

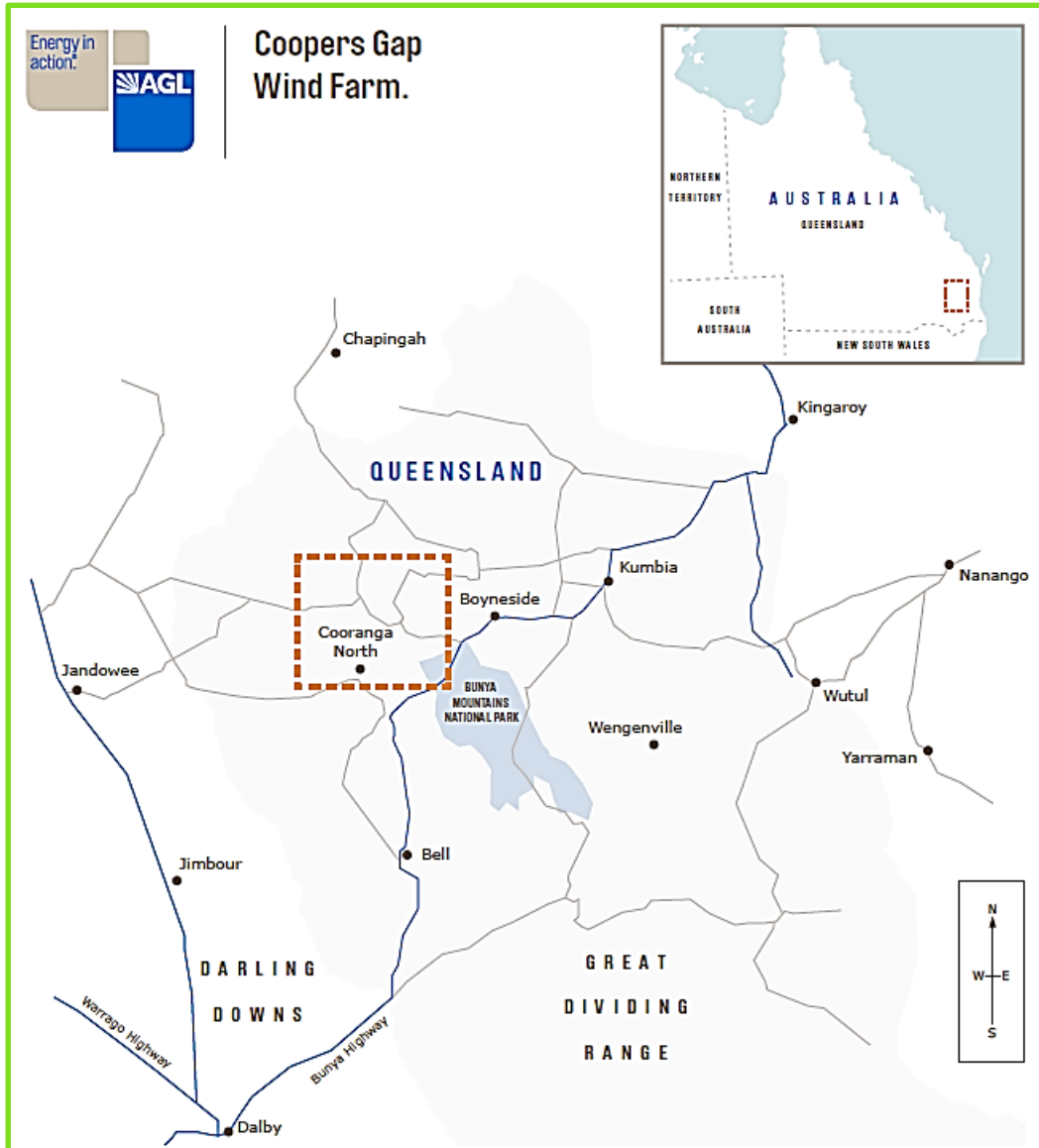
Coopers Gap Presentation on Traffic and Transport Assessments

Albert Kwong

Agenda

- Approach of Assessment
- Methodology
- Existing Environment
- Proposed Development (including Construction Phase)
- Affected Transport Network
- Traffic Generation and Distribution
- Impact Assessments
- Potential Mitigation Measures
- Questions and Discussion

Project Location



Assessment Methodology

- Identifying the existing transport infrastructure in the region (i.e. road, sea ports, rail infrastructure and airports).
- Assessing the potential construction and operational impacts of the Project on the surrounding transport infrastructure, including the movement of materials, plant, equipment in addition to the construction and operational workforce.
- Identifying potential mitigation and management strategies to be implemented during construction and operations (such as developing the framework for the Road Use Management Plan).

