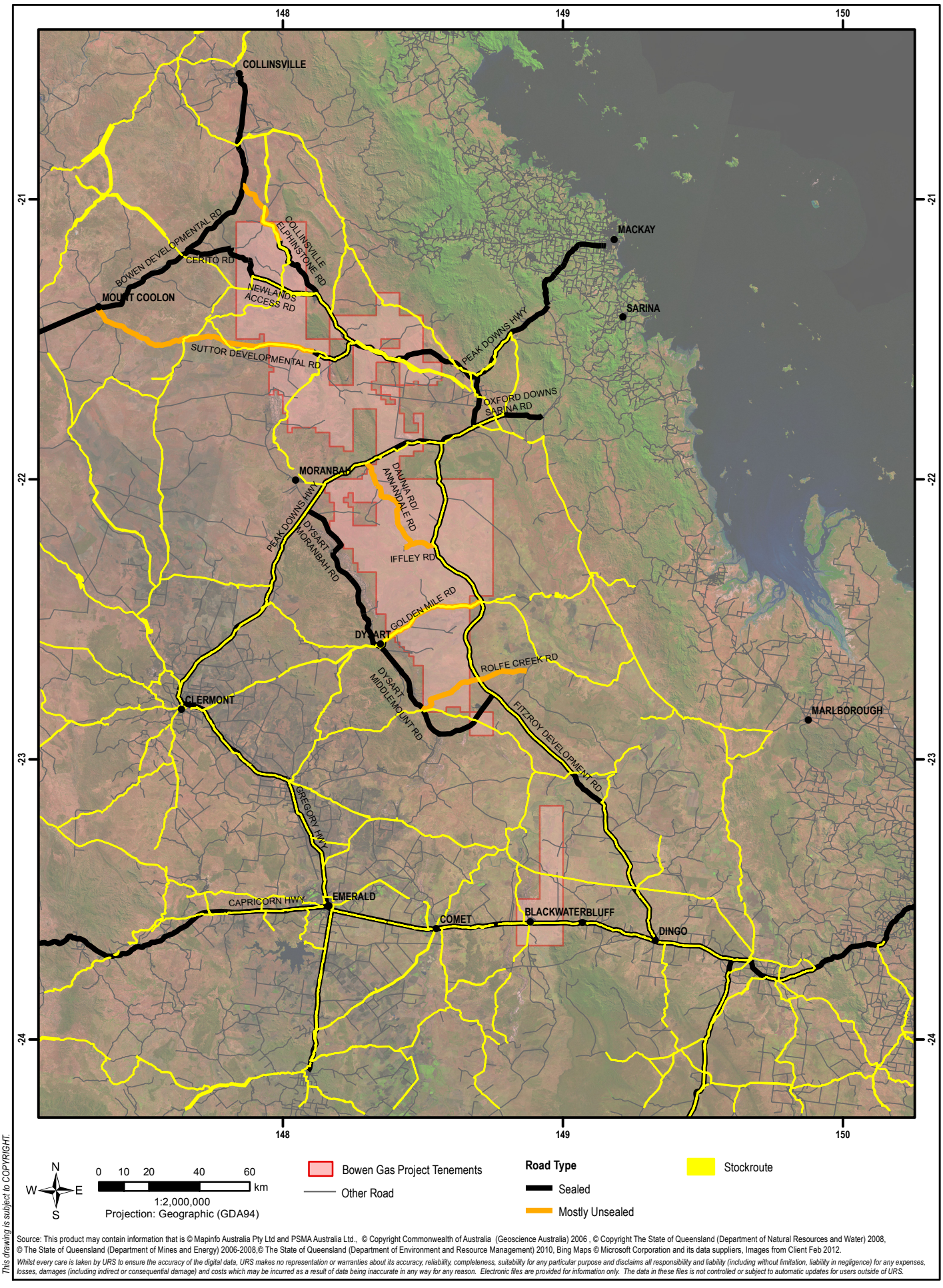

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BOWEN GAS PROJECT EIS

STOCK ROUTES