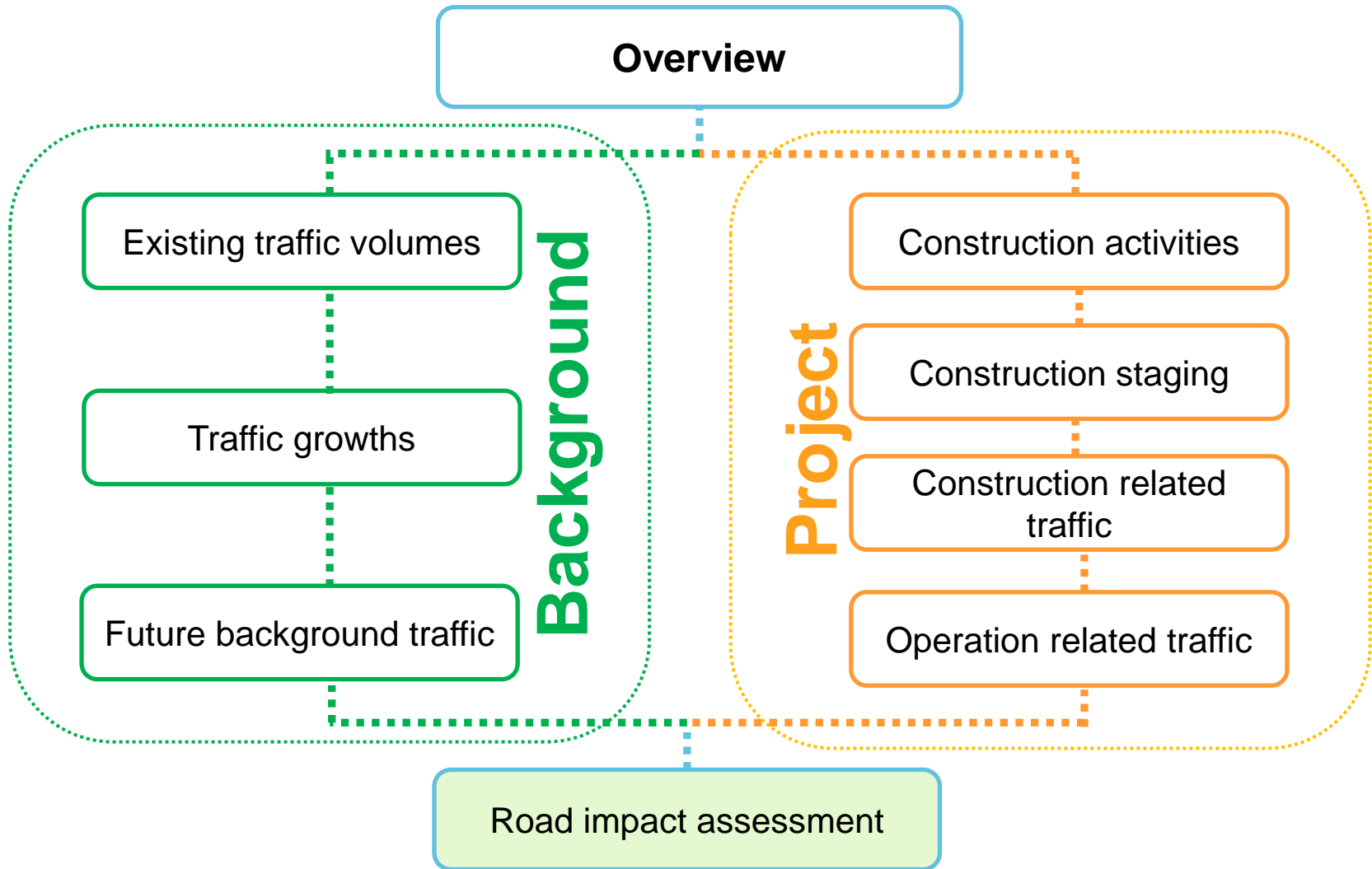
Approach

- Identifies potential impacts of the project upon the transport environment (Road Impact Assessment).
- Anticipate traffic generated throughout the construction and operational phases of the Project.
- Considers potential mitigation measures to appropriately reduce the level of impact and maintain the operational efficiency of the existing transport networks.
- The primary transport network of relevance to the Project is the road network but other transport modes have also been reviewed to identify their relevancy to the Project.

Methodology – Road Impact Assessment

- The Road Impact Assessment (RIA), comprising traffic and pavement impact assessments, was undertaken based on the *Guidelines for Assessment of Road Impacts of Development, 2006* (GARID) by the Department of Main Roads (now DTMR).
- GARID identifies the process to assess a development's impact on State-controlled Roads (SCR).
- GARID generally considers a development's road impact to be inconsequential if the development generates an increase in traffic of less than 5% over existing levels, measured either in terms of annual average daily traffic (AADT) or equivalent standard axles (ESA).

Methodology – Road Impact Assessment



Methodology – Performance Criteria (GARID)

Percentage Comparison

“Traffic operation impacts needs to be considered for any section of a SCR where the construction or operational traffic generated by the development equals or exceeds 5% of the existing AADT on the road section...” – DTMR, GARID 2006

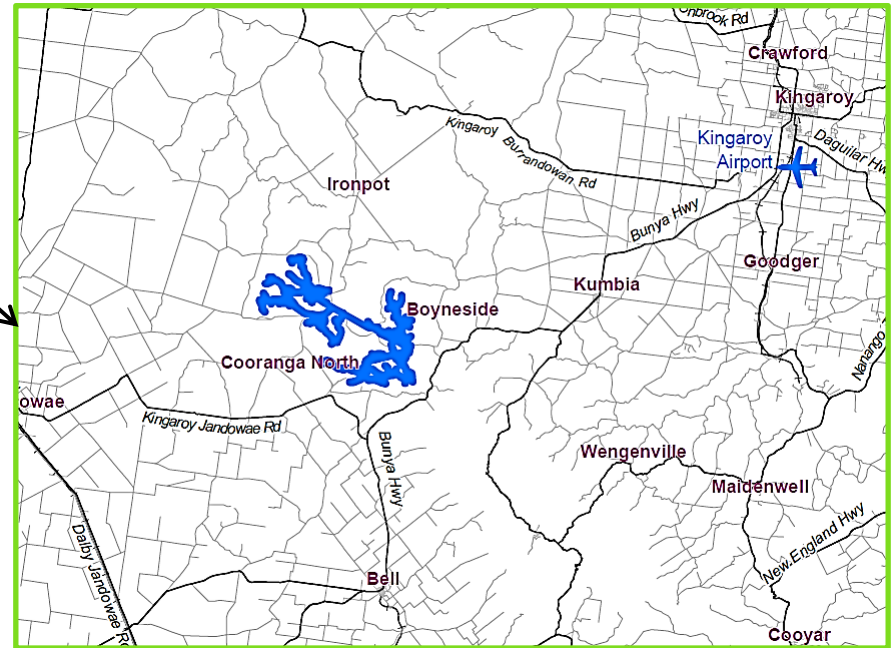
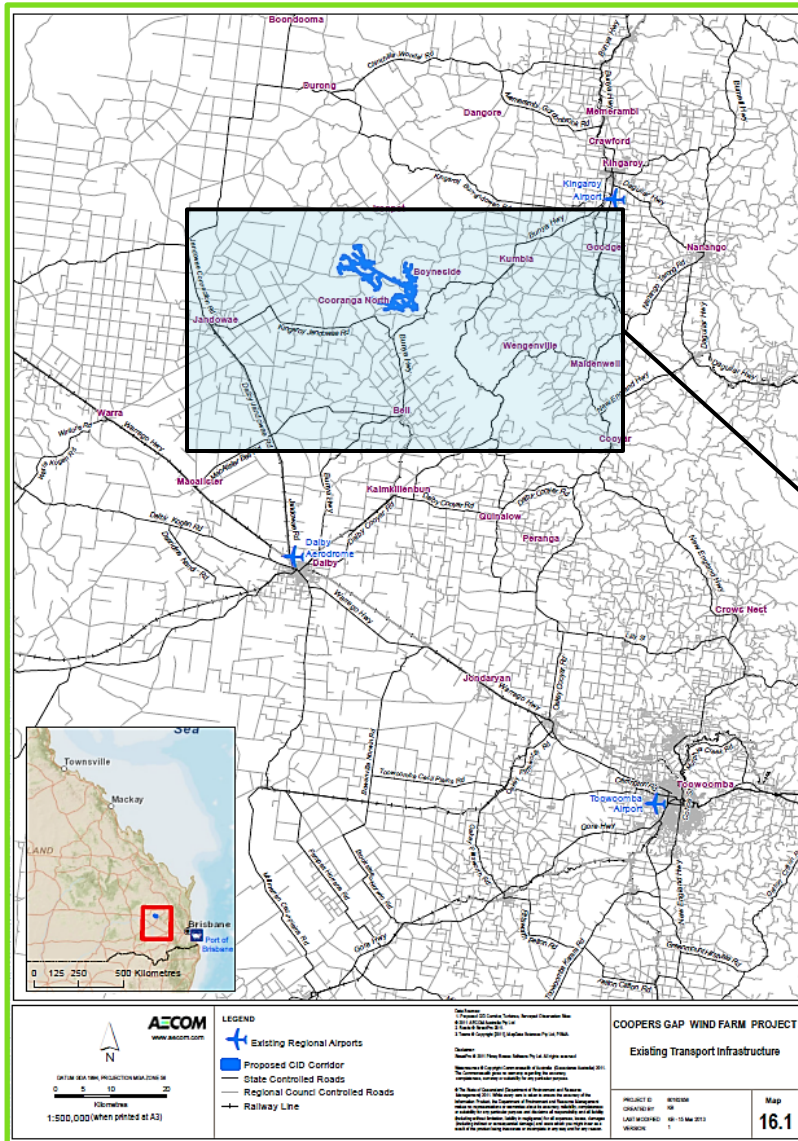
Assessment type	Performance criteria for road impact assessment
Traffic operation assessment	Construction and operational traffic generated by the development equals or exceeds 5% of the existing AADT on the road section.
Pavement impact assessment *	Construction and operational traffic generated by the development equals or exceeds 5% of the existing ESA's on the road section.

* To be carried out as part of the Road Use Management Plan to be completed at the detail design stage prior to construction.

Existing Environment

- Identified the existing transport infrastructure, in the vicinity of the Project, considered in this assessment.
- Describes the road network and identifies the port, airport and rail infrastructure in the surrounding region.
- Following figure indicates the existing transport infrastructure in the region.

Existing Transport Infrastructure



Road Network

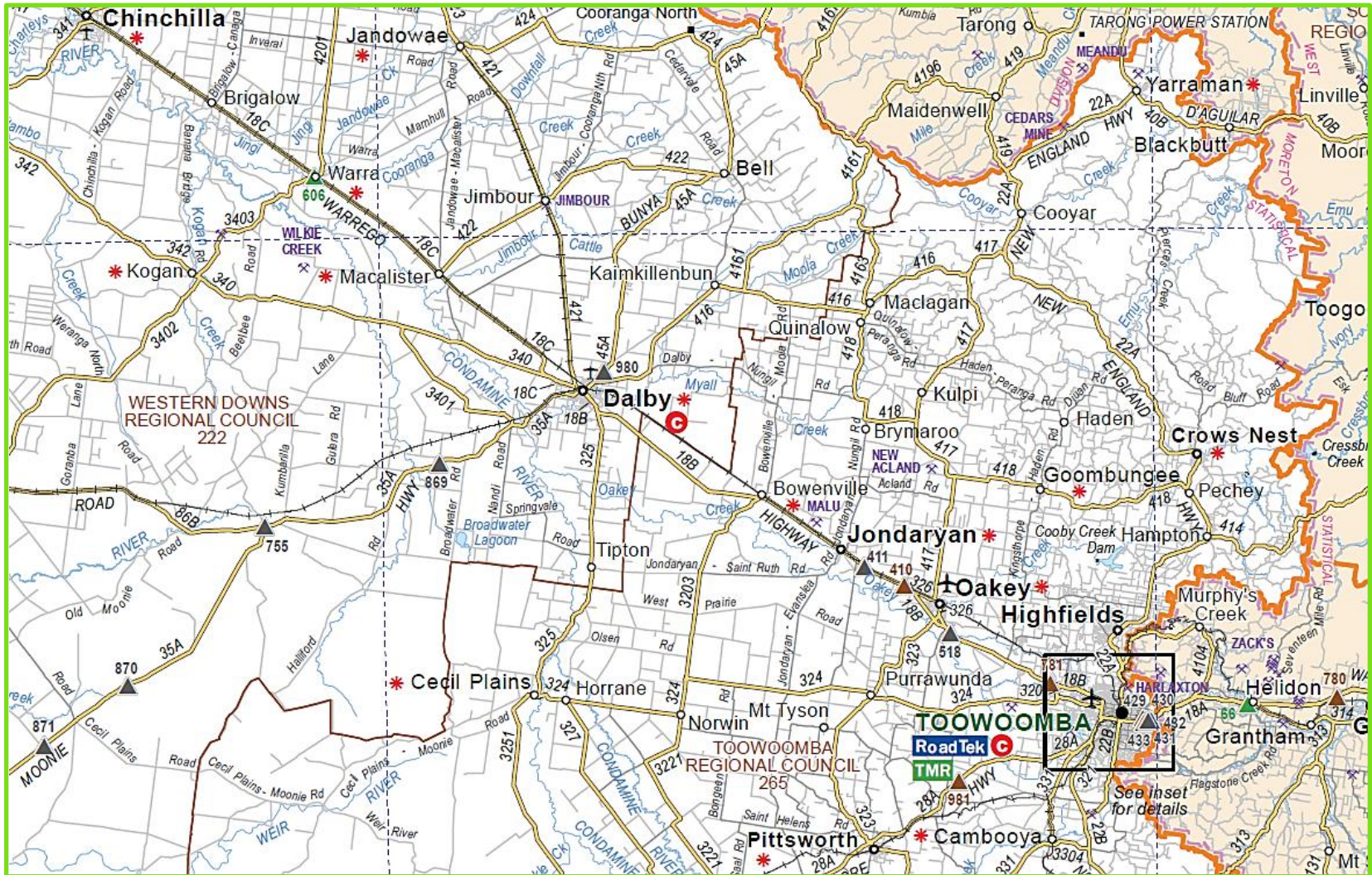
- The Darling Downs region of Queensland is serviced by a network of highways, State Controlled Roads (SCR) and Regional Council Roads (RCR) that function as the main transport routes in the vicinity of the Project.
- The highways and other SCRs provide links from the Project to Kingaroy and Gayndah to the north, Brisbane and Toowoomba to the east, Dalby to the south and Chinchilla and Miles to the west.