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Figure: **21-4**

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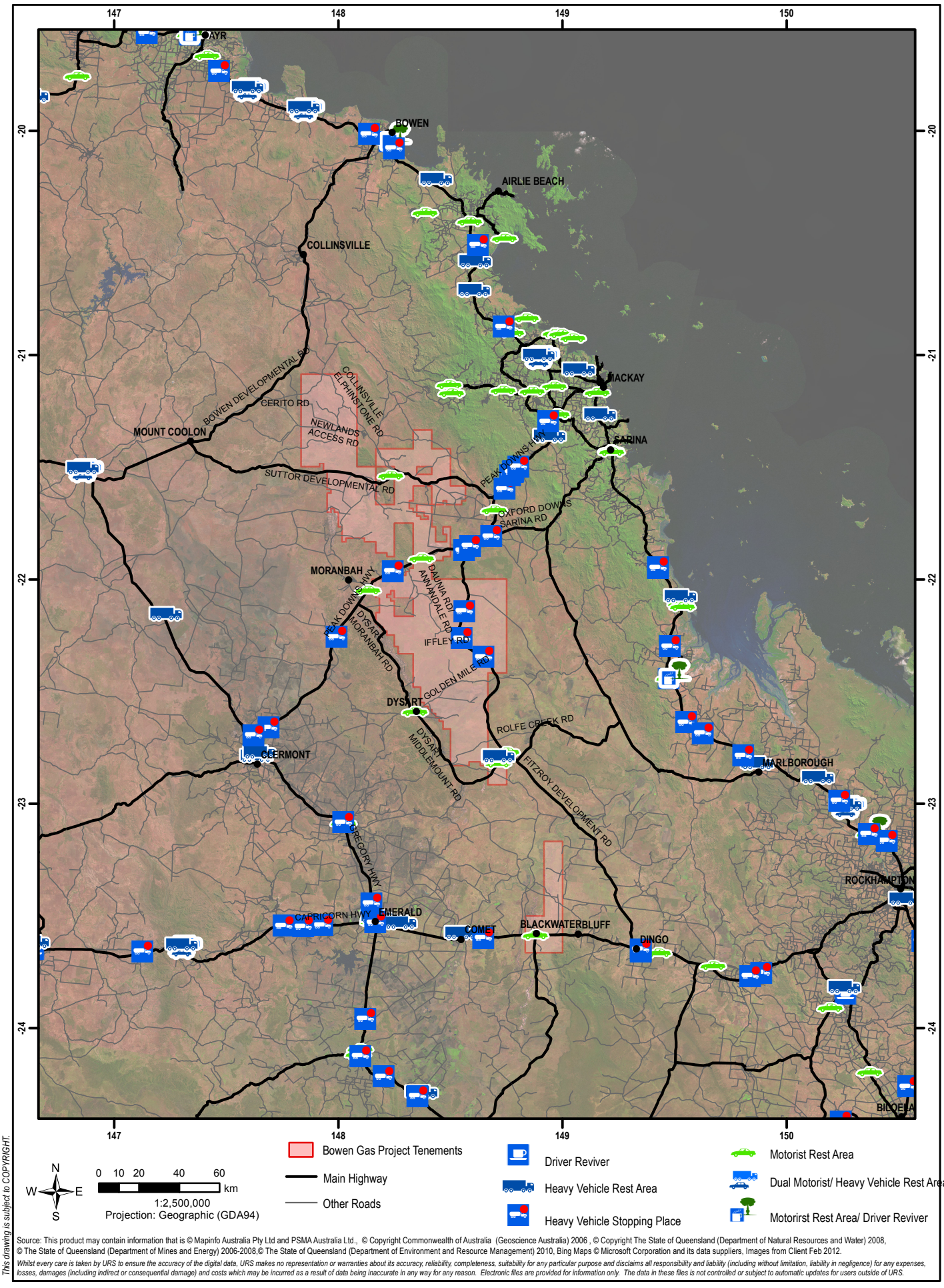