State Controlled Road Network

- Major SCRs intersected by the Project transport corridors:

Road ID	Description	Classification
U13A	Gateway Arterial Road (Gateway Motorway South)	National Highway
17A	Cunningham Highway (Ipswich Motorway)	National Highway
17B	Cunningham Highway (Ipswich – Warwick)	National Highway
18A	Warrego Highway (Ipswich – Toowoomba)	National Highway
18B	Warrego Highway (Toowoomba – Dalby)	National Highway
45A	Bunya Highway	Regional Road
424	Kingaroy-Jandowae Road	District Road

State Controlled Road Network – Darling Downs Region



Regional Council Road Network

Several RCRs in the vicinity of the study area including some non-gazetted roads. These roads fall under the jurisdiction of either the South Burnett Regional Council (SBRC) or the Western Downs Regional Council (WDRC).

For the Project related traffic only Niagara Road is expected to be utilised as part of the proposed transport corridors during both the construction and operation phases.

Niagara Road

Niagara Road runs from a junction with Kingaroy-Jandowae Road east through the project area. It is sealed up until the intersection with Jarail Road, but also runs in part as an unsealed access road through the site where it then joins the Bunya Highway south of Boyneside.

Existing Traffic Volumes

Segment ID	Road Section Name	Combined Bi-Directional Traffic Data				
		Provided AADT	Count Year	%HV	Annual Growth Rate	2013 AADT ("Existing")
18B-1	Warrego Highway	23,488	2010	13.6%	0.00% *	23,488
18B-2	Warrego Highway	23,618	2010	13.9%	0.54%	24,003
18B-3	Warrego Highway	17,272	2010	17.6%	0.00% *	17,272
18B-4	Warrego Highway	11,838	2010	5.9%	0.00% *	11,838
18B-5	Warrego Highway	15,674	2010	6.4%	0.00% *	15,674
18B-6	Warrego Highway	11,720	2010	7.6%	0.00% *	11,720
18B-7	Warrego Highway	11,795	2010	12.9%	1.41%	12,301
18B-8	Warrego Highway	9,147	2010	17.2%	0.00% *	9,147
18B-9	Warrego Highway	4,938	2010	18.8%	4.61%	5,653
18B-10	Warrego Highway	6,302	2010	19.1%	2.28%	6,743
45A-1	Bunya Highway	3,859	2010	12.0%	8.42%	4,918
45A-2	Bunya Highway	832	2010	20.7%	1.82%	878
45A-3	Bunya Highway	589	2010	27.0%	7.45%	731
45A-4	Bunya Highway	975	2010	18.1%	2.35%	1,045
45A-5	Bunya Highway	2,420	2010	13.6%	1.34%	2,519
45A-6	Bunya Highway	4,972	2010	8.4%	0.00% *	4,972
424-1	Kingaroy-Jandowae Road	94	2010	14.9%	0.00% *	94
RCR-1	Niagara Road	32	2006	14.9%	0.00% *	32

* Growth rates along these sections were negative, hence zero growth has been adopted for the purpose of the traffic assessments

Key Project Phases

- Construction Phase
- Operational Phase
- Decommissioning Phase

Construction Phase

- Preliminary planning stage, detailed construction methodology and program have not been completed.
- The Engineering, Procurement and Construction (EPC) contractor ultimately responsible for the detailed construction methodology.
- Typical construction methodology likely to be used for the Project and has been based on Macarthur Wind Farm in regional Victoria.
- Although the final staging of the Project will depend on various factors such as timely approvals and other considerations, it has been assumed that the construction phase will generally commence at the beginning of 2015 and continue through to the end of 2016.

Construction Activities

The following typical construction activities are expected to occur:

1. Site establishment - temporary site facilities, lay down areas, equipment and materials
2. Earthworks - access roads and wind turbine hardstands
3. Excavation - foundations
4. Construction of wind turbine foundations - bolt cage, reinforcement and concrete
5. Installation of electrical and communications cabling and equipment - overhead feeders from cable marshalling points to the wind farm substation
6. Installation of wind turbine transformers - in parallel with electrical reticulation works

Construction Activities (continue)

7. Installation of towers for the wind turbines - *delivery of wind turbine components to site*
8. Erection of wind turbines - *using high-level mobile cranes*
9. Construction of wind farm substation and Powerlink substation - *progressed in parallel with the construction of the wind farm*
10. Commissioning of wind turbines - *followed by reliability testing*
11. Rehabilitation and restoration - *following commissioning.*