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MOTORIST REST AREAS

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Figure: **21-5**

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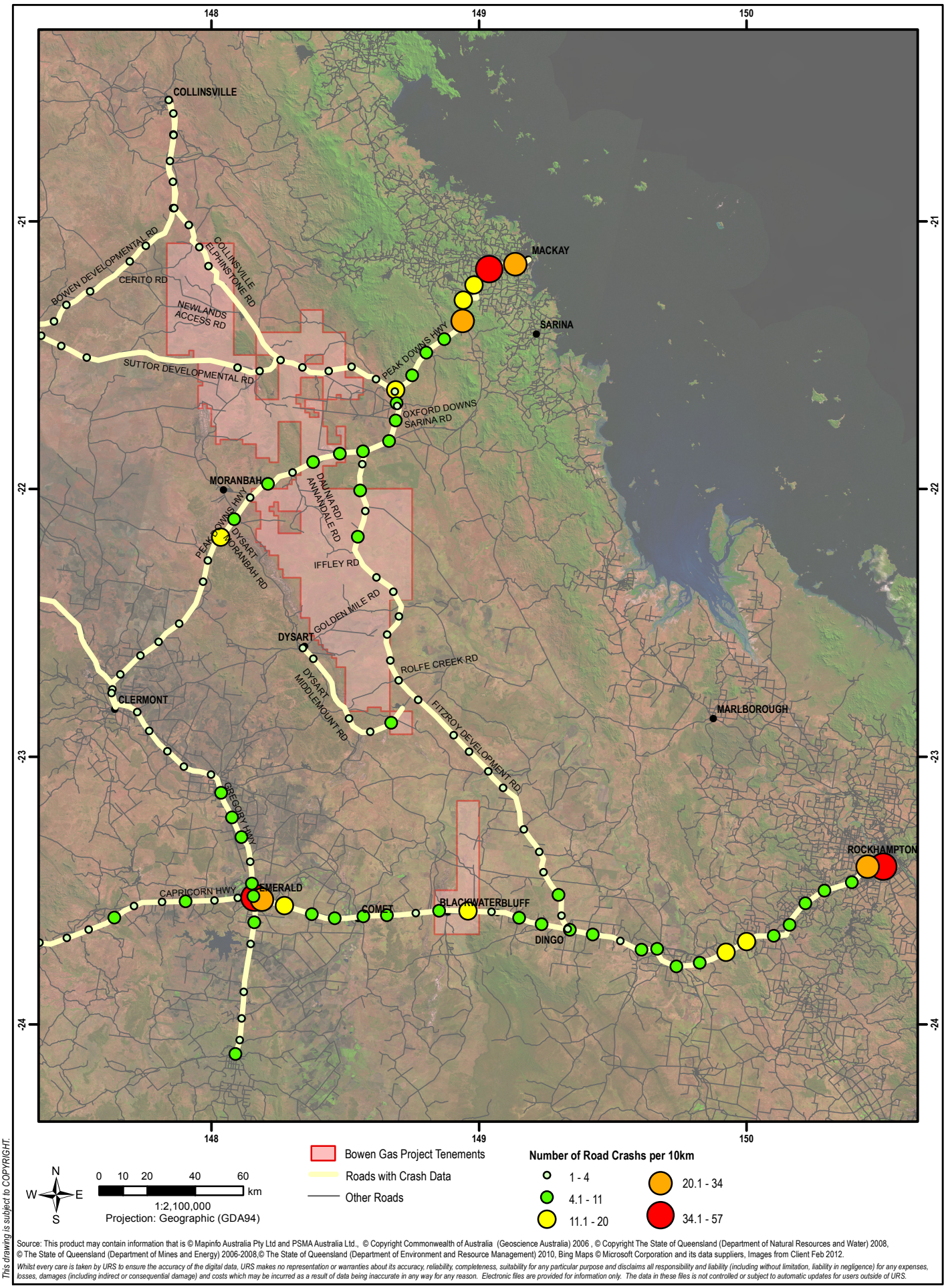

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BOWEN GAS PROJECT EIS

ROAD CRASH FREQUENCY MAP

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Figure: 21-6

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21.5 Assessment Methodology

The potential impacts of the Project on environmental values for each environmental aspect are assessed using one of three methodologies; significance assessment, risk assessment or compliance assessment. The significance assessment method is particularly relevant for technical studies where an understanding of the vulnerability of the environmental asset or resource is important. Thus, this approach has been adopted for the RIA element of the EIS.

The following steps were undertaken to facilitate the RIA:

1. Data collection and collation to facilitate reporting of existing conditions. This included a desktop review of information obtained from TMR, Isaac Regional Council and Whitsunday Regional Council, as well as the use of online resources. Information reviewed includes traffic volumes, crash data, school bus routes, stock routes, rail crossings, and road construction standards. A site inspection was also undertaken to confirm the condition of existing road infrastructure;
2. The road network environmental values were identified and their sensitivity to changed traffic conditions was analysed;
3. The number and type of vehicles likely to be generated during the various phases of the Project were identified based on a reference Project development plan;
4. The peak traffic generating year was identified;
5. The magnitude of the Project's potential impacts on the various environmental values was identified;
6. The significance of the Project's impact on the road network environmental values was determined;
7. Mitigation and management measures were identified. These will be incorporated into any future Road Use Management Plan (RUMP) developed by Arrow as the Project progresses;
8. The significance of residual impacts, following implementation of management and mitigation was determined; and
9. The potential cumulative impacts were evaluated, taking account of other major projects in the area.

The approach outlined above enables the significance of the Project's traffic impacts to be widely assessed at the strategic planning stage. Specific details on location based traffic impacts will be more precisely defined through the development of the RUMP during the detailed engineering design phase when further Project details and activities are more defined.

21.6 Road Environmental Values and Sensitivity Assessment

The road environment within the Project area comprises unique characteristics, which define the overarching value of the road environment and form the basis of the assessment from which the sensitivity of the value is determined.

Table 21–2 summarises the typical characteristics of each road type in further detail as they relate to efficiency, safety and amenity.