Transport Mode

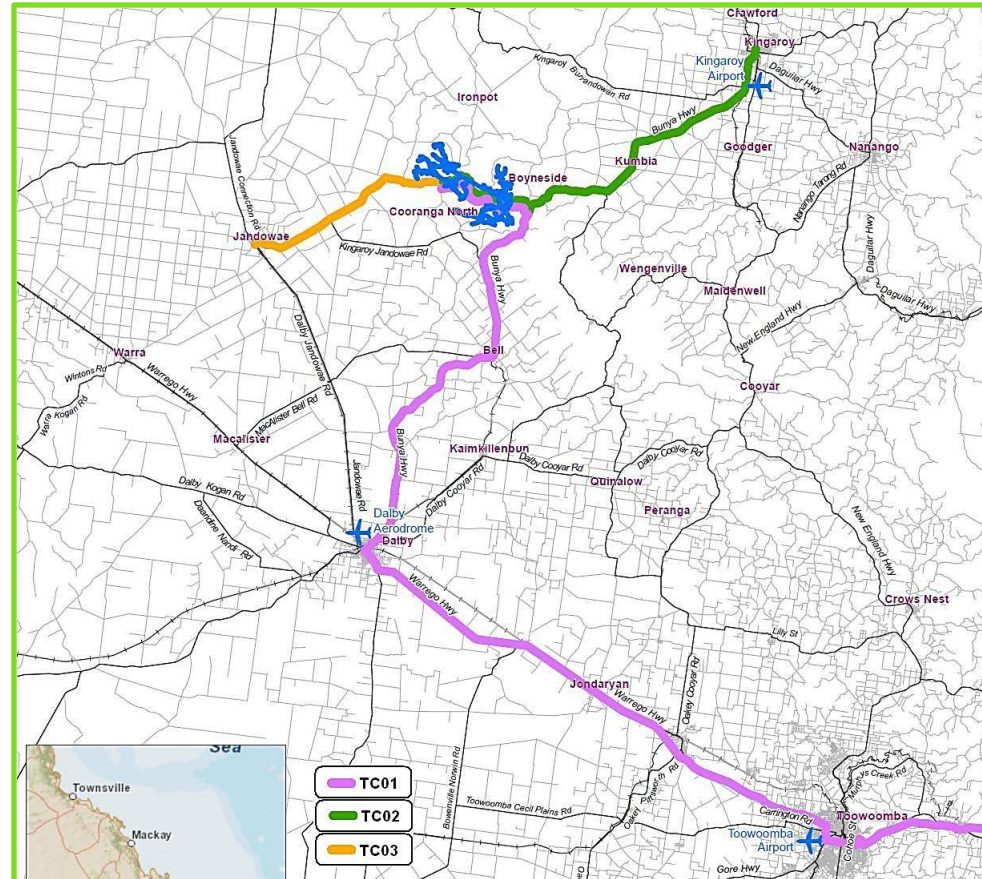
Activity	Mode of transport
Road Materials	Road
Concrete Aggregates for Footings	Road
Reinforcing Steel (2 Deliveries / Turbine)	Road
Other Concrete Supplies	Road
Construction Water	Road
Transformers	Road
33kV Cabling	Road
Turbine Blades (3 Blades per Turbine)	Sea and Road
Nacelles	Sea and Road
Cooling Towers	Sea and Road
Turbine Hubs	Sea and Road
Tower Sections (3 Sections per Wind Turbine)	Road and/or Sea and Road
Substation Equipment	Road
Cranes and Other Heavy Equipment	Road
Workforce	Road

Affected Transport Network

Transport Corridor	Description	Constituting Roads	Principal Purpose
TC01	Port of Brisbane to Coopers Gap Wind Farm	<ul style="list-style-type: none"> - Port of Brisbane Road, - Gateway Arterial Road, - Gateway Extension Motorway, - Logan Motorway, - Cunningham Highway (Ipswich Motorway), - Warrego Highway, - Bunya Highway, - Niagara Road 	<p>Transport of equipment</p> <p>Transport of materials</p> <p>Transport of workforce</p>
TC02	Kingaroy to Coopers Gap Wind Farm	<ul style="list-style-type: none"> - Bunya Highway, - Niagara Road 	<p>Transport of equipment</p> <p>Transport of materials</p> <p>Transport of workforce</p>
TC03	Jandowae to Coopers Gap Wind Farm	<ul style="list-style-type: none"> - Kingaroy-Jandowae Road, - Niagara Road 	<p>Transport of materials</p> <p>Transport of workforce</p>

Affected Transport Network

- The transport corridors extend over three separate DTMR regions: the Metropolitan Region, the Darling Downs Region and the Wide Bay-Burnett Region.
- Roads falling within the Metropolitan region are predominantly major highway systems (such as the Cunningham Highway, Gateway Extension Motorway and the Logan Motorway).
- Project related traffic is unlikely to have a significant impact on the pavement condition or traffic operation of the road as they are unlikely to exceed 5% of the background traffic volumes.
- Only roads along the transport corridors which fall within either the Darling Downs or Wide Bay-Burnett regions are analysed as part of the RIA.



Indicative Quantities (Construction Phase)

- Indicative Quantities to be transported during the construction phase.

Construction Activity	Total Indicative Quantity to be Transported	Units
Road Materials [^]	161,550	Cubic metres (m ³)
Concrete Aggregates for Footings	51,750	Cubic metres (m ³)
Reinforcing Steel (2 Deliveries / Turbine)	230	Deliveries
Other Concrete Supplies	10,350	Cubic metres (m ³)
Construction Water	12,735	Kilolitres (kL)
Transformers	3	Each
33kV Cabling	147	Rolls
Turbine Blades (3 Blades / Turbine)	345	Each
Nacelles	115	Each
Cooling Towers	115	Each
Turbine Hubs	115	Each
Tower Sections (3 Sections / Turbine)	345	Each
Substation Equipment	132	Each
Cranes and Other Heavy Equipment	65	Each
Peak Construction Workforce	365	Employees

[^] It has been assumed that 30% of road materials will be imported with the remaining sourced within project site area. This will be refined pending geo-technical investigations.

Traffic Distribution

Construction Activity	% Total Transported	Transported from	Transport Corridor
Road Materials	100%	Quarry Site	TC01, TC02 and TC03
Concrete Aggregates for Footings	100%	Quarry Site	TC01, TC02 and TC03
Reinforcing Steel	50%	Dalby	TC01
	50%	Kingaroy	TC02
Other Concrete Materials	50%	Dalby	TC01
	50%	Kingaroy	TC02
Transformers	100%	Brisbane	TC01
33kV Cabling	100%	Brisbane	TC01
Turbine Blades (3 Blades / Turbine)	100%	Port of Brisbane	TC01
Nacelles	100%	Port of Brisbane	TC01
Cooling Towers	100%	Port of Brisbane	TC01
Turbine Hubs	100%	Port of Brisbane	TC01
Tower Sections	100%	Port of Brisbane	TC01
Substation Equipment	100%	Brisbane	TC01
Cranes and Other Heavy Equipment	100%	Brisbane	TC01
Construction Workforce	10%	Toowoomba	TC01
	35%	Dalby	TC01
	35%	Kingaroy	TC02
	10%	Jandowae	TC03
	10%	Bell	TC01

Construction Vehicles

Construction Activity	Typical Construction Vehicles (AustRoads Vehicle Class)
Road Materials	6 Axle – Truck and Dog Trailer (AustRoads Class 9)
Concrete Aggregates for Footings	
Reinforcing Steel (2 Deliveries / Turbine)	
Other Concrete Supplies	
33kV Cabling	
Substation Equipment	
Transformers	Over Dimensioned / Higher Mass Limit Vehicle (Special Permit Vehicle)
Turbine Blades (3 Blades / Turbine)	
Nacelles	
Cooling Towers	
Turbine Hubs	
Tower Sections (3 Sections / Turbine)	Over Dimensioned / Higher Mass Limit Vehicles and 6 Axle – Truck and Dog Trailer (Special Permit Vehicles and AustRoads Class 9)
Cranes and Other Heavy Equipment	
Construction Water	4 Axle – Heavy Rigid Water Tanker (AustRoads Class 5)
Peak Construction Workforce	2 Axle – Short (Light) Vehicles (AustRoads Class 1)

AustRoads Class 5 – Heavy Rigid Water Tanker



Similar vehicles are likely to be used for transporting construction water.