Table 21-2 Environmental Values and Sensitivity

	Characteristic	Value		
		Highway	Regional Connecting Road	Local Connecting Road
Description	Function	A high order road of a high standard facilitating connectivity between regional centres	A high order road of a high standard facilitating connectivity between townships	Lower order road facilitating connectivity between higher order roads
Typical Observations				
Efficiency	Volumes	3,000+ vehicles per day	1,000 – 3,000 vehicles per day	<1,000 vehicles per day
	Pavement	Sealed	Sealed	Sealed / Unsealed
	Standard of intersection control	Varies	Varies	Low order
Sensitivity of Efficiency		Low	Moderate	High
	Standard of rail crossing control	Active	Passive	Passive
	School bus route presence	Present	Present	Present
	Composition of traffic	High proportion heavy vehicles	Moderate proportion of heavy vehicles	Low number of heavy vehicles
	Drive fatigue controls	Present	Uncommon	Uncommon
Sensitivity of Safety		Low	Moderate	High
Amenity	Stock route co-location	Present	Present	Present
	Sensitivity of adjacent land uses	Low	Moderate	Moderate
	Potential for dust nuisance issues	Low	Low	Potential
	Potential for light glare issues	Low	Low	Potential
Sensitivity of Amenity		Low	Moderate	High

In summary, the roads designed for higher traffic volumes are less sensitive to changing traffic conditions than roads designed primarily to facilitate local traffic. That is, the environmental values of Highways have a low sensitivity to changing traffic conditions; the environmental values of Regional Connecting Roads are moderately sensitive to changing traffic conditions; while the environmental values of Local Connecting Roads have a high sensitivity to changing traffic conditions.

Based on the classification of roads in the Project area identified in Table 21–1 and the criteria for sensitivity for each road classification identified in Table 21–2 above, the sensitivity of roads utilised by Project traffic has been determined and is shown in Table 21–3.

Table 21-3 Road Sensitivity

Road	Classification	Sensitivity
Peak Downs Highway	Highway	Low
Capricorn Highway	Highway	Low
Suttor Developmental Road	Regional Connecting Road	Moderate
Collinsville to Elphinstone Road	Regional Connecting Road	Moderate
Newlands Access Road	Regional Connecting Road	Moderate
Fitzroy Developmental Road	Regional Connecting Road	Moderate
Moranbah to Dysart Road	Regional Connecting Road	Moderate
Dysart to Middlemount Road	Regional Connecting Road	Moderate
Golden Mile Road	Local Connecting Road	High
Rolphe Creek Road	Local Connecting Road	High
Daunia Road / Annadale Road	Local Connecting Road	High
Iffley Road	Local Connecting Road	High

21.7 Traffic Volumes

Average Annual Daily Traffic (AADT) volume data was obtained from TMR, including the percent of heavy vehicles (HVs). A review of this data was undertaken, which showed that the volume of traffic on roads within the Project area has typically increased by some 5–31 % over the past 10 years, reflecting the resources boom that has occurred over the same period.

Assuming growth resulting from development of resources opportunities in the area continues for another decade (2021), then declines over the 10 years thereafter (2031), TMR has confirmed it is reasonable to assume that in 2045 (peak Project traffic generating year – see Section 21.8) only operational traffic relating to resources activities need be considered i.e. by 2045 resources opportunities would in general be fully developed resulting in limited construction related traffic, but with operational traffic continuing beyond this point.

Whilst recognising the difficulties in predicting so far ahead, assuming the above reflects a rough assessment of past and future development patterns in the area. With the rise and fall of construction traffic relating to resources project related activities before 2045, it has been agreed with TMR that it would be reasonable to assume nominal annual background traffic growth of 3% with an additional 2% to account for the expected increase in traffic resulting from on-going resources project operations to estimate future background traffic in 2045.

To determine future background 2045 traffic volumes, 2011 traffic volumes have been projected back to 2001 using observed growth over the past 10 years; then projected forwards to 2045 using combined 5% growth to provide future background 2045 traffic volumes.

Full details on 2011 AADT, % HVs, traffic growth and future background 2045 AADT are contained in the Roads and Transport Technical Report (Appendix R) of this EIS.

21.8 Project Traffic Generation

There are three phases associated with the Project, including the construction phase, the operation and maintenance phase and the decommissioning and rehabilitation phase.

Key traffic generating activities will be undertaken in each phase, with a significant overlap in the timing of the three phases likely to occur.

For example, in 2045 (the peak traffic generating year) it is estimated that 272 production wells and associated gathering infrastructure will be constructed, whilst 10 production facilities, four construction camps and 3,333 production wells will be operated and maintained. A single production facility will also be decommissioned across the Project area in 2045.

Table 21–4 provides a summary of the estimated traffic generation for each activity associated with the Project.

A detailed description including rationale and assumptions made for each phase for Project activities and traffic generation, as well as workforce numbers is included in the Roads and Transport Technical Report (Appendix R) of this EIS.

Table 21-4 Summary of Project Traffic Generation

Activity	Quantity	Activity Duration	Traffic Generation		
			HV Trips (two way)	Bus Trips (two way)	LV Trips (two way)
Construction Phase					
Production wells (hydraulic fracturing)	1,656 wells	10 days	110 HV / well	N/A	133 LV / well
Production wells (no hydraulic fracturing)	4,969 wells	10 days	50 HV / well	N/A	91 LV / well
Gathering infrastructure	6,625 sections	3 days	13 HV / section	N/A	14 LV / well
High pressure pipelines	-	-	N/A to this study		
Integrated Processing Facilities (IPFs)	4 facilities	61 weeks	2,126 HV / IPF	N/A	N/A
Central Gas Processing Facilities (CGPFs)	3 facilities	52 weeks	1,130 HV / CGPF	743 buses / CGPF	2,475 LV / CGPF
Field Compression Facilities (FCFs)	10 facilities	43 weeks	583 HV / FCF	326 buses / FCF	1,084 LV / FCF
Construction Camps	4 facilities	4 weeks	600 HV / camp	N/A	N/A
Operational and Maintenance Phase					
Production wells	6,625 wells	20 years	9 HV / well / year	N/A	17 LV / well / year
Gathering infrastructure	6,625 sections	20 years	-	Limited	-
IPFs	4 facilities	40 years	885 HV / IPF / year*	N/A	N/A

Activity	Quantity	Activity Duration	Traffic Generation		
			HV Trips (two way)	Bus Trips (two way)	LV Trips (two way)
CGPFs	3 facilities	40 years	260 HV / CGPF / year	N/A	2,340 LV / CGPF / year
FCFs	10 facilities	25 years	156 HV / FCF / year	N/A	156 LV / FCF / year
Construction camps	4 facilities	For period of production facilities construction	936 HV / camp / year	61	3,647 LV / camp / year
Decommissioning and Rehabilitation Phase					
Production wells	6,625 wells	2 days	10 HV / well	N/A	10 LV / well
Gathering infrastructure	6,625 sections	2 days	2 HV / section	N/A	Limited
IPFs	4 facilities	8 months	600 HV / IPF	N/A	N/A
CGPFs	3 facilities	8 months	600 HV / CGPF	490 buses / CGPF	1,633 LV / CGPF
FCFs	10 facilities	4 months	201 HV / FCF	119 buses / FCF	397 LV / FCF
Construction camps	4 facilities	4 weeks	600 HV / camp	N/A	400 LV / camp

Note: * Includes vehicle trips associated with brine removal from year 11 to 40 of the IPFs assumed 40 year operation and maintenance life. LV: Light vehicle

Identification of aggregate traffic generation per phase per year was considered, which allowed the peak traffic generating year to be identified, which was found to be 2045. This was then used for the purpose of the impact assessment described in Section 21.9.

21.9 Impact Assessment

21.9.1 Significance Assessment

To determine the significance of traffic impacts associated with the Project, the sensitivity of the three aspects, namely efficiency, safety and amenity associated with each of the identified environmental values (road types) were identified (see Section 21.6).

The magnitude of potential impacts was then determined by considering the percentage increase in traffic due to Project related activities in accordance with the criteria contained in Table 21–5.

Table 21-5 Magnitude Criteria

% Increase in AADT	Magnitude of Impact
>90	High
60 – 90	Moderate
30 – 60	Low

Note: Increases in AADT lower than 30% are considered negligible in terms of environmental effects

In order to assess the effectiveness of management and mitigation measures, the significance of potential impacts has been assessed both before and after the application of management and mitigation measures. This section outlines the magnitude and significance of impacts prior to implementation of these measures.

The significance of an impact on an environmental value is decided by determining the sensitivity of that value to change and the magnitude of the change it experiences. Table 21–6 displays information on the significance of an impact as a function of the sensitivity of the environmental value and the magnitude of the impact.

Table 21-6 Assessment of Significance of Impacts

	Sensitivity of Environmental Value		
Magnitude of Impact	**High**	**Moderate**	**Low**
High	Major	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Negligible

Major Impact: This occurs when the impact on the Project is severe to the extent that it cannot be tolerated for safety, economic or social reasons. Infrastructure upgrades are likely to be required in order to mitigate a major impact.

High Impact: This occurs when the impact on the network is severe to the extent that it cannot be tolerated for safety, economic or social reasons. Mitigation may be required, but not necessarily in the form of infrastructure upgrades.

Moderate Impact: This occurs when the impact on the network could be tolerated. Despite this, traffic management or other mitigation may be required to reduce the impact on the network.

Low Impact: This occurs when the impact to the network may be detectable but is at a level that can be tolerated.

Negligible Impact: This occurs when the significance of the impact is considered negligible.

The percentage increase in traffic resulting from Project activities was compared against criteria in Table 21–5 to determine magnitude. Once magnitude had been determined, this information together with the sensitivity of individual road sections identified in Table 21–3 was used to determine the significance of impacts for roads likely to be used by Project traffic.