AustRoads Class 9 – Truck and Dog Trailer



Similar vehicles are likely to be used for transporting earthworks, concrete supplies and non-oversized heavy equipment.

Over Dimensioned Vehicles



Similar vehicles are likely to be used for transporting the turbine components and oversized heavy equipment.

Over Dimensioned Vehicles



Similar vehicles are likely to be used for transporting the turbine components and oversized heavy equipment.

Oversized Equipment



Similar cranes are likely to be used to erect the turbines.

Development Traffic Volume (TC01)

Construction Activity	Total Daily Two-Way Vehicle Trips			
	Light Vehicle	Heavy Vehicle	Over Dimensioned Vehicle	Total Trips *
Road Materials	0	20	0	20
Concrete Aggregates for Footings	0	6	0	6
Reinforcing Steel (2 Deliveries / Turbine)	0	2	0	2
Other Concrete Supplies	0	2	0	2
Construction Water	0	0	0	0
33kV Cabling	0	2	0	2
Turbine Blades (3 Blades / Turbine)	0	0	2	2
Nacelles	0	0	2	2
Cooling Towers	0	0	2	2
Turbine Hubs	0	0	2	2
Tower Sections (3 Sections / Turbine)	0	0	2	2
Substation Equipment	0	4	0	4
Construction Workforce	404	0	0	404
Sum Total Trips	404	36	10	450

* All traffic volumes have been rounded up to the nearest two trips (i.e. rounded up to the nearest trip per direction)

Development Traffic Volume (TC02)

Construction Activity	Total Daily Two-Way Vehicle Trips			
	Light Vehicle	Heavy Vehicle	Over Dimensioned Vehicle	Total Trips *
Road Materials	0	20	0	20
Concrete Aggregates for Footings	0	6	0	6
Reinforcing Steel (2 Deliveries / Turbine)	0	2	0	2
Other Concrete Supplies	0	2	0	2
Construction Water	0	6	0	6
33kV Cabling	0	0	0	0
Turbine Blades (3 Blades / Turbine)	0	0	0	0
Nacelles	0	0	0	0
Cooling Towers	0	0	0	0
Turbine Hubs	0	0	0	0
Tower Sections (3 Sections / Turbine)	0	0	0	0
Substation Equipment	0	0	0	0
Construction Workforce	256	0	0	256
Sum Total Trips	256	36	0	292

* All traffic volumes have been rounded up to the nearest two trips (i.e. rounded up to the nearest trip per direction)

Development Traffic Volume (TC03)

Construction Activity	Total Daily Two-Way Vehicle Trips			
	Light Vehicle	Heavy Vehicle	Over Dimensioned Vehicle	Total Trips *
Road Materials	0	20	0	20
Concrete Aggregates for Footings	0	6	0	6
Reinforcing Steel (2 Deliveries / Turbine)	0	0	0	0
Other Concrete Supplies	0	0	0	0
Construction Water	0	0	0	0
33kV Cabling	0	0	0	0
Turbine Blades (3 Blades / Turbine)	0	0	0	0
Nacelles	0	0	0	0
Cooling Towers	0	0	0	0
Turbine Hubs	0	0	0	0
Tower Sections (3 Sections / Turbine)	0	0	0	0
Substation Equipment	0	0	0	0
Construction Workforce	74	0	0	74
Sum Total Trips	74	26	0	100

* All traffic volumes have been rounded up to the nearest two trips (i.e. rounded up to the nearest trip per direction)

Occasional Occurrence Development Traffic Volumes

- These trips relate to the movement of large construction equipment and heavy electrical equipment which are not expected to occur regularly over the duration of the project.

Construction Activity	Transport Corridor	Total Daily Two-Way Vehicle Trips			
		Light Vehicle	Heavy Vehicle	Over Dimensioned Vehicle	Total Trips *
Cranes and Other Heavy Equipment ^	TC01	0	10	10	20
Transformers ^	TC01	0	0	2	2
Sum Total Trips	-	0	10	12	22

* All traffic volumes have been rounded up to the nearest two trips.

^ Two-way trips relate to the number of equipment transported to site during the day of transportation.