Table 21–7 summarises the sensitivity, magnitude, as well as the significance of impacts for all relevant sections of road.

Table 21-7 Significance of Impact on Roads Used by the Project

Road	Start Point	End Point	Sensitivity	Magnitude	Significance of Impacts
Peak Downs Highway	Mackay	Nebo	Low	Negligible	Negligible
	Nebo	Fitzroy Dev. Rd	Low	Negligible	Negligible
	Fitzroy Dev. Rd	Coppabella	Low	Negligible	Negligible
	Coppabella	Moranbah	Low	Negligible	Negligible
Capricorn Highway	Rockhampton	Dingo	Low	Negligible	Negligible
	Dingo	Blackwater	Low	Negligible	Negligible
Suttor Developmental Road	Nebo	Elphinstone	Moderate	Negligible	Negligible
	Elphinstone	Red Hill Rd.	Moderate	Low	Low
Collinsville to Elphinstone Road	Elphinstone	Glenden	Moderate	Negligible	Negligible
Newlands Access Road	Glenden	Newlands Mine	Moderate	Negligible	Negligible
Fitzroy Developmental Road	Mount Flora	Middlemount	Moderate	Negligible	Negligible
	Middlemount	Junee Road	Moderate	Negligible	Negligible
	Junee Road	Dingo	Moderate	Negligible	Negligible
Moranbah to Dysart Road	Moranbah	Dysart	Moderate	Negligible	Negligible
Dysart to Middlemount Road	Dysart	German Creek	Moderate	Negligible	Negligible
	German Creek	Middlemount	Moderate	Negligible	Negligible

Note: Based on indicative facility locations. Impacts based on a representative case for EIS purposes only. Actual roads affected may differ.

Within the Project area, a low magnitude and significance of impact is anticipated on Suttor Developmental Road, between Elphinstone and Red Hill Road. This is predominately due to the number of Project related vehicles predicted to travel along this road in 2045, compared to the relatively low existing and future 2045 background traffic volumes.

All other roads assessed have a negligible magnitude and significance of impact due to low Project traffic compared to future 2045 background traffic.

Table 21–7 is not meant to form a comprehensive list of roads likely to be impacted, but rather provide examples of what significance of impacts may be experienced in the absence of management and mitigation measures. As indicated previously, the impacts are based upon a representative scenario of development which has been assessed for the purposes of developing management and mitigation measures to address potential impacts on the existing road network.

In summary, the impacts resulting from Project traffic are generally negligible on the efficiency, safety and amenity of the road network, although impacts on the Suttor Developmental Road are found to be low due to increased traffic volumes and the existing sensitivity of the road.

21.9.2 Road Network Performance Assessment

This section analyses the road network from a traffic performance perspective at midblock locations, rather than from the environmental impact perspective considered earlier in the chapter.

Results from a Level of Service (LOS) analysis, included in Table 21–8, indicate that the additional average daily traffic generated by the Project using peak transport estimates is minimal in comparison to the capacity of the road network.

It is therefore concluded that the Project will not have a significant impact on road links, or intersection performance based on a LOS measurement.

Whilst from a road network performance perspective there are no significant impacts created by the Project, additional considerations such as safety and road use management may be relevant in addressing the wider impact of the Project. Impact management and mitigation, including the need for a RUMP, is considered in Section 21.10 of this report.

Table 21-8 Road Link Assessment - Level of Service During Peak Year (2045)

Road	Start Point	End Point	2045 Background Two-way AADT	LOS	2045 Total Two-way AADT	LOS
Capricorn Highway	Rockhampton	Dingo	3,250	A	3,481	A
Suttor Developmental Road	Nebo	Elphinstone	1,500	A	2,029	A
	Elphinstone	Red Hill Road	450	A	1,134	A
Collinsville to Elphinstone Road	Elphinstone	Glenden	950	A	1,217	A
Newlands Access Road	Glenden	Newlands Mine	2,550	A	2,817	A
Fitzroy Developmental Road	Mount Flora	Middlemount	1,100	A	1,282	A
	Middlemount	Junee Road	850	A	1,072	A
	Junee Rd	Dingo	1,050	A	1,272	A
Moranbah to Dysart Road	Moranbah	Dysart	2,450	A	2,805	A
Dysart to Middlemount Road	Dysart	German Creek	2,000	A	2,255	A
	German Creek	Middlemount	3,800	A	3,996	A

Note: LOS A: This indicates highest level of service, is a condition of free flow in which individual drivers are unaffected by the presence of others in the traffic stream.

21.10 Impact Management and Mitigation

Potential impacts resulting from the Project should generally be addressed based on the following hierarchy: avoid, minimise and manage.