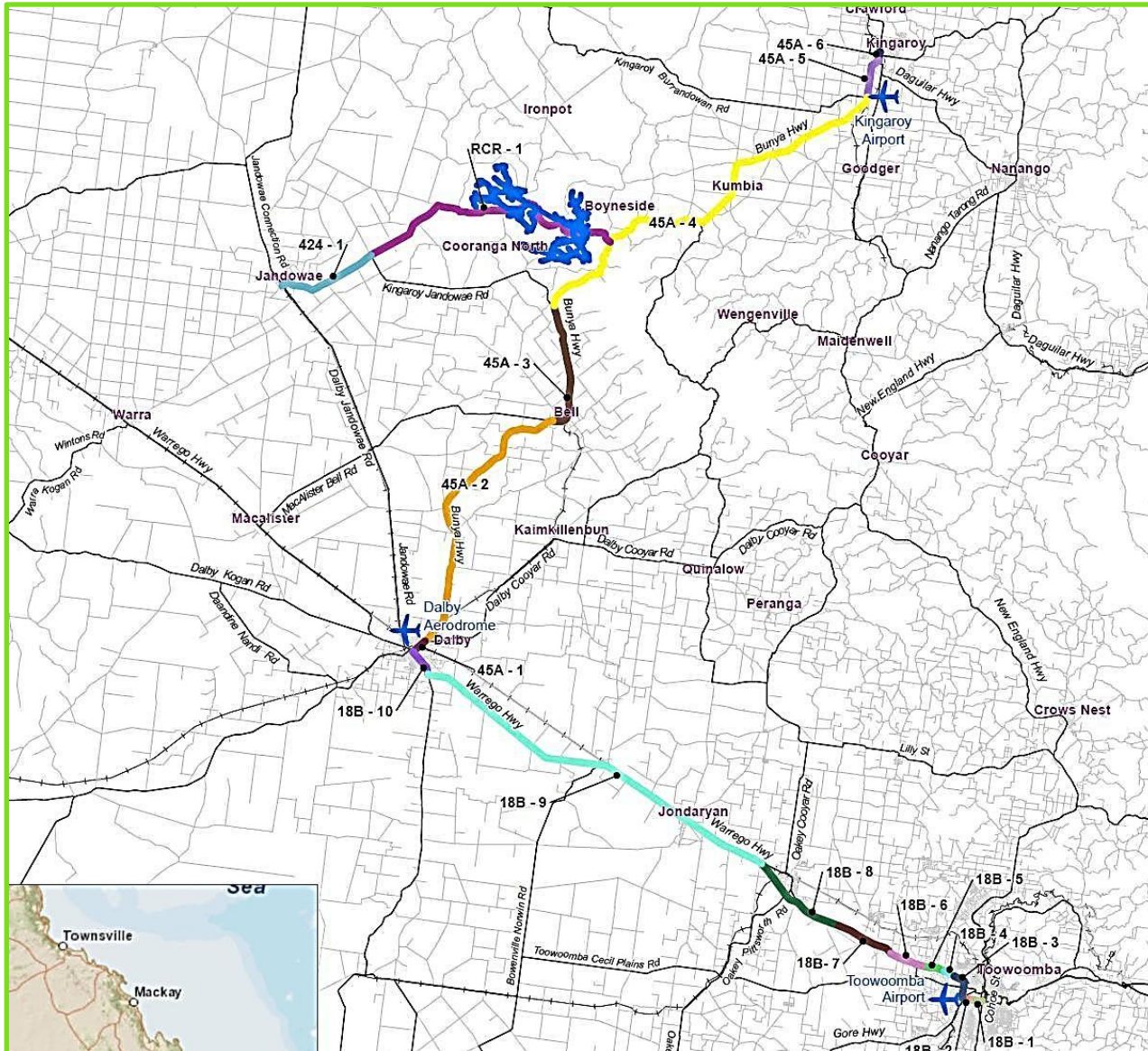
Impact Assessments – Traffic Operations

TMR Road ID	Road Section ID	Road Name	2013 Background Traffic (AADT)	Development Related Traffic (AADT)	% increase in AADT
18B	18B-1	Warrego Highway (Toowoomba to Dalby)	23,488	116	<1%
	18B-2	Warrego Highway (Toowoomba to Dalby)	24,003	116	<1%
	18B-3	Warrego Highway (Toowoomba to Dalby)	17,272	116	<1%
	18B-4	Warrego Highway (Toowoomba to Dalby)	11,838	116	<1%
	18B-5	Warrego Highway (Toowoomba to Dalby)	15,674	116	<1%
	18B-6	Warrego Highway (Toowoomba to Dalby)	11,720	116	<1%
	18B-7	Warrego Highway (Toowoomba to Dalby)	12,301	116	<1%
	18B-8	Warrego Highway (Toowoomba to Dalby)	9,147	116	1%
	18B-9	Warrego Highway (Toowoomba to Dalby)	5,653	116	2%
	18B-10	Warrego Highway (Toowoomba to Dalby)	6,743	116	2%
45A	45A-1	Bunya Highway (Dalby to Kingaroy)	4,918	376	8%
	45A-2	Bunya Highway (Dalby to Kingaroy)	878	376	43%
	45A-3	Bunya Highway (Dalby to Kingaroy)	731	450	62%
	45A-4	Bunya Highway (Dalby to Kingaroy)	1,045	742	71%
	45A-5	Bunya Highway (Dalby to Kingaroy)	2,519	292	12%
	45A-6	Bunya Highway (Dalby to Kingaroy)	4,972	292	6%
424	424-1	Kingaroy-Jandowae Road	94	100	106%
RCR	RCR-1	Niagara Road	32	842	2,631%

Impact Assessments – Pavement Impacts

TMR Road ID	Road Section ID	Road Name	2013 Background Traffic (ESA)	Development Related Traffic (ESA)	% increase in ESA
18B	18B-1	Warrego Highway (Toowoomba to Dalby)	30,526	371	1%
	18B-2	Warrego Highway (Toowoomba to Dalby)	31,343	371	1%
	18B-3	Warrego Highway (Toowoomba to Dalby)	23,975	371	2%
	18B-4	Warrego Highway (Toowoomba to Dalby)	13,369	371	3%
	18B-5	Warrego Highway (Toowoomba to Dalby)	17,891	371	2%
	18B-6	Warrego Highway (Toowoomba to Dalby)	13,677	371	3%
	18B-7	Warrego Highway (Toowoomba to Dalby)	15,803	371	2%
	18B-8	Warrego Highway (Toowoomba to Dalby)	12,616	371	3%
	18B-9	Warrego Highway (Toowoomba to Dalby)	7,987	371	5%
	18B-10	Warrego Highway (Toowoomba to Dalby)	9,579	371	4%
45A	45A-1	Bunya Highway (Dalby to Kingaroy)	6,211	649	10%
	45A-2	Bunya Highway (Dalby to Kingaroy)	1,278	649	51%
	45A-3	Bunya Highway (Dalby to Kingaroy)	1,165	723	62%
	45A-4	Bunya Highway (Dalby to Kingaroy)	1,460	1,128	77%
	45A-5	Bunya Highway (Dalby to Kingaroy)	3,272	405	12%
	45A-6	Bunya Highway (Dalby to Kingaroy)	5,890	405	7%
424	424-1	Kingaroy-Jandowae Road	125	215	172%
RCR	RCR-1	Niagara Road	42	1,343	3,161%

Affected Road Sections



Potential Mitigation Measures

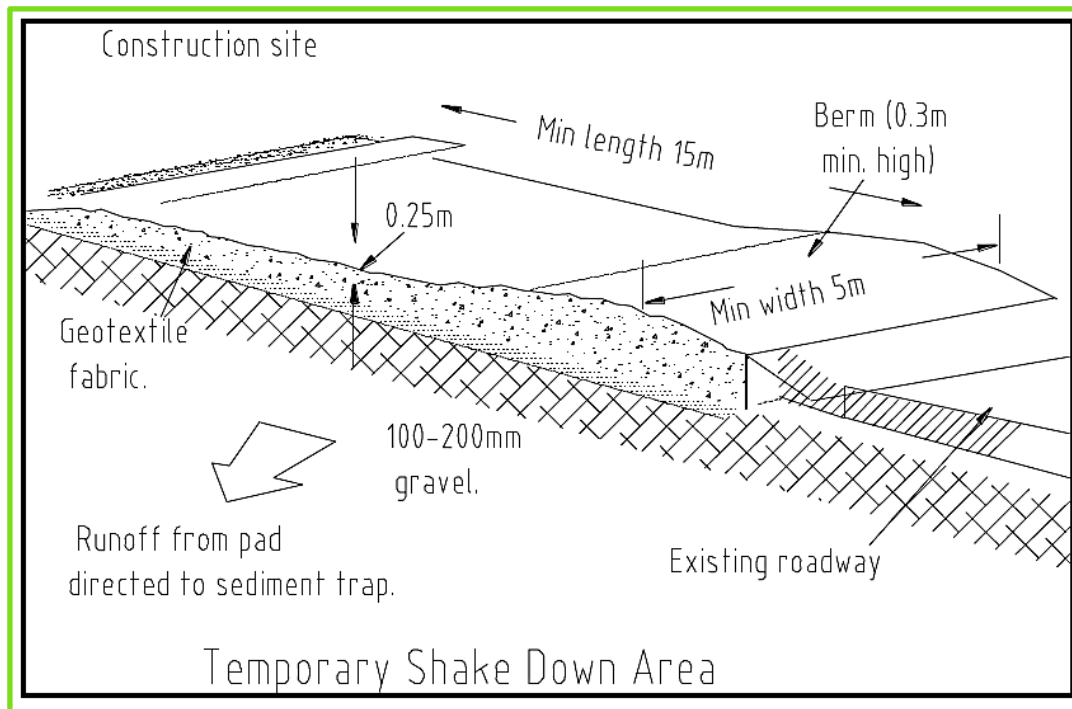
Bunya Highway

- Install adequate shake-down / wash-down areas on-site to prevent the spread of construction dust and debris along the Bunya Highway.
- Undertake discussions with TMR to identify and agree upon other appropriate mitigation measures (if required).

Potential Mitigation Measures

Typical Construction Entry / Exit Shake Down area

- To prevent the tracking of sediment from the tyres of vehicles to public roads (prevent the transport of sediment off-site).
- Any sediment transported onto roadways must be removed and corrective measures applied so as to ensure no recurrence.



Potential Mitigation Measures

Niagara Road

Key sections of Niagara Road where temporary or permanent mitigation work will be required in these areas.

Niagara Road – Problem Sections



Sections of Niagara Road have steep terrain on either side where lateral clearance may be an issue.

Niagara Road – Problem Sections



Sections of Niagara Road have steep, undulating gradients which make heavy vehicle passage difficult.

Niagara Road – Problem Sections



There are numerous cattle grids along Niagara Road.

Niagara Road – Problem Sections



Creek crossings along Niagara Road may not be suitable for over dimensioned vehicles.

Potential Mitigation Measures

Niagara Road

- Potential shuttle service to transport workforce from the surrounding towns.
- Temporary traffic arrangement at narrow road sections along Niagara Road.
- Temporary crossing arrangement along weak structures and/or creek crossings.
- Discussions with Regional Councils to identify other appropriate mitigation measures including potential upgrade of Niagara Road.
- Upgrade to Niagara Road will be considered and where necessary be implemented either on a temporary or permanent basis as appropriate.

Kingaroy-Jandowae Road



Potential Mitigation Measures

Kingaroy-Jandowae Road

- Potential shuttle service to transport workforce from the surrounding towns.
- Temporary crossing arrangement along weak structures and/or creek crossings.
- Undertake discussions with TMR to identify and agree upon other appropriate mitigation measures.

Bunya Highway – Niagara Road Intersection



Potential Mitigation Measures

Bunya Highway / Niagara Road Intersection

- Further investigation and detailed analysis required to determine the requirement for intersection upgrades.
- If required, consider the provision for a left-turn deceleration lanes so that through traffic along the Bunya Highway to minimise any potential impact to the through traffic due to additional turning vehicles.
- If required, consider the provision for a protected right-turn pocket along the Bunya Highway to minimise any potential impact to the through traffic due to additional turning vehicles.
- Undertake discussions with DTMR and Regional Councils to identify and agree upon other appropriate mitigation measures.

Kingaroy-Jandowae Road / Niagara Road Intersection



Potential Mitigation Measures

Kingaroy-Jandowae Road / Niagara Road Intersection

- Potential to re-line mark the intersection to prioritise Niagara Road due to increase in construction related vehicles.
- Undertake discussions with Regional Council to identify and agree upon other appropriate mitigation measures.

Other Potential Mitigation Measures

- Oversized loads to be delivered outside the peak periods such as at night.
- Management of project related traffic during school bus operations.
- Establishment of a communication plan for the local community. This potentially be facilitated through the CCC and relaying back to the communities.
- Potential pavement upgrade improvement for sections of unsealed roads include regrading and/or laying of additional roadbase materials.
- Further discussions with TMR, and Councils on potential temporary and/or permanent pavement upgrades as appropriate in these areas.
- On roads that are not designated for HML and OD vehicle movements, negotiations with TMR and Councils to obtain approval for the use of these roads.

Next Steps

- Finalise the Road Impact Assessments for input into the Revised Assessment Report
- Continue discussions with TMR and Councils in relation to this assessment.

Next Steps – post Planning Approval (CI Designation)

- Preliminary Road Use Management Plan
 - Develop RUMP framework to include mitigation strategies and management measures. RUMP prepared prior to the commencement of construction, including requirements for temporary traffic arrangements.
- Management strategies
 - Identify management strategies and plans required for construction and operation phases (e.g. driver fatigue, emergency response/disaster management).
- Consultation with DTMR, Regional Councils and other authorities
 - Following designation more detailed discussions can commence with the same stakeholders to further refine the relevant mitigation measures.
- Final RUMP
 - RUMP to be prepared and implemented by the project contractor. However AGL will have an overarching involvement and ownership as the project owner.