There are a number of management and mitigation measures which may be used to address the wider impacts of the Project on the road network.

A RUMP will be prepared to manage and mitigate the risks and impacts of any transport related issues. The RUMP will evolve as detailed design and operation details are finalised, however an outline of the components that the RUMP should include are as follows [B570]:

- A strategy to safely manage road usage by construction vehicles;
- Interaction of Project vehicles with school bus routes;
- Interaction between stock and freight routes;
- Detail safe driver behaviour and fatigue management protocols;
- Consideration of specific requirements for over dimensional (OD) vehicles;
- Interaction between Project traffic and at grade road / rail crossings;
- Dust mitigation strategy;
- Detail road maintenance and/or road upgrade requirements;
- Liaise with relevant stakeholders;
- Define community engagement strategies; and
- Suitability of existing road infrastructure.

21.11 Residual Impacts

The implementation of management and mitigation measures effectively reduces the significance of the Project's impacts from a range of negligible to low to just negligible.

Specifically, the impact of Project related traffic on the Suttor Developmental Road between Elphinstone and Red Hill Road was identified as low in Section 21.9. As the magnitudes remains unchanged (low) and the sensitivity for this road has reduced from moderate to low, the significance has also reduced from low to negligible.

The adopted significance assessment approach constitutes a strategic assessment of the Project's road impacts consistent with the level of Project development schedule certainty available at the EIS planning approval stage.

In conclusion, there are no impacts that cannot be effectively managed through the implementation of appropriate management and mitigation measures.

It is recognised that at this strategic level, specific mitigation works cannot be identified. During the detailed Project planning phase, consultation will be undertaken with TMR, Councils and Queensland Rail to identify works at specific locations.

Through preparation of a RUMP and possible requirement to enter into infrastructure agreements, the road impacts associated with the Project may be avoided, minimised, or mitigated.

It is therefore considered that the residual impacts relating to safety, efficiency and amenity impacts associated with the Project can be effectively managed.

21.12 Cumulative Impacts

21.12.1 Significance Assessment

Due to the potential for the Project to take place concurrently with other projects, the impacts of all significant committed projects in the area have been considered. The cumulative assessment considers the Project together with these other committed projects, which are identified in Table 21–9 below.

Table 21-9 Cumulative Projects

Project	Location	Roads Used by all Projects
Caval Ridge Mine	6 km south west of Moranbah	Peak Downs Highway, Moranbah to Dysart Road
Alpha Coal Project	38 km north west of Alpha	Peak Downs Highway

The projects listed in Table 21–9 are projects for which planning has been granted (i.e. committed development). A number of other projects are currently in operation in the Project area; however traffic associated with these projects is already reflected in the 2011 AADT traffic volumes supplied by TMR and has therefore not been considered in the cumulative assessment.

Table 21–10 shows the significance of impacts for each road section taking account of all cumulative development projects in the area pre implementation of management and mitigation measures. It can be seen that all impacts remain negligible, except for the impact on Suttor Developmental Road between Elphinstone and Red Hill Road, which remains low.

Table 21-10 Cumulative Significance of Impacts

Road	Start Point	End Point	Sensitivity	Magnitude	Cumulative Significance
Peak Downs Highway	Mackay	Nebo	Low	Negligible	Negligible
	Nebo	Fitzroy Dev. Rd	Low	Negligible	Negligible
	Fitzroy Dev. Rd	Coppabella	Low	Negligible	Negligible
	Coppabella	Moranbah	Low	Negligible	Negligible
Capricorn Highway	Rockhampton	Dingo	Low	Negligible	Negligible
	Dingo	Blackwater	Low	Negligible	Negligible
Suttor Developmental Road	Nebo	Elphinstone	Moderate	Negligible	Negligible
	Elphinstone	Red Hill Rd.	Moderate	Low	Low

Road	Start Point	End Point	Sensitivity	Magnitude	Cumulative Significance
Collinsville to Elphinstone Road	Elphinstone	Glenden	Moderate	Negligible	Negligible
Newlands Access Road	Glenden	Newlands Mine	Moderate	Negligible	Negligible
Fitzroy Developmental Road	Mount Flora	Middlemount	Moderate	Negligible	Negligible
	Middlemount	Junee Road	Moderate	Negligible	Negligible
	Junee Road	Dingo	Moderate	Negligible	Negligible
Moranbah to Dysart Road	Moranbah	Dysart	Moderate	Negligible	Negligible
Dysart to Middlemount Road	Dysart	German Creek	Moderate	Negligible	Negligible
	German Creek	Middlemount	Moderate	Negligible	Negligible

21.12.2 Road Network Performance Assessment

This section analyses the road network from a traffic performance perspective at midblock locations, taking account of cumulative traffic generation from other projects.

Level of Service (LOS) analysis indicates that the additional average daily traffic generated using peak transport estimates when considering cumulative traffic from other projects remains minimal in comparison to the capacity of the road network.

The results of the analysis contained in Table 21–11 show that all of the roads assessed would operate at LOS A with future 2045 background traffic flows. With the addition of cumulative development traffic all roads would continue to operate at LOS A, which indicates that free flow conditions will occur.

Table 21-11 Road Link Assessment - LOS during Peak Traffic Generating Year

Road	Start Point	End Point	2045 Background Two-way AADT	LOS	2045 Total Two-way AADT	LOS
Peak Downs Highway	Nebo	Fitzroy Developmental Road	4,300	A	5,085	A
	Fitzroy Developmental Road	Coppabella	3,400	A	4,185	A
	Coppabella	Moranbah	3,300	A	4,114	A
Capricorn Highway	Rockhampton	Dingo	3,250	A	3,481	A
Suttor Developmental Road	Nebo	Elphinstone	1,500	A	2,029	A
	Elphinstone	Red Hill Road	450	A	1,134	A

Road	Start Point	End Point	2045 Background Two-way AADT	LOS	2045 Total Two-way AADT	LOS
Collinsville to Elphinstone Road	Elphinstone	Glenden	950	A	1,217	A
Newlands Access Road	Glenden	Newlands Mine	2,550	A	2,817	A
Fitzroy Developmental Road	Mount Flora	Middlemount	1,100	A	1,282	A
	Middlemount	Junee Road	850	A	1,072	A
	Junee Rd	Dingo	1,050	A	1,272	A
Moranbah to Dysart Road	Moranbah	Dysart	2,450	A	2,805	A
Dysart to Middlemount Road	Dysart	German Creek	2,000	A	2,255	A
	German Creek	Middlemount	3,800	A	3,996	A

Note: LOS A: This indicates highest level of service, is a condition of free flow in which individual drivers are unaffected by the presence of others in the traffic stream.

It is therefore concluded that the Project will not have a significant impact on road link performance based on a LOS measurement, when traffic generated by cumulative projects in the area is taken into consideration.

21.13 Conclusion

The adopted significance assessment approach constitutes a strategic assessment of the Project's road impacts consistent with the level of Project development schedule certainty available at time of report preparation.

Within the Project area, a low significance impact is anticipated on Suttor Developmental Road between Elphinstone and Red Hill Road pre-implementation of management and mitigation measures. This is predominately due to the number of Project vehicles predicted to travel along this road in 2045 (peak Project traffic generating year) compared to relatively low existing and future 2045 background traffic volumes.

All other roads assessed have a negligible magnitude and significance of impact pre-implementation of management and mitigation measures due to low Project traffic compared to future 2045 background traffic.

LOS analysis indicates that the additional average daily traffic generated by the Project using peak transport estimates is minimal in comparison to the capacity of the existing road network.

The analysis has revealed that all of the roads assessed would operate at LOS A with future 2045 background traffic flows. With the addition of Project traffic, all roads would continue to operate at LOS A, which indicates that free flow conditions will occur.

It is therefore concluded that the Project will not have a significant impact on road performance based on a LOS measurement.

Whilst from a road network performance perspective there are no significant impacts created by the Project, additional considerations such as safety and road use management are relevant in addressing the wider impact of the Project.

A RUMP will be prepared to manage and mitigate the risks and impacts of transport related issues [B570]. The RUMP will evolve as detailed design and operation details are finalised.

The implementation of management and mitigation measures effectively reduces the significance of the Project's impacts from a range of negligible to low to just negligible. Specifically, with regard to the Suttor Developmental Road, a negligible significance impact is anticipated between Elphinstone and Red Hill Road post implementation of management and mitigation measures.

A cumulative impact assessment was also undertaken, which considered traffic generated by other projects that are likely to coincide with the Project. The significance of impacts for each road section taking account of all cumulative development projects in the area was found to remain negligible, except for the impact on Suttor Developmental Road, which remains low between Elphinstone and Red Hill Road.

With management and mitigation measures, however, the significance of impacts taking account of cumulative project traffic would become negligible between Elphinstone and Red Hill Road.

It is recognised that at this strategic level, specific mitigation works cannot be identified. During the detailed Project planning phase, consultation will be undertaken with Councils, TMR and Queensland Rail to identify works at specific locations.

As an indication however, road upgrades may be required on parts of the Suttor Developmental Road, Collinsville to Elphinstone Road, as well as on Council controlled roads. Improvements to the condition of roads more generally may also be required if identified by pre / post condition surveys.

Through preparation of a RUMP and the possible requirement to enter into infrastructure agreements, the road impacts associated with the Project may be avoided, minimised, or mitigated.

To conclude, there are no Project impacts that cannot be effectively managed through the implementation of appropriate management and mitigation measures